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ACCIDENT PREVENTION PLAN AND SITE SAFETY AND HEALTH PLAN FOR MUNITIONS
CONSTITUENTS AND EXPLOSIVES CONCERN FULL RCRA FACILITY INVESTIGATION AT
SOLID WASTE MANAGEMENT UNIT 77 (SWMU 77) SMALL ARMS RANGE NAVAL
ACTIVITY PUERTO RICO
06/01/2012
TETRA TECH

**Accident Prevention Plan
and
Site Safety and Health Plan
for
Munitions Constituents and
Explosives of Concern
Full RCRA Facility Investigation**

**Naval Activity Puerto Rico
At
Solid Waste Management Unit 77 – Small Arms
Range**

**Naval Activity Puerto Rico
Ceiba, Puerto Rico**



**BRAC Program Management Office Southeast
Contract Number N62470-08-D-1001
Contract Task Order JM04**

June 2012

**ACCIDENT PREVENTION PLAN
AND
SITE SAFETY AND HEALTH PLAN**

FOR

**MUNITIONS CONSTITUENTS AND EXPLOSIVES OF CONCERN
FULL RCRA FACILITY INVESTIGATION**

**NAVAL ACTIVITY PUERTO RICO
AT
SOLID WASTE MANAGEMENT UNIT 77 -- SMALL ARMS RANGE
CEIBA, PUERTO RICO**

**SUBMITTED TO:
NAVAL FACILITIES ENGINEERING COMMAND SOUTHEAST
NAS JACKSONVILLE
JACKSONVILLE, FLORIDA 32212-0030**

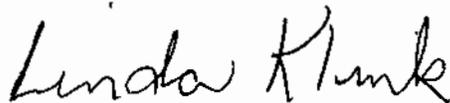
**SUBMITTED BY:
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234 MALL BOULEVARD, SUITE 260
KING OF PRUSSIA, PENNSYLVANIA 19406**

**CONTRACT NUMBER N62470-08-D-1001
CONTRACT TASK ORDER JM04**

JUNE 2012

PREPARED UNDER THE SUPERVISION OF:

APPROVED FOR SUBMISSION BY:



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PITTSBURGH, PENNSYLVANIA**



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CLEAN HEALTH AND SAFETY MANAGER
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APPENDIX

- A Site Safety and Health Plan

ATTACHMENTS

- I Site-Specific Training Documentation Form and Employee Training/Qualifications/Medical Clearance
- II Unexploded Ordnance and Chemical Warfare Agents Activities Standard Operating Procedure and Table 4-1 of the Department Of Defense Explosives Safety Board Technical Paper #18
- III Equipment Inspection Checklist
- IV Tetra Tech Standard Operating Procedure (SOP) Utility Locating and Excavation Clearance
- V OSHA Poster

ACRONYMS

§	Section
ACGIH	American Conference of Governmental Industrial Hygienists
AHA	Activity Hazard Analysis
ANSI	American National Standards Institute
APP	Accident Prevention Plan
BBP	Bloodborne Pathogen
BLS	Bureau of Labor Statistics
C	Centigrade
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
COC	Contaminant of Concern
CPR	Cardiopulmonary Resuscitation
CRZ	Contamination Reduction Zone
CSP	Certified Safety Professional
CTO	Contract Task Order
DART	Days Away/Restricted Duty/Transfer
dB	decibels
DEET	n,n-diethyl-meta-toluamide
DOD	Department of Defense
DOT	Department of Transportation
EM	Engineer Manual
EPA	Environmental Protection Agency
ESS	Explosives Safety Submission
F	Fahrenheit
GPS	Global Positioning System
FOL	Field Operations Leader
HAZWOPER	Hazardous Waste Operations and Emergency Response
HE	High Explosives
HSM	Health and Safety Manager
IDW	Investigative Derived Waste
ISO	Industry Standard Objects
lbs	pounds
mg/kg	milligrams per kilogram
mg/m ³	milligrams per cubic meter
mm	millimeter
MRP	Munitions Response Program
MPPEH	Material Potentially Presenting an Explosive Hazard

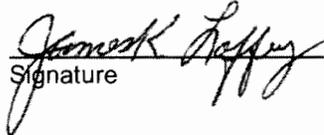
NAICS	North American Industry Classification System
NAPR	Naval Activity Puerto Rico
NAVFAC	Naval Facilities Engineering Command
NOSSA	Naval Ordnance Safety & Security Activity
NRR	Noise Reduction Rating
OEL	Occupational Exposure Limit
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor)
PE	Professional Engineer
PG	Professional Geologist
PHSO	Project Health and Safety Officer
PM	Project Manager
PMP	Project Management Professional
POC	Point of Contact
PPE	Personal Protective Equipment
RAC	Risk Assessment Code
RCIR	Recordable Case Incident Rate
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RPM	Remedial Project Manager
SOP	Standard Operating Procedure
SSO	Site Safety Officer
SSHP	Site Safety and Health Plan
SUXOS	Senior Unexploded Ordnance Supervisor
TSS	Technical Support Services
TP	Technical Paper
TWA	Time-Weighted Average
USCG	United States Coast Guard
UXO	Unexploded Ordnance
UXOSO	Unexploded Ordnance Safety Officer
UXOQC	Unexploded Ordnance Quality Control

ACCIDENT PREVENTION PLAN

1.0 TITLE, SIGNATURE, AND PHONE NUMBER OF THE PLAN PREPARER

Prepared by:

James K. Laffey
Tetra Tech
Project Health and Safety Officer


Signature

(412) 921-8678
Phone

Approved by:

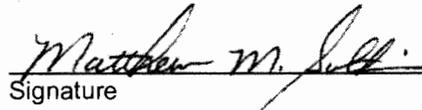
John Trepanowski, P.E.
Tetra Tech
Vice-President


Signature

(610) 491-9688
Phone

Concurred by:

Matthew M. Soltis, CIH, CSP
Tetra Tech
CLEAN Health and Safety Manager


Signature

(412) 921-8912
Phone

2.0 BACKGROUND INFORMATION

Contractor: Tetra Tech
Contract Number: N62470-08-D-1001
Project Name: Solid Waste Management Unit (SWMU) 77 – Small Arms Range, Naval Activity
Puerto Rico (NAPR), Cieba, Puerto Rico

2.1 PROJECT DESCRIPTION

This Accident Prevention Plan (APP) and Site Safety and Health Plan (SSHP), presented in Appendix A, have been prepared to support a Full RCRA Facility Investigation (RFI) at Solid Waste Management Unit (SWMU) 77 - Small Arms Range at Naval Activity Puerto Rico (NAPR), located in Cieba, Puerto Rico. It presents support to the technical approach described in the corresponding Sampling and Analysis Plan (SAP) and Explosives Safety Submission (ESS).

SWMU 77 is located on the Punta Medio Mundo on the northeastern boundary of NAPR. SWMU 77 contains six munitions subareas:

- Rifle Range
- Potential Open Burn/Open Detonation (OB/OD)
- Potential Munitions Trench
- Detonation Area near Concrete Pad
- Pistol Range
- Former Pistol Range

This APP addresses only the activities to be performed by Tetra Tech and its subcontractor personnel. The site-specific health and safety provisions in this document have been developed for use during the implementation of the RFI.

This document addresses applicable items specified under the U.S. Army Corps of Engineers Safety and Health Requirements Manual, Engineering Manual (EM) 385-1-1, and United States Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) standard Title 29 of Code of Federal Regulations (CFR), § 1910.120(b).

This APP is applicable to: (1) on-site personnel who may be exposed to hazardous on-site conditions, including Tetra Tech and subcontractor personnel participating in field activities, and (2) site visitors,

including regulatory agency representatives. Site-specific sections of EM 385-1-1 applicable to this field effort are as follows. If the box is checked "Yes," the topic listed is applicable, and if the box is checked "NA," it is not applicable to this project.

Yes NA

- | | | |
|-------------------------------------|-------------------------------------|---|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 1 - Program Management |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | 2 - Sanitation |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 3 - Medical and First Aid Requirements |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | 4 - Temporary Facilities |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 5 - Personal Protective and Safety Equipment |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 6 - Hazardous Substances, Agents, and Environments |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | 7 - Lighting |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 8 - Accident Prevention Signs, Tags, Labels, Signals, Piping System Identification, and Traffic Control |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 9 - Fire Prevention and Protection |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | 10 - Welding and Cutting |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | 11 - Electrical |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | 12 - Control of Hazardous Energy |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 13 - Hand and Power Tools |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 14 - Material Handling, Storage, and Disposal |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | 15 - Rigging |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 16 - Machinery and Mechanized Equipment |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | 17 - Conveyors |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | 18 - Motor Vehicles and Aircraft |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | 19 - Floating Plant and Marine Activities |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | 20 - Pressurized Equipment and Systems |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | 21 - Safe Access and Fall Protection |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | 22 - Work Platforms |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | 23 - Demolition |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | 24 - Floor and Wall Holes and Openings |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 25 - Excavations |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | 26 - Underground Construction, Shafts, and Caissons |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | 27 - Concrete and Masonry Construction and Steel Erection |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 28 - HAZWOPER |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | 29 - Blasting |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | 30 - Contract Diving Operations |

This APP and SSHP have been developed using the latest available information regarding known or suspected chemical contaminants and potential physical hazards associated with the proposed work at the site. These documents will be modified if new information becomes available. Changes will be made with the approval of the Tetra Tech Project Health and Safety Officer (PHSO), and the Tetra Tech Corporate Manager of Health and Safety who serves as the Health and Safety Manager (HSM). Requests for modifications to the SSHP will be directed to the Site Safety Officer (SSO), who will determine whether the changes are necessary. The SSO will notify the Project Manager (PM), who will notify affected personnel of changes.

The information contained in this plan, as well as policies on conducting on-site operations, have been obtained from the Tetra Tech Health and Safety Program, and supporting Standard Operating Procedures (SOP).

2.2 SITE MAPS

A facility location map is shown on Figure 2-1. A site location map showing the specific sites where Tetra Tech employees will be performing work is shown on Figure 2-2.

2.3 WORK PHASES

Field work on this project will occur in the following phases:

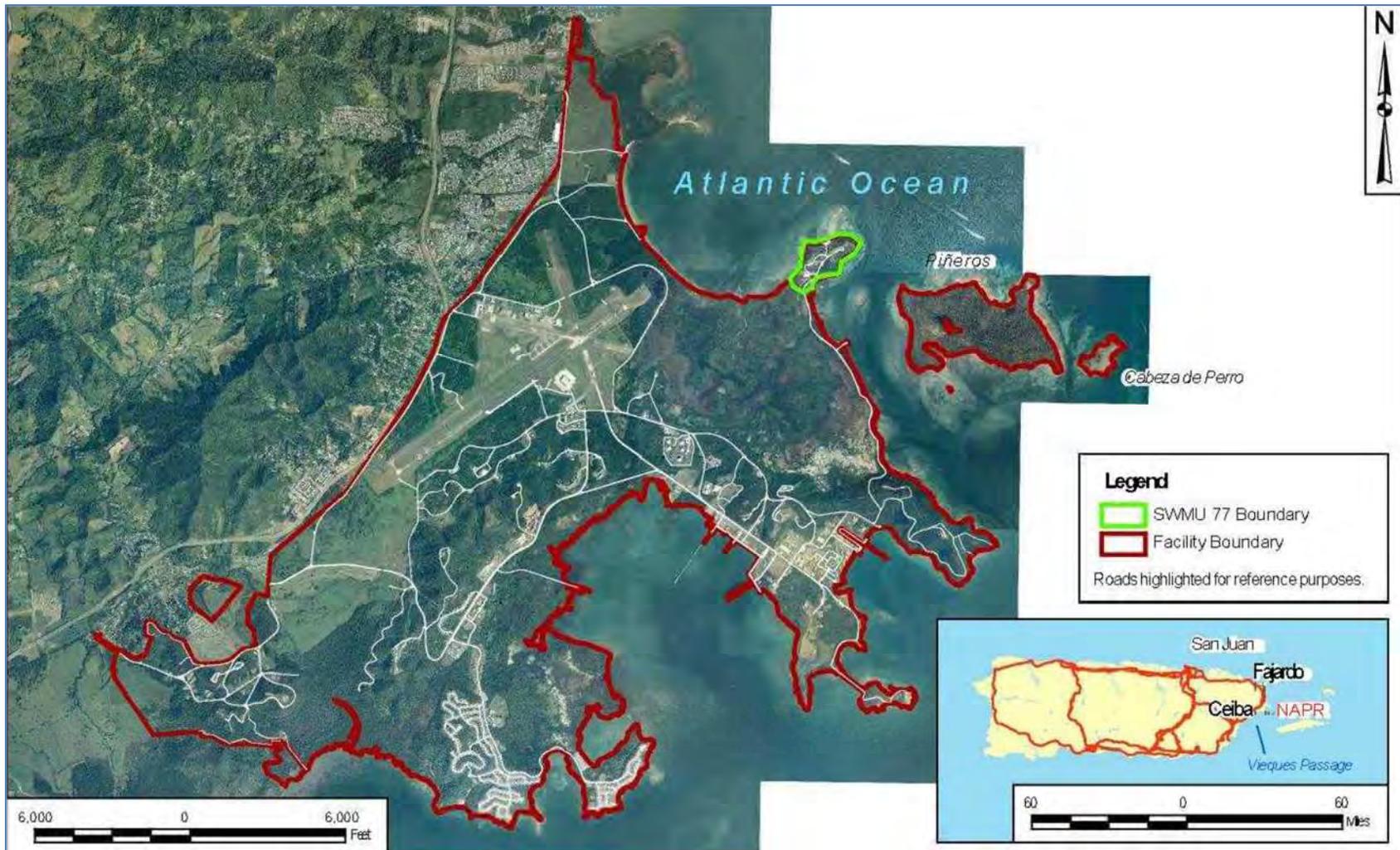
- Phase 1 – Mobilization
- Phase 2 – RCRA Facility Investigation
- Phase 3 – Demobilization

Associated dates when Tetra Tech personnel will be on site performing work will be listed for each phase of the project following the approval of the Work Plans.

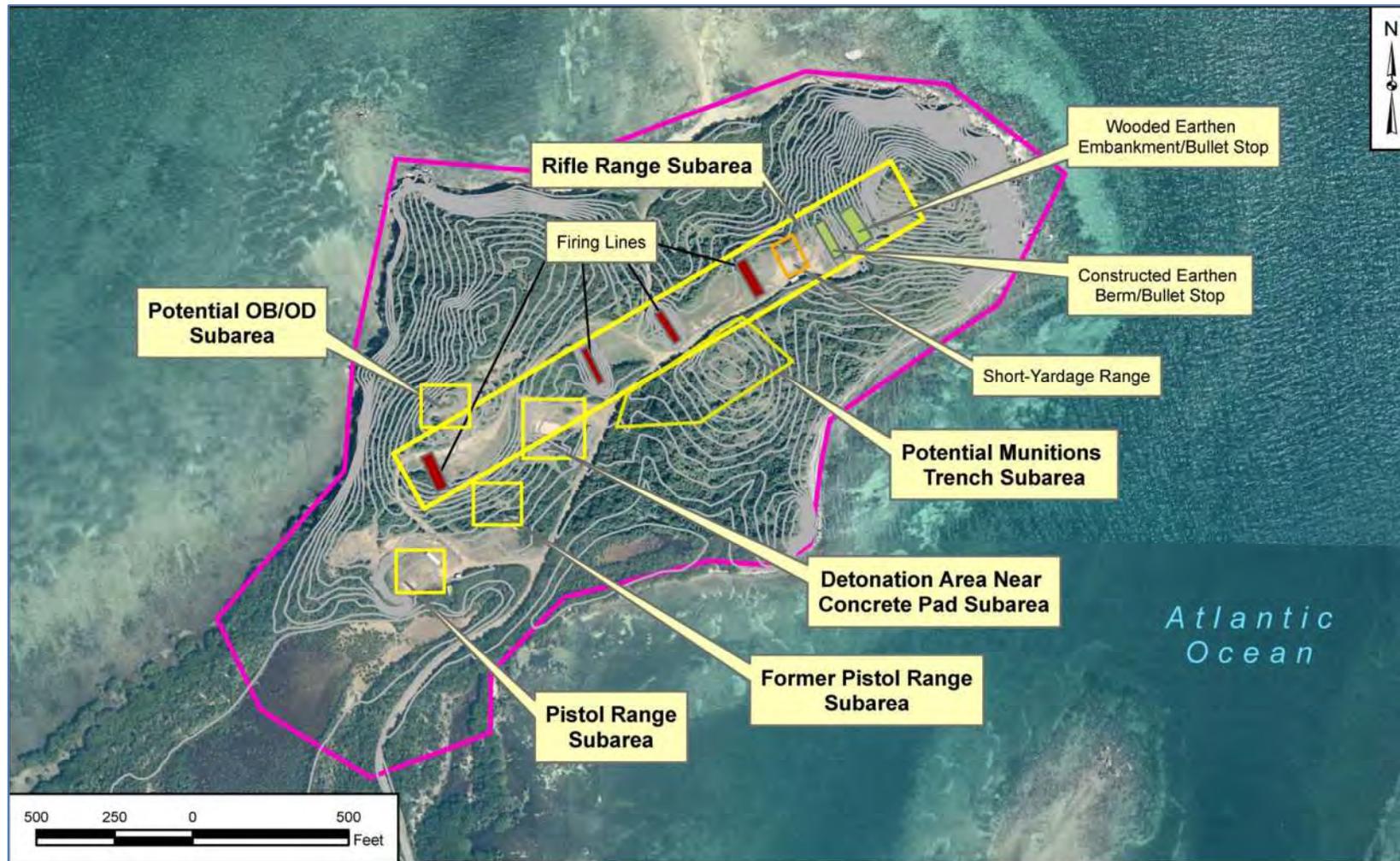
2.4 SPECIFIC SITE ACTIVITIES

The detailed Scope of Work for field activities to be performed for the Munitions Response Program (MRP) RFI at NAPR is presented in the Project-Specific Sampling and Analysis Plan (SAP). For each defined task, detailed Activity Hazard Analyses (AHAs) have been prepared and are provided in Section 2.0 of the SSHP (see Appendix A). If additional tasks are determined to be necessary, the SAP and this APP and SSHP will be amended and a hazard evaluation of the additional tasks performed.

**FIGURE 2-1
FACILITY LOCATION**



**FIGURE 2-2
SITE LOCATION MAP
SWMU 77**



3.0 STATEMENT OF SAFETY AND HEALTH POLICY

Tetra Tech is committed to providing our employees with a safe and healthful workplace. It is the goal of Tetra Tech to continue excellent safety performance on Naval Facilities Engineering Command (NAVFAC) contracts to support the Navy in their safety efforts. Specifically, Tetra Tech will perform work in a manner that is consistent with the Zero Incident Philosophy. It is our goal to plan and perform the work in a manner that integrates safety and health considerations so that worker injuries or illnesses, environmental releases/impacts, or property damage are eliminated. In addition to the line and staff management functions described in this APP and SSHP, each individual performing work under this contract has the responsibility for his/her own personal health and safety, as well as for assisting in assuring the health and safety of co-workers. This element is also the first one listed in our corporate Health and Safety Policy Statement, which requires that employees "recognize a *personal* responsibility for their own health and safety and for actions that affect the health and safety of fellow employees." This employee responsibility includes observing specified health and safety requirements and communicating with the designated SSO on matters such as the effectiveness of specified control measures, identification of new potential hazards, and other related issues.

An employee's failure to adhere to the requirements of this APP and SSHP, or to observe specified safety requirements and restrictions, or to properly use identified protective equipment may lead to injury or illness. As a result, deviation from safety and health procedures is not tolerated. Failure to comply with health and safety procedures and requirements will lead to reprimand up to and including dismissal.

Health and safety-related information is communicated to employees through meetings, postings, written communications, and reporting of hazards.

The principal elements of our program are founded on the requirements presented in the Health and Safety Policy shown on Figure 3-1.

FIGURE 3-1
HEALTH AND SAFETY POLICY



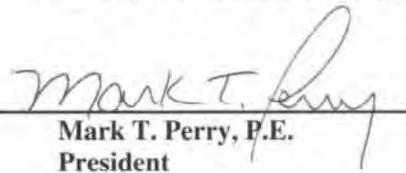
TETRA TECH NUS, INC. HEALTH AND SAFETY POLICY



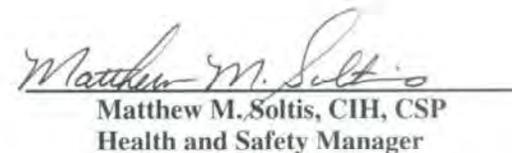
Tetra Tech NUS, Inc., is committed to providing our employees with a safe and healthful workplace. We believe that occupational injuries and illness can be prevented; and we are convinced that a strong Health and Safety Program is essential to achieve this objective.

The principal elements of our program are founded on the requirements that our managers and employees:

- Recognize a *personal responsibility* for their own health and safety and for actions that affect the health and safety of fellow employees.
- Integrate safety and health into *all aspects* of their work, with the well-being of employees as the primary concern in all activities.
- Comply with applicable *federal, state, and local regulations*, as well as with our internal Corporate and our clients' safety and health policies and procedures.
- Take an *active role* in the Health and Safety Program by providing input and constructive criticism for improvements to the program.



Mark T. Perry, P.E.
President



Matthew M. Soltis, CIH, CSP
Health and Safety Manager



Tetra Tech NUS, Inc.
January 2010



3.1 TETRA TECH SAFETY STATISTICS

Table 3-1 presents safety statistics for Tetra Tech for the last 3 calendar years compared to the national averages for our industry. This comparison uses data collected by the United States Department of Labor, Bureau of Labor Statistics (BLS) for different types of employers, segregated by North American Industry Classification System (NAICS) codes.

**TABLE 3-1
COMPARISON OF TETRA TECH AND 2010 BLS DATA FOR
NAICS CODE 541 (RCIR AND DART CASE RATES)**

	NAICS 541 Professional, Scientific and Technical Services 2010	Tetra Tech 2009	Tetra Tech 2010	Tetra Tech 2011
Total Recordable Case Incident Rate (RCIR)	1.0	0.2	0.6	0
Days Away/Restricted Duty/Transfer Case Rate (DART)	0.3	0.2	0.2	0

The data comparison illustrates that Tetra Tech’s performance compares favorably with the most-recent national averages for the environmental engineering and hazardous waste services industries. Raw data for these statistics can be found in the OSHA Form 300 and 300A attached

Tetra Tech Man Hours Worked

2009	890,072
2010	900,132
2011	872,801

**Tetra Tech Experience Modification Rates
(Policy Year October 1 - September 30):**

2009-2010:	0.74
2010-2011:	0.76
2011-2012:	0.78

**FIGURE 3-2
OSHA 300 AND 300A LOGS**

**OSHA's Form 300A (Rev. 01/2004)
Summary of Work-Related Injuries and Illnesses**

Year 2009
U.S. Department of Labor
Occupational Safety and Health Administration
Form approved OMB no. 1218-0176

All establishments covered by Part 1904 must complete this Summary page, even if no injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the log. If you had no cases write "0."

Employees former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR 1904.35, in OSHA's Recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
0	0	1	0
(G)	(H)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
0	38
(K)	(L)

Injury and Illness Types

Total number of... (M)			
(1) Injury	1	(4) Poisoning	0
(2) Skin Disorder	0	(5) Hearing Loss	0
(3) Respiratory Condition	0	(6) All Other Illnesses	0

Post this Summary page from February 1 to April 30 of the year following the year covered by the form

Public reporting burden for this collection of information is estimated to average 58 minutes per response, including time to review the instruction, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave, NW, Washington, DC 20210. Do not send the completed forms to this office.

Establishment information

Your establishment name Tetra Tech NUS, Inc.

Street 661 Andersen Drive, Foster Plaza 7

City Pittsburgh State PA Zip 15220

Industry description (e.g., Manufacture of motor truck trailers)
Environmental Consulting

Standard Industrial Classification (SIC), if known (e.g., SIC 3715)

OR North American Industrial Classification (NAICS), if known (e.g., 336212)
5 4 1 6 2 0

Employment information

Annual average number of employees 437

Total hours worked by all employees last year 890,072

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

Ronald J. Chew President
Company Executive Title

(626) 470-2819 Phone
13-Jan-10 Date

OSHA's Form 300 (Rev. 01/2004) Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.



You must record information about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR 1904.B through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an injury and illness incident report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Form approved OMB no. 1218-0176

Establishment name Tetra Tech NUS, Inc.
City Pittsburgh State PA

Identify the person				Describe the case		Classify the case											
(A) Case No.	(B) Employee's Name	(C) Job Title (e.g., Welder)	(D) Date of injury or onset of illness (mo./day)	(E) Where the event occurred (e.g. Loading dock north end)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (e.g. Second degree burns on right forearm from acetylene torch)	CHECK ONLY ONE box for each case based on the most serious outcome for that case:				Enter the number of days the injured or ill worker was:		Check the "injury" column or choose one type of illness:					
						Death	Days away from work	Remained at work		Away From Work (days)	On job transfer or restriction (days)	(M)					
								Job transfer or restriction	Other recordable cases			Injury	Skin Disorder	Respiratory Condition	Poisoning	Hearing Loss	All other illnesses
						(G)	(H)	(I)	(J)	(K)	(L)	(1)	(2)	(3)	(4)	(5)	(6)
NUS-2009-10	XXXXXXXXXXXXXX	Environmental Engineer	9/4/2009	MarkWest Energy - E&S Permits	Sprained right ankle while walking a gas pipeline			X			38	X					
Page totals						0	0	1	0	0	38	1	0	0	0	0	0

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instruction, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave, NW, Washington, DC 20210. Do not send the completed forms to this office.

Injury (1)
Skin Disorder (2)
Respiratory Condition (3)
Poisoning (4)
Hearing Loss (5)
All other illnesses (6)

OSHA's Form 300A (Rev. 01/2004) Summary of Work-Related Injuries and Illnesses

Year 2010

U.S. Department of Labor
 Occupational Safety and Health Administration
Form approved OMB no. 1218-0176

All establishments covered by Part 1904 must complete this Summary page, even if no injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete.

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the log. If you had no cases write "0."

Employees former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR 1904.35, in OSHA's Recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
0	0	1	2
<small>(G)</small>	<small>(H)</small>	<small>(I)</small>	<small>(J)</small>

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
0	2
<small>(K)</small>	<small>(L)</small>

Injury and Illness Types

Total number of... <small>(M)</small>			
(1) Injury	3	(4) Poisoning	0
(2) Skin Disorder	0	(5) Hearing Loss	0
(3) Respiratory Condition	0	(6) All Other Illnesses	0

Post this Summary page from February 1 to April 30 of the year following the year covered by the form

Public reporting burden for this collection of information is estimated to average 59 minutes per response, including time to review the instruction, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave. NW, Washington, DC 20210. Do not send the completed forms to this office.

Establishment information

Your establishment name Tetra Tech NUS, Inc.

Street Foster Plaza 7, 661 Andersen Drive

City Pittsburgh State Pennsylvania Zip 15220

Industry description (e.g., Manufacture of motor truck trailers)
Environmental Consulting

Standard Industrial Classification (SIC), if known (e.g., SIC 3715)

OR North American Industrial Classification (NAICS), if known (e.g., 336212)
5 4 1 6 2 0

Employment information

Annual average number of employees 465

Total hours worked by all employees last year 900,132

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

Mark T. Ferry President

Company executive

(412) 921-7217

Phone

28-Jan-11

Date

OSHA's Form 300 (Rev. 01/2004) Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year 2010
U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0178

You must record information about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an injury and illness incident report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Establishment name Tetra Tech NUS, Inc.
City Pittsburgh State PA

Identify the person				Describe the case		Classify the case				Enter the number of days the injured or ill worker was:									
(A) Case No.	(B) Employee's Name	(C) Job Title (e.g., Welder)	(D) Date of injury or onset of illness (mo./day)	(E) Where the event occurred (e.g. Loading dock north end)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (e.g. Second degree burns on right forearm from acetylene torch)	CHECK ONLY ONE box for each case based on the most serious outcome for that case:				Away From Work (days)		On job transfer or restriction (days)		Check the "injury" column or choose one type of illness:					
						Death	Days away from work	Remained at work		Job transfer or restriction	Other recordable cases	Away From Work (days)	On job transfer or restriction (days)	(M)					
						(G)	(H)	Job transfer or restriction	Other recordable cases					(K)	(L)	Injury	Skin Disorder	Respiratory Condition	Poisoning
						(I)	(J)	(I)	(J)	(K)	(L)	(1)	(2)	(3)	(4)	(5)	(6)		
NUS-2010-10	***** (Wilmington, MA)	Environmental Scientist	3/22/2010	NAVY CLEAN LANT CTO WE45	Back injury from lifting empty cooler and bottleware boxes			X				2		X					
NUS-2010-19	***** (Newark, DE)	Environmental Technician	12/3/2010	DNREC - Syntech Columbia	Cut hand with blade removing equipment from well				X					X					
NUS-2010-20	***** (Germantown, MD)	Graphic	12/7/2010	112 Germantown, MD - 2	Sprain Ankle				X					X					
Page totals						0	0	1	2	0	2	3	0	0	0	0	0	0	

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instruction, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave, NW, Washington, DC 20210. Do not send the completed forms to this office.

Injury	Skin Disorder	Respiratory Condition	Poisoning	Hearing Loss	All other illnesses
(1)	(2)	(3)	(4)	(5)	(6)

4.0 RESPONSIBILITIES AND LINES OF AUTHORITY

Tetra Tech, as the employer for staff that will be engaged in performing the work presented in this APP, fully recognizes and accepts ultimate responsibility for protecting the safety and health of our employees, and for the implementation of an effective Safety and Occupational Health program. The Tetra Tech SSO for this project has been appointed by the PM and is responsible for field implementation of tasks and procedures contained in the SSHP (see Appendix A).

The SSO has completed 40-Hour HAZWOPER and subsequent 8-Hour HAZWOPER Refresher Training, 8-Hour HAZWOPER Supervisor Training, the OSHA 30 Construction Safety Training course and First Aid/CPR and Bloodborne Pathogen (BBP) training in accordance with regulatory requirements applicable to the work that will be performed for this project. The Tetra Tech SSO has primary responsibility for responding to and correcting emergency situations and for taking appropriate measures to ensure the safety of site personnel and the public (e.g., evacuation of personnel from the site area).

The SSO is also responsible for ensuring that corrective measures have been implemented, appropriate internal and Navy authorities have been notified, and follow-up reports have been completed.

Individual subcontractors are required to cooperate with the SSO within the parameters of their respective Scope of Work.

Personnel are required to immediately report injuries, illnesses, spills, fires, and property damage to the SSO. The SSO must be notified of any on-site emergencies and is responsible for ensuring that the appropriate emergency procedures described in this section are followed. The SSO is also responsible for informing the Navy Remedial Project Manager (RPM) of major incidents and associated corrective actions.

The work under this contract, including this field effort, is subject to a comprehensive health and safety program developed, designed, and implemented by Matthew M. Soltis, CIH, CSP. Mr. Soltis serves as Corporate Manager of Health and Safety for Tetra Tech Technical Support Services (TSS) and as the HSM for the planned work addressed in this APP. He has more than 25 years of experience in the Health and Safety field.

Section 3.0 of the SSHP outlines the project organization qualifications and responsibilities for this Contract Task Order (CTO).

4.1 REQUIREMENTS OF PRE-TASK SAFETY AND HEALTH ANALYSIS

Tetra Tech requires that an AHA be prepared for each job task to be performed at this site to identify hazards before they occur and provide mitigation measures. The AHAs focus on the relationship between the worker, the task, the tools, and the work environment. The AHAs are reviewed at the tailgate safety meeting at the beginning of each work day. These sessions inform each person of the potential hazards for each task and provide steps to take to eliminate or reduce hazards to an acceptable risk level. The AHAs are presented in the SSHP in Section 2.0.

Personnel will be encouraged to report to the SSO any conditions or practices that they consider detrimental to their health or safety, or those they believe violate applicable health and safety standards. Such reports may be made orally or in writing. Personnel who believe that an imminent danger threatens human health or the environment are encouraged to bring the matter to the immediate attention of the SSO for resolution. Job site activities presenting danger to life or limb should be stopped immediately and reported to the SSO for resolution. Near miss incidents are to be reported to the SSO who will record the information in the site logbook and in the Tetra Tech TOTAL System.

At least one copy of this APP and SSHP will be available to site personnel. Each vehicle used on the job site will contain a copy of the APP and SSHP to ensure quick and easy access by employees. In addition to a review of the AHAs, minor changes and any other relevant topics will be discussed by the SSO at the daily tailgate safety meeting. However, significant revisions must be discussed with the HSM and PM and approved prior to implementation.

It is the goal of Tetra Tech to continue its excellent safety performance on NAVFAC contracts to support the Navy in their safety efforts. Specifically, Tetra Tech will perform the work in a manner that is consistent with the Zero Incident Philosophy. In accordance with this philosophy, it is our stated goal to plan and perform the work in a manner that integrates safety and health considerations so that it is accomplished without experiencing any worker injuries or illnesses, environmental releases/impacts, or property damage events.

4.2 APP AND SSHP COMPLIANCE

Personnel who will be working on this project (Tetra Tech and subcontractors) are covered by this APP and SSHP. These documents shall be rigorously enforced during this field effort. Violators of the APP and SSHP will be verbally notified upon first violation, and the violation will be noted by the Tetra Tech SSO in a field logbook. Upon second violation, the violator will be notified in writing, and the Tetra Tech PM and the violator's supervisor will be notified. A third violation will result in a written notification and the

violator's eviction from the site. The written notification will be sent to the human resources department and the HSM.

Any violations that are deemed to be serious, intentional, or otherwise egregious will be subject to immediate corrective action, up to and including removal from the site, and will not require adherence to this progressive, three-step disciplinary process.

In the Tetra Tech Health and Safety Program Summary, it is stated by the company Chief Executive Officer Mr. Daniel L. Batrack, "Management is responsible for ensuring that all aspects of the workplace, including offices and project locations, are safe and that any risks, hazards, and safety violations are brought to their attention, investigated, and corrected promptly. Tetra Tech's associates are responsible for complying with the H&S policy, programs and standards, and conducting their work safely and without detriment to themselves, other employees, other individuals or property. Compliance with this policy is mandatory. Willful violation or negligent disregard of this policy will be considered cause for disciplinary action up to and including termination."

5.0 SUBCONTRACTORS AND SUPPLIERS

Tetra Tech will employ subcontractors in the performance of work covered by this APP and SSHP. Subcontractor personnel are required to read and comply with the sections of this Tetra Tech APP and SSHP. The subcontractor personnel entering the site must sign the Site-Specific Training Documentation form included in the APP and the individual AHAs included in the SSHP.

Subcontractor personnel must comply with the applicable 29 CFR §1910.120 training and medical surveillance requirements. Subcontractors are responsible for providing personal protective equipment (PPE) needed to protect personnel as specified by their safety and health planning documents and by this APP, and are directly responsible for assuring the health and safety of their employees. Subcontractors who have not met OSHA training, medical surveillance, and PPE requirements are not permitted to enter areas where exposure to hazardous materials is possible.

The APP and SSHP (see Appendix A) shall be rigorously enforced during this field effort. Subcontractor personnel who violate the SSHP will be verbally notified upon first violation and the violation will be noted by the Tetra Tech SSO in a field logbook. Upon second violation, the violator will be notified in writing, and the Tetra Tech PM and the violator's supervisor will be notified. A third violation will result in a written notification and the violator's eviction from the site. The written notification will be sent to the Subcontractor, Tetra Tech Contracts Department, and the HSM.

Enforcement of violations of the APP and SSHP/AHAs is conducted by the SSO/UXOSO during remedial actions. Tetra Tech will monitor the work practices of its subcontractor workers onsite, and unequivocally enforce all aspects of the SSHP/AHAs. Subcontractors are responsible for enforcing all health and safety policies applicable to site activities on this project. Disciplinary action will be enforced against the subcontractor manager and personnel for noncompliance violations.

NOTE: Any violations that are deemed to be serious, intentional, or otherwise egregious will be subject to immediate corrective action, up to and including removal from the site.

6.0 TRAINING

Personnel who may be exposed to hazardous conditions and who will participate in site activities are required to meet the training requirements outlined in 29 CFR §1910.120, HAZWOPER. Furthermore, site personnel must satisfy any specialized training requirements that are presented in the AHAs for tasks to be completed under this CTO.

6.1 MANDATORY TRAINING AND CERTIFICATIONS

Tetra Tech personnel qualification and training certification documentation will be obtained by the PM and included in Attachment I and a copy maintained on-site. Mandatory training and certifications applicable to this project include the following:

- 40 hours of introductory hazardous waste site training prior to performing work at NAPR.
- 8 hours of refresher training within the past 12 months before being cleared for site work. (Field personnel who have had introductory training more than 12 months prior to site work must complete this training again).
- 8-hour supervisory training in accordance with 29 CFR 1910.120(e)(4) will be required for site personnel operating in a supervisory capacity.
- 30-hour OSHA Construction Safety Training is required for the SSO
- Specialized operations (UXO) or health and safety responsibilities (i.e., first aid, respiratory protection) will also require additional training for personnel filling those roles.
- UXO personnel will be trained in accordance with DDESB TP-18 for the position they are assigned. (See Attachment II).

Documentation of Tetra Tech introductory, supervisory, and refresher training as well as site-specific training will be maintained at the site. The UXO Technicians will provide documentation when they arrive on-site. Copies of certificates or other official documentation will be used to fulfill this requirement.

6.2 SITE-SPECIFIC SAFETY AND HEALTH TRAINING

The Tetra Tech SSO will provide site-specific training to Tetra Tech employees who will perform work on this project. This will consist of a brief meeting at the beginning of each day to discuss operations planned for that day and a review of the appropriate AHAs with the planned task participants. Based on

field activities, a short meeting may also be held at the end of the day to discuss the operations completed and any problems encountered.

Prior to accessing active work areas of the sites or participating in any intrusive activities, site personnel and visitors will first be required to undergo a site-specific safety and health training session conducted by the FOL and Senior UXO Supervisor (SUXOS), which will include a review of the APP and SSHP and signing of the Site-Specific Training Documentation form.

Before site activities begin, the Tetra Tech FOL and SSO will present a briefing for site personnel who will participate in on-site activities. The following topics will be addressed during the pre-work briefing:

- Names of the personnel listed in the organizational chart and designated alternates
- Site history
- Work tasks
- Hazardous chemicals that may be encountered
- Physical hazards that may be encountered
- PPE, including types of respiratory and hearing protection to be used for work tasks
- Mandatory training and certification requirements (e.g., HAZWOPER; MEC-specific)
- Environmental surveillance (air monitoring) equipment use and maintenance
- Action levels and situations requiring an upgrade or downgrade of level of protection
- Site control measures including site communications and control zones
- Decontamination procedures
- Emergency communication signals and codes, including incident reporting procedures
- Environmental accident/emergency procedures
- UXO notification procedures
- Personnel exposure and accident emergency procedures
- Fire and explosion emergency procedures
- Emergency telephone numbers
- Emergency routes

Any other health and safety-related issues that may arise before site activities begin will be covered during the pre-work briefing.

6.3 TRAINING DOCUMENTATION

Attachment I Site Specific Training Documentation documents the provision and content of the project-specific and associated training. Site personnel will be required to sign this form prior to commencement of site activities. This training documentation identifies personnel who, through record review and attendance of the site-specific training, are cleared for participation in site activities. This document shall be maintained at the site to identify and maintain an active list of trained and cleared site personnel.

6.4 MEDICAL SURVEILLANCE

Site personnel will have had a physical examination that meets the requirements of Tetra Tech's medical surveillance program. Documentation for medical clearances will be maintained in the Tetra Tech Pittsburgh office and made available, as necessary, and will be documented using Attachment I Site Specific Training Documentation for employees participating in on-site work activities.

7.0 SAFETY AND HEALTH INSPECTIONS

It is Tetra Tech's internal policy that the job sites involving work for Naval Facilities Engineering Command Southeast (NAVFAC SE) are subject to audits by corporate safety staff.

7.1 SPECIFIC ASSIGNMENT OF RESPONSIBILITY FOR A MINIMUM DAILY JOB SITE SAFETY AND HEALTH INSPECTION DURING PERIODS OF WORK ACTIVITY

Daily site safety inspections shall be conducted by the Tetra Tech SSO during this field effort to ensure safe work areas and compliance with the SSHP.

7.1.1 Proof of Inspector's Training/Qualifications

The SSO is certified as a HAZWOPER Supervisor under 29 CFR 1910.120(e)(4).

7.1.2 Documentation Procedures

The SSO will record any deficiencies in the Field Log Book that is maintained on site for the site practices.

7.1.3 Deficiency Tracking System

The items noted during field audits will be communicated to the Tetra Tech HSM who maintains a corrective/preventive action database. Responsibility for resolving each item noted during these audits is assigned and tracked through resolution. Results from field audits are also regularly communicated throughout Tetra Tech through training and electronic means as a method of continuous program improvement.

8.0 ACCIDENT REPORTING

Accidents or incidents as well as near-miss events are to be reported using the Tetra Tech web-based incident reporting process. Tetra Tech employees have been educated that prompt and accurate reporting of any incidents they encounter is one of their personal health and safety responsibilities. On this project, the FOL and the SSO are responsible for assuring that the incidents and serious near miss events are reported via the Tetra Tech TOTAL incident reporting system. The HSM is responsible for assuring that the incidents and serious near-miss events are adequately investigated and is also responsible for collecting, tracking, and trending incident data (e.g., recordable cases, employee hours worked, etc.). Accidents involving near misses, injuries, or illnesses must be immediately reported to the PM and the HSM, and documented on the Tetra Tech Incident Report form provided at the end of this section.

Hazardous work conditions or unsafe work practices will be corrected in a timely manner, both in the field and in the office. Upon discovery of an unsafe condition at a field site, the degree of hazard must be assessed. Action may range from complete shutdown of the operation to phased correction. The Tetra Tech employees working on this project will have "Stop Work" authority in the event that a potentially serious action or condition is observed. Tetra Tech will shut down a project during which life threatening, severe environmental impact, or significant equipment or property damage conditions may exist. Employees shall follow specific information for emergency evacuation and PPE usage as described in this APP and associated SSHP (see Appendix A). The PM and Navy RPM must be contacted regarding each incident.

8.1 INCIDENT REPORTING/NOTIFICATIONS

Any occupational incidents meeting the definitions presented below that occur on this project will be reported to the Facility POC as soon as possible, but not later than 24 hours from the time of the event. Incidents that must be reported to the Facility POC include those that result in any of the following:

- Fatalities
- Permanent total disability
- Permanent partial disability
- Hospitalization of 3 or more people resulting from a single occurrence
- Property damage of \$200,000 or more

With consultation with the PHSO, the PM will coordinate with the Program Manager in making any such notifications to the Facility POC. The PM will also provide information on exposure data (man-hours worked).

8.2 INCIDENT REPORTING PROCEDURES

Following this incident reporting procedure is necessary for documenting the information obtained at the time of the incident.

8.2.1 TOTAL Incident Reporting System

TOTAL is Tetra Tech's new online incident reporting system. Site employees can use TOTAL to directly report health and safety incidents, notify key personnel, and initiate the process for properly investigating and addressing the causes of incidents, including near-miss events.

An incident is considered any unplanned event. It may include several types of near misses, events where no loss was incurred, or incidents that resulted in injuries or illness, property or equipment damage, chemical spills, fires, or damage to motor vehicles. Some examples of incidents are as follows:

- Work-related injury or illness
- Suspected hazardous substance exposure over the allowable exposure limit
- Automobile or vehicle-related incidents
- Significant property or equipment damage
- An unplanned fire or explosion
- An unplanned spill or release (including air releases) to the environment
- A permit or permit equivalent exceedance
- Unexpected contact with damage to aboveground or below ground utilities

A near miss incident is described as an undesired event or workplace condition, which under slightly different circumstances had a reasonable probability of resulting in one of the outcomes described above. Some examples of near miss incidents are as follows:

- Tools falling from overhead work near workers below
- Unexpected contact without damage to aboveground or below ground utilities
- Discovery of an unknown and potentially hazardous material or anomaly
- Discovery of confirmed or potential or Recovered Chemical Warfare Materiel (RCWM) that may present a hazard

Incidents, including near-miss incidents, involving Tetra Tech personnel or Tetra Tech subcontractors under Tetra Tech's immediate direction shall be reported and investigated.

TOTAL is an intuitive system that will guide you through the necessary steps to report an incident within 24 hours of its occurrence. TOTAL is a tool for Tetra Tech to better track incidents, analyze root causes, implement corrective action plans, and share lessons learned. TOTAL is maintained on the secure Tetra Tech Intranet site at <https://my.tetrattech.com/>.

8.2.2 How to Access TOTAL to Report an Incident

Once on the "My Tetrattech" web site (<https://my.tetrattech.com>), TOTAL can be found under the "Health and Safety" tab, by clicking on the Incident Reporting, select "Report an Incident (TOTAL)". Then, near the bottom of the screen, click on "Launch TOTAL Application". This will connect you directly to TOTAL. Next, click on "Enter new incident", and follow the steps as presented. The system was designed to be "fail safe" in that the employee will not be able to skip any required information. TOTAL can also be accessed directly from the internet using the following web address: <http://totalhs.tetrattech.com/>.

Note: When accessing the system from outside the Tetra Tech intranet system or when operating in a wireless mode, a VPN connection will be required. The speed of the application may be dependent upon outside factors such as connection speed, signal strength, etc. Enter the system using your network user name and password. The user name should be in the following format - TT\firstname.lastname.

If any Tetra Tech personnel are injured or develop an illness as a result of working on site, and they are at a remote location where they cannot establish reliable internet connection with TOTAL to report an incident, then the employee will complete a hard-copy Tetra Tech "Incident Report Form."

Tetra Tech's Incident Reporting and Investigation Program requires that employees report all incidents as soon as possible, but within 24 hours. An initial report must be completed on TOTAL within that time frame.

Table 8-1 is a print out of the screens found online in the TOTAL system. It can be used as a reference during the incident information gathering phase and prior to completing the form on line.

Report Date	Report Prepared By	Incident Report Number
INSTRUCTIONS:		
All incidents (including those involving subcontractors under direct supervision of Tetra Tech personnel) must be documented on the IR Form.		
Complete any additional parts to this form as indicated below for the type of incident selected.		
TYPE OF INCIDENT (Check all that apply)	Additional Form(s) Required for this type of incident	
Near Miss (No losses, but could have resulted in injury, illness, or damage)	<input type="checkbox"/> Complete IR Form Only	
Injury or Illness	<input type="checkbox"/> Complete Form IR-A; Injury or Illness	
Property or Equipment Damage, Fire, Spill or Release	<input type="checkbox"/> Complete Form IR-B; Damage, Fire, Spill or Release	
Motor Vehicle	<input type="checkbox"/> Complete Form IR-C; Motor Vehicle	
INFORMATION ABOUT THE INCIDENT		
Description of Incident		
<hr/> <hr/> <hr/>		
Date of Incident	Time of Incident	
	_____ AM <input type="checkbox"/> PM <input type="checkbox"/> OR Cannot be determined <input type="checkbox"/>	
Weather conditions at the time of the incident	Was there adequate lighting?	
	_____ Yes <input type="checkbox"/> No <input type="checkbox"/>	
Location of Incident		
_____ Was location of incident within the employer's work environment? Yes <input type="checkbox"/> No <input type="checkbox"/>		
Street Address	City, State, Zip Code and Country	
Project Name/Number	Client:	
Tt Supervisor or Project Manager	Was supervisor on the scene?	
	Yes <input type="checkbox"/> No <input type="checkbox"/>	
WITNESS INFORMATION (attach additional sheets if necessary)		
Name	Company	
Street Address	City, State and Zip Code	
Telephone Number(s)		

CORRECTIVE ACTIONS				
Corrective action(s) immediately taken by unit reporting the incident:				
Corrective action(s) still to be taken (by whom and when):				
ROOT CAUSE ANALYSIS LEVEL REQUIRED				
Root Cause Analysis Level Required: Level - 1 <input type="checkbox"/> Level - 2 <input type="checkbox"/> None <input type="checkbox"/>				
Root Cause Analysis Level Definitions				
Level - 1	<p>Definition: A Level 1 RCA is conducted by an individual(s) with experience or training in root cause analysis techniques and will conduct or direct documentation reviews, site investigation, witness and affected employee interviews, and identify corrective actions. Activating a Level 1 RCA and identifying RCA team members will be at the discretion of the Corporate Administration office.</p> <p>The following events may trigger a Level 1 RCA:</p> <ul style="list-style-type: none"> ▪ Work related fatality ▪ Hospitalization of one or more employee where injuries result in total or partial permanent disability ▪ Property damage in excess of \$75,000 ▪ When requested by senior management 			
Level - 2	<p>Definition: A Level 2 RCA is self-performed within the operating unit by supervisory personnel with assistance of the operating unit HSR. Level 2 RCA will utilize the 5 Why RCA methodology and document the findings on the tools provided.</p> <p>The following events will require a Level 2 RCA:</p> <ul style="list-style-type: none"> ▪ OSHA recordable lost time incident ▪ Near miss incident that could have triggered a Level 1 RCA ▪ When requested by senior management 			
Complete the Root Cause Analysis Worksheet and Corrective Action form. Identify a corrective action(s) for each root cause identified within each area of inquiry.				
NOTIFICATIONS				
Title	Printed Name	Signature	Telephone Number	Date
Project Manager or Supervisor				
Site Safety Coordinator or Office H&S Representative				
Operating Unit H&S Representative				
Other: _____				

The signatures provided above indicate that appropriate personnel have been notified of the incident.

INSTRUCTIONS:		
Complete all sections below for incidents involving injury or illness. Do NOT leave any blanks. Attach this form to the IR FORM completed for this incident.		
Incident Report Number: (From the IR Form)		
EMPLOYEE INFORMATION		
Company Affiliation		
Tetra Tech Employee? <input type="checkbox"/>		Tetra Tech subcontractor employee (directly supervised by Tt personnel)? <input type="checkbox"/>
Full Name	Company (if not Tt employee)	
Street Address, City, State and Zip Code	Address Type	
_____	Home address (for Tt employees) <input type="checkbox"/>	
_____	Business address (for subcontractors) <input type="checkbox"/>	
Telephone Numbers		
Work: _____	Home: _____	Cell: _____
Occupation (regular job title)	Department	
Was the individual performing regular job duties?	Time individual began work	
Yes <input type="checkbox"/> No <input type="checkbox"/>	_____ AM <input type="checkbox"/> PM <input type="checkbox"/> OR Cannot be determined <input type="checkbox"/>	
Safety equipment		
Provided? Yes <input type="checkbox"/> No <input type="checkbox"/>	Type(s) provided: <input type="checkbox"/> Hard hat <input type="checkbox"/> Protective clothing	
Used? Yes <input type="checkbox"/> No <input type="checkbox"/> If no, explain why	<input type="checkbox"/> Gloves <input type="checkbox"/> High visibility vest	
_____	<input type="checkbox"/> Eye protection <input type="checkbox"/> Fall protection	
_____	<input type="checkbox"/> Safety shoes <input type="checkbox"/> Machine guarding	
_____	<input type="checkbox"/> Respirator <input type="checkbox"/> Other (list) _____	
NOTIFICATIONS		
Name of Tt employee to whom the injury or illness was first reported	Was H&S notified within one hour of injury or illness?	
	Yes <input type="checkbox"/> No <input type="checkbox"/>	
Date of report	H&S Personnel Notified	
Time of report	Time of Report	
If subcontractor injury, did subcontractor's firm perform their own incident investigation?		
Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, request a copy of their completed investigation form/report and attach it to this report.		

INJURY / ILLNESS DETAILS			
What was the individual doing just before the incident occurred? Describe the activity as well as the tools, equipment, or material the individual was using. Be specific. Examples: "Climbing a ladder while carrying roofing materials"; "Spraying chlorine from a hand sprayer"; "Daily computer key-entry"			
<hr/> <hr/>			
What Happened? Describe how the injury occurred. Examples: "When ladder slipped on wet floor and worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; Worker developed soreness in wrist over time"			
<hr/> <hr/>			
Describe the object or substance that directly harmed the individual: Examples: "Concrete floor"; "Chlorine"; "Radial Arm Saw". If this question does not apply to the incident, write "Not Applicable".			
<hr/> <hr/>			
MEDICAL CARE PROVIDED			
Was first aid provided at the site: Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, describe the type of first aid administered and by whom?			
<hr/>			
Was treatment provided away from the site: Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, provide the information below.			
Name of physician or health care professional		Facility Name	
<hr/>		<hr/>	
Street Address, City State and Zip Code		Type of Care?	
<hr/> <hr/>		Was individual treated in emergency room? Yes <input type="checkbox"/> No <input type="checkbox"/>	
Telephone Number		Was individual hospitalized overnight as an in-patient? Yes <input type="checkbox"/> No <input type="checkbox"/>	
<hr/>		Did the individual die? Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, date: _____	
		Will a worker's compensation claim be filed? Yes <input type="checkbox"/> No <input type="checkbox"/>	
NOTE: Attach any police reports or related diagrams to this report.			
SIGNATURES			
I have reviewed this report and agree that all the supplied information is accurate			
Affected individual (print)	Affected individual (signature)	Telephone Number	Date
<hr/>	<hr/>	<hr/>	<hr/>

This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.

INSTRUCTIONS:

Complete all sections below for incidents involving property/equipment damage, fire, spill or release.
Do NOT leave any blanks.
Attach this form to the IR FORM completed for this incident.

Incident Report Number: (From the IR Form)

TYPE OF INCIDENT (Check all that apply)

Property Damage Equipment Damage Fire or Explosion Spill or Release

INCIDENT DETAILS

Results of Incident: Fully describe damages, losses, etc.

Response Actions Taken:

Responding Agency(s) (i.e. police, fire department, etc.)

Agency(s) Contact Name(s)

DAMAGED ITEMS (List all damaged items, extent of damage and estimated repair cost)

Item:	Extent of damage:	Estimated repair cost

SPILLS / RELEASES (Provide information for spilled/released materials)

Substance	Estimated quantity and duration	Specify Reportable Quantity (RQ)
		_____ Exceeded? Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>

FIRES / EXPLOSIONS (Provide information related to fires/explosions)

Fire fighting equipment used? Yes No If yes, type of equipment: _____

NOTIFICATIONS

Required notifications	Name of person notified	By whom	Date / Time
Client: _____ Yes <input type="checkbox"/> No <input type="checkbox"/>			
Agency: _____ Yes <input type="checkbox"/> No <input type="checkbox"/>			
Other: _____ Yes <input type="checkbox"/> No <input type="checkbox"/>			

Who is responsible for reporting incident to outside agency(s)? Tt Client Other Name: _____

Was an additional written report on this incident generated? Yes No If yes, place in project file.

INSTRUCTIONS:			
<p>Complete all sections below for incidents involving motor vehicle accidents. Do NOT leave any blanks. Attach this form to the IR FORM completed for this incident.</p>			
Incident Report Number: (From the IR Form)			
INCIDENT DETAILS			
Name of road, street, highway or location where accident occurred		Name of intersecting road, street or highway if applicable	
County	City	State	
Did police respond to the accident?		Did ambulance respond to the accident?	
Yes <input type="checkbox"/> No <input type="checkbox"/>		Yes <input type="checkbox"/> No <input type="checkbox"/>	
Name and location of responding police department		Ambulance company name and location	
Officer's name/badge #			
Did police complete an incident report? Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, police report number: _____ Request a copy of completed investigation report and attach to this form.			
VEHICLE INFORMATION			
How many vehicles were involved in the accident? _____ (Attach additional sheets as applicable for accidents involving more than 2 vehicles.)			
Vehicle Number 1 – Tetra Tech Vehicle		Vehicle Number 2 – Other Vehicle	
Vehicle Owner / Contact Information		Vehicle Owner / Contact Information	
Color		Color	
Make		Make	
Model		Model	
Year		Year	
License Plate #		License Plate #	
Identification #		Identification #	
Describe damage to vehicle number 1		Describe damage to vehicle number 2	
Insurance Company Name and Address		Insurance Company Name and Address	
Agent Name		Agent Name	
Agent Phone No.		Agent Phone No.	
Policy Number		Policy Number	

DRIVER INFORMATION							
Vehicle Number 1 – Tetra Tech Vehicle				Vehicle Number 2 – Other Vehicle			
Driver's Name				Driver's Name			
Driver's Address				Driver's Address			
Phone Number				Phone Number			
Date of Birth				Date of Birth			
Driver's License #				Driver's License #			
Licensing State				Licensing State			
Gender		Male <input type="checkbox"/> Female <input type="checkbox"/>		Gender		Male <input type="checkbox"/> Female <input type="checkbox"/>	
Was traffic citation issued to Tetra Tech driver? Yes <input type="checkbox"/> No <input type="checkbox"/>				Was traffic citation issued to driver of other vehicle? Yes <input type="checkbox"/> No <input type="checkbox"/>			
Citation #				Citation #			
Citation Description				Citation Description			
PASSENGERS IN VEHICLES (NON-INJURED)							
<p>List all non-injured passengers (excluding driver) in each vehicle. Driver information is captured in the preceding section. Information related to persons injured in the accident (non-Tt employees) is captured in the section below on this form. Injured Tt employee information is captured on FORM IR-A</p>							
Vehicle Number 1 – Tetra Tech Vehicle				Vehicle Number 2 – Other Vehicle			
How many passengers (excluding driver) in the vehicle? ____				How many passengers (excluding driver) in the vehicle? ____			
Non-Injured Passenger Name and Address				Non-Injured Passenger Name and Address			
Non-Injured Passenger Name and Address				Non-Injured Passenger Name and Address			
Non-Injured Passenger Name and Address				Non-Injured Passenger Name and Address			
INJURIES TO NON-TETRATECH EMPLOYEES							
Name of injured person 1				Address of injured person 1			
Age	Gender	Car No.	Location in Car	Seat Used?	Belt	Ejected from car?	Injury or Fatality?
	Male <input type="checkbox"/> Female <input type="checkbox"/>			Yes <input type="checkbox"/> No <input type="checkbox"/>		Yes <input type="checkbox"/> No <input type="checkbox"/>	Injured <input type="checkbox"/> Died <input type="checkbox"/>
Name of injured person 2				Address of injured person 2			
Age	Gender	Car No.	Location in Car	Seat Used?	Belt	Ejected from car?	Injury or Fatality?
	Male <input type="checkbox"/> Female <input type="checkbox"/>			Yes <input type="checkbox"/> No <input type="checkbox"/>		Yes <input type="checkbox"/> No <input type="checkbox"/>	Injured <input type="checkbox"/> Died <input type="checkbox"/>
OTHER PROPERTY DAMAGE							
Describe damage to property other than motor vehicles							
Property Owner's Name				Property Owner's Address			



COMPLETE AND SUBMIT DIAGRAM DEPICTING WHAT HAPPENED

A large, empty rectangular box with a black border, intended for drawing a diagram depicting what happened during an incident.

9.0 REQUIRED PLANS (PROGRAMS, PROCEDURES)

Based on a risk assessment of the planned activities, the following indicated plans are applicable to this work and are included in or appended to this APP.

Yes/NA		Yes/NA	
<input type="checkbox"/> <input checked="" type="checkbox"/>	Layout Plans	<input type="checkbox"/> <input checked="" type="checkbox"/>	Asbestos Abatement Plan
<input type="checkbox"/> <input checked="" type="checkbox"/>	Emergency Response Plans	<input type="checkbox"/> <input checked="" type="checkbox"/>	Radiation Safety Program
<input type="checkbox"/> <input checked="" type="checkbox"/>	Procedures and Tests	<input type="checkbox"/> <input checked="" type="checkbox"/>	Abrasive Blasting Plan
<input checked="" type="checkbox"/> <input type="checkbox"/>	Spill Plans	<input type="checkbox"/> <input checked="" type="checkbox"/>	Heat/Cold Stress Monitoring Plan
<input checked="" type="checkbox"/> <input type="checkbox"/>	Posting of Emergency Telephone Numbers	<input type="checkbox"/> <input checked="" type="checkbox"/>	Crystalline Silica Monitoring Plan
<input type="checkbox"/> <input checked="" type="checkbox"/>	Man Overboard/Abandon Ship	<input type="checkbox"/> <input checked="" type="checkbox"/>	Night Operations Lighting Plan
<input checked="" type="checkbox"/> <input type="checkbox"/>	Medical Support (Onsite/Offsite)	<input type="checkbox"/> <input checked="" type="checkbox"/>	Fire Prevention Plan
<input checked="" type="checkbox"/> <input type="checkbox"/>	Substance Abuse Plan	<input type="checkbox"/> <input checked="" type="checkbox"/>	Wild Land Fire Management Plan
<input type="checkbox"/> <input checked="" type="checkbox"/>	Site Sanitation Plan	<input type="checkbox"/> <input checked="" type="checkbox"/>	Hazardous Energy Control (LO/TO) Plan
<input type="checkbox"/> <input checked="" type="checkbox"/>	Access and Haul Road Plan	<input type="checkbox"/> <input checked="" type="checkbox"/>	Critical Lift Plan
<input checked="" type="checkbox"/> <input type="checkbox"/>	Respiratory Protection Plan	<input type="checkbox"/> <input checked="" type="checkbox"/>	Severe Weather Contingency Plan
<input type="checkbox"/> <input checked="" type="checkbox"/>	Health Hazard Control Program	<input type="checkbox"/> <input checked="" type="checkbox"/>	Float Plan
<input checked="" type="checkbox"/> <input type="checkbox"/>	Hazard Communication Program	<input type="checkbox"/> <input checked="" type="checkbox"/>	Compressed Air Plan
<input type="checkbox"/> <input checked="" type="checkbox"/>	Process Safety Management Plan	<input type="checkbox"/> <input checked="" type="checkbox"/>	Crystalline Silica Monitoring Plan
<input checked="" type="checkbox"/> <input type="checkbox"/>	Lead Abatement Plan	<input checked="" type="checkbox"/> <input type="checkbox"/>	Excavation/Trenching Plan
<input type="checkbox"/> <input checked="" type="checkbox"/>	Demolition Plan	<input type="checkbox"/> <input checked="" type="checkbox"/>	Pre-Cast Concrete Plan
<input type="checkbox"/> <input checked="" type="checkbox"/>	Emergency Rescue (Tunneling) Plan	<input checked="" type="checkbox"/> <input type="checkbox"/>	SSHP for HTRW Work
<input type="checkbox"/> <input checked="" type="checkbox"/>	Blasting Safety Plan	<input type="checkbox"/> <input checked="" type="checkbox"/>	Steel Erection Plan
<input type="checkbox"/> <input checked="" type="checkbox"/>	Lift Slab Plan	<input type="checkbox"/> <input checked="" type="checkbox"/>	Underground Construction Fire Prevention and Protection Plan
<input type="checkbox"/> <input checked="" type="checkbox"/>	Site-Specific Fall Protection & Prevention Plan	<input type="checkbox"/> <input checked="" type="checkbox"/>	Permit-Required Confined Space Entry Plan
<input type="checkbox"/> <input checked="" type="checkbox"/>	Formwork/Shoring Erection and Removal Plan	<input checked="" type="checkbox"/> <input type="checkbox"/>	Explosives Safety Submission
<input type="checkbox"/> <input checked="" type="checkbox"/>	Diving Slab Plan	<input type="checkbox"/> <input type="checkbox"/>	Other _____

THE FOLLOW SECTIONS FURTHER DESCRIBE THE PLANS AND/OR IDENTIFY THE LOCATION OF THE INFORMATION.

9.1 SPILL PLANS

Spill Plans for this site are found in Section 9.2 of the SSHP.

9.2 POSTING OF EMERGENCY TELEPHONE NUMBERS

See Table A-14-1 of the SSHP

9.3 MEDICAL SUPPORT (ONSITE/OFFSITE)

See Section 13.0 of the SSHP

9.4 SUBSTANCE ABUSE POLICY

The Tetra Tech Substance Abuse policy prohibits the unlawful manufacture, distribution, dispensation, possession, or use of alcohol, illegal drugs or intoxicants on any Company-owned or leased space, client facility, or work site. Use of these substances, regardless of whether it is determined that such use occurred during the work hours or at a company work location, or whether such use actually affected an employee's ability to perform his or her job, is a violation of this policy.

In order to enforce this policy, the Company may investigate potential violations and require personnel to undergo drug/alcohol screening, including urinalysis, blood tests or other appropriate tests. The Company may also conduct searches of all areas of the Company premises, including, but not limited to work areas, rest rooms, break areas, personal articles, employee's clothes, desks, work stations, lockers, and personal and Company-owned vehicles.

Violation of this policy or any of its provisions may result in disciplinary action up to and including termination of employment. Employees may be subject to discipline up to and including termination for refusing to cooperate with searches or investigations, refusing to submit to screening, or failing to execute consent forms when required by supervisors.

Employees who are convicted of any criminal drug statute for a violation occurring in the workplace are required to notify their Human Resources Representative no later than five days after the conviction. It shall also be the responsibility of each employee who observes or has knowledge of another employee in

a condition which impairs the employee to perform his or her job duties or who presents a hazard to the safety and welfare of others to promptly report that fact to his or her immediate supervisor.

9.5 RESPIRATORY PROTECTION PLAN

See Section 5.1 of the SSHP

9.6 HAZARD COMMUNICATION PROGRAM

See Section 10.5 of the SSHP

9.7 LEAD ABATEMENT PLAN

Lead adversely affects numerous body systems and causes forms of health impairment and disease that arise after periods of exposure as short as days (acute exposure) or as long as several years (chronic exposure). The frequency and severity of medical symptoms increases with the concentration of lead in the blood. Common symptoms of acute lead poisoning are loss of appetite, nausea, vomiting, stomach cramps, constipation, difficulty in sleeping, fatigue, moodiness, headache, joint or muscle aches, anemia, and decreased sexual drive. Acute health poisoning from uncontrolled occupational exposures has resulted in fatalities. Long term (chronic) overexposure to lead may result in severe damage to the blood-forming, nervous, urinary, and reproductive systems. The following provisions are in effect for this project:

- Each employee working on this site will have blood lead and zinc protoporphyrin (ZPP) level sampling and analysis prior to and after completion of the work.
- If necessary area wetting techniques will be used to keep dust levels down.
- If there is a chance to soil clothing, the PPE will be Tyvek® coveralls worn with boot covers and disposable gloves.
- Smoking, eating and any hand to mouth activity is prohibited in the Exclusion Zone.

9.8 EXCAVATION/TRENCHING PLAN

Tetra Tech will follow the procedures in the AHA, Anomaly Intrusive Investigation, and Attachment IV of the SSHP, Tetra Tech Standard Operating Procedure Utility Locating and Excavation Clearance.

9.9 SSHP FOR HTRW WORK

See Appendix A.

9.10 EXPLOSIVES SAFETY SUBMISSION

This is a stand-alone document that is required by the Naval Ordnance Safety & Security Activity (NOSSA) and is approved by DDESB and is in the possession of the SUXOS during site activities.

10.0 RISK MANAGEMENT PROCESSES

The AHA defines the activity being performed, the hazards posed, and control measures required to perform the work safely. Site workers are briefed on the AHA before doing the work and their input is solicited before, during, and after the performance of work to further identify the hazards posed and control measures required.

APPENDIX A

SITE SAFETY AND HEALTH PLAN

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1.0 INTRODUCTION

This SSHP has been developed to provide safe work practices and procedures for Tetra Tech and subcontractor personnel conducting site activities in support of the Naval Activity Puerto Rico (NAPR) Solid Waste Management Unit (SWMU) 77 located on the Punta Medio Mundo peninsula on the northeastern boundary of NAPR Ceiba, Puerto Rico. The objective of the field work is to characterize and delineate potential MEC/Material Potentially Presenting an Explosive Hazard (MPPEH) hazards and soil sampling to identify Munitions Constituent (MC) contamination present within SWMU 77. A combination of geophysical and intrusive techniques will be used. The Tetra Tech Unexploded Ordnance and Chemical Warfare Agents Activities Standard Operating Procedure will be followed (See Attachment II).

This SSHP was developed using historical site background information regarding known or suspected chemical contaminants, previous site visits, and potential physical hazards that may be associated with the proposed work at the site. This SSHP will be modified, as necessary, if new information becomes available, and changes will be made with the approval of the Tetra Tech SSO and the CLEAN HSM. Requests for modifications to the SSHP should be directed to the SSO. The SSO will notify the HSM, who will then notify affected personnel of the changes.

1.1 SITE DESCRIPTION AND SCOPE OF WORK

NAPR, formerly known as Naval Station Roosevelt Roads (NSRR), is located on the eastern coast of Puerto Rico in the municipality of Ceiba, approximately 33 miles southeast of San Juan (Figure 2-1). The nearest major town is Fajardo, which is 10 miles north of the station. The facility occupies approximately 8,600 acres, and except for two adjacent unpopulated islands (Pineros and Cabeza de Perro) off the northeastern coast of the facility, it is bordered on the north, south, and east by the marine waters of the Atlantic Ocean, Caribbean Sea, and Vieques Passage.

The property was acquired by the Navy between 1941 and 1945. In 1941, Fort Bundy was established in the southwestern portion of the property as the United States Army headquarters for coastal artillery emplacements. In 1943, the northeastern portion of NSRR was commissioned as a Naval Operating Base to provide training for Atlantic Fleet Operations in the Caribbean. Both areas remained active until the end of World War II. Between the end of World War II and 1957, Fort Bundy and NSRR were deactivated and reactivated several times. In 1957, NSRR was reactivated as home of the new Atlantic Fleet Guided Missile Training Operations Center, which provided missile support to facilities and missile training to the Atlantic Fleet's submarine units.

In 1963, the Atlantic Fleet Weapons Training Facility (AFWTF) was commissioned to support communications and weapons technology, maintenance and operation of weapons testing and exercises, and military maneuvers training. NSRR was officially closed on March 31, 2004; the Navy established NAPR to serve as the caretaker of the property associated with NSRR and to assist in transfer of the property.

SWMU 77, Small Arms Range was closed on January 1, 2010. Several of the subareas became inactive prior to closure of SWMU 77. The subareas are no longer maintained. The future use of SWMU 77 including its subareas is unknown at this time; however, SWMU 77 will most likely be developed as an ecotourism area with a hotel. The following is a description of each site.

NAPR has a tropical-marine climate characterized by minimal temperature fluctuations, relatively moderate humidity, and frequent rain showers. The rainy season is typically defined as May through November. Hurricane season is from June 1 through November 30. SWMU 77 consists of shallow, well-drained, moderately permeable soils that formed in moderately fine-textured residual soil derived from volcanic rock.

1.1.1 Pistol Range Subarea

This subarea is located in a level area north of the entrance road to SWMU 77. The Pistol Range is active and maintained via grass cutting. An earthen berm that serves as the bullet backstop is present just beyond the target area and numerous bullets are visible on the surface. There are six firing lines (1.5-yard, 3-yard, 7-yard, 10-yard, 15-yard, and 25-yard) across two 50-foot-wide side-by-side ranges. The southern half of the range has been used exclusively since 2004.

Nitroglycerin (NG) at the firing lines and metals (antimony, arsenic, copper, lead, and zinc) and explosives at the berm area were investigated in surface soil during the Phase I RFI. NG was determined to be neither a human health nor ecological issue. For the berm, metals, particularly the primary contaminant lead, were elevated and present both a human health and ecological risk issue. A high density of bullets and fragments are ubiquitous on the main side of the earthen berm directly behind the target areas, and much less present on the far right side to the north; similarly, lead contamination in soil is much higher on the main side of the berm versus the northern side.

- Discrete surface (0 to 6 inches bgs) soil samples and discrete subsurface (1 to 2 feet bgs) soil samples will be collected from the Pistol Range Subarea.

1.1.2 Former Pistol Range Subarea

This subarea is now overgrown with trees, and no visible evidence remains of the former pistol range located northeast of the current pistol range and southwest of the Detonation Area near Concrete Pad Subarea.

NG and metals (antimony, arsenic, copper, lead, and zinc) were investigated in soil during the Phase I RFI. NG did not exceed the project action limit (PAL). For the berm, metals, particularly the primary contaminant lead, is elevated, which presents both a human health and ecological risk issue. The most highly contaminated area is in the northwestern area of the subarea. A low density of bullets and fragments are in the area.

- Discrete surface (0 to 6 inches bgs) soil samples will be collected from the Former Pistol Range.

1.1.3 Detonation Area near Concrete Pad Subarea

This subarea is located southeast of the Potential OB/OD Subarea between the 300-yard and 500-yard Rifle Range firing lines on the southern side of the unpaved road. Clearing of the subarea occurred sometime between 1977 and 1985, and construction of the concrete pad used for target assembly occurred by 1995. The area around the pad is level, grassy, and not maintained. A small open depression, contained standing water, is located at the northern corner of the pad and shows no evidence of MEC. The depression is reported to be a detonation pit used for a one-time detonation event. Lead concentration in this subarea is less than human health screening levels and greater than ecological screening levels.

- Discrete surface (0 to 6 inches bgs) soil samples will be collected from across the site.

1.1.4 Rifle Range Subarea

This subarea is a 500-yard narrow feature centrally located in SWMU 77 and orientated such that shots were fired toward the outer point of the peninsula. Construction of the range occurred sometime between 1940 and 1958. The range has 100-yard, 200-yard, 300-yard, and 500-yard elevated firing lines and a short-yardage range formerly used as a pistol range. The short-yardage range is located in front of a fixed target area. The target berm consists of a constructed earthen berm that served the short-yardage range, a concrete wall at the rear of the earthen berm equipped with a target carrier mechanism to raise (and lower) targets, and a natural steep wooded hillside beyond the earthen berm/concrete wall that serves as the backstop for these elevated targets. MEC/ MPPEH items were on the constructed earthen

berm and grassy strip at the toe of the wooded embankment, however, these items were removed when SWMU 77 was closed in January 2010.

NG at the firing lines and metals (antimony, arsenic, copper, lead, and zinc) and explosives at berm/embankment areas were investigated. NG is only a potential risk concern at the 200-yard firing line for the Rifle Range, which may have been more heavily used than the other firing lines. For the earthen constructed berm area/wooded embankment, metals, particularly the primary contaminant lead, were present at elevated concentrations compared to the PALs. A high density of bullets is on the constructed earthen berm and, also, a high density of bullets may be present on the wooded embankment (heavily wooded vegetation prevented visual observation) due to its location relative to the constructed earthen berm. The explosive, cyclotrimethylenetrinitramine (RDX), was detected, but did not exceed the PAL.

- UXO Technicians will conduct a detector-aided surface survey and intrusive investigations.
- MC sampling will include surface (0 to 6 inches bgs) and subsurface (1 to 2 feet bgs) soil.
- A UXO Technician will be required for sampling at the Rifle Range Subarea earthen berm and wooded embankment beyond the berm, and UXO avoidance will be practiced during MC sampling.

1.1.5 Potential OB/OD Subarea

This subarea is on the northern side of the unpaved road on the northwestern portion of the peninsula. Operation of this subarea occurred possibly as early as 1961 and ended sometime prior to 1985. The subarea is flat, grassy, with a small depression is present in the middle of the grassy area. No evidence of OB/OD operations is apparent to date, other than the suspicious historical aerial photographs. The terrain inclines steeply beyond the level area, with scrubby brush and trees present on the hillside north of the subarea.

NG, metals (antimony, arsenic, copper, lead, and zinc), and explosives were investigated. Where surface and subsurface soil were investigated in anomalous areas identified during the geophysical survey, only lead was of potential ecological concern based on evaluation of analytical results.

- A UXO Technician will be required during MC sampling, and UXO avoidance procedures will be practiced.
- Excavations will be conducted (test pits).
- Hand dig
- Soil samples collected

1.1.6 Potential Munitions Trench Subarea

This subarea is located between the 200-yard and 100-yard firing lines of the Rifle Range, south of the existing unpaved road. Operation of the suspected trenching subarea occurred sometime prior to 1958 (possibly as early as 1940) until October 1961. The area is heavily wooded except over the suspect potential trenches, which are covered with overgrown grasses. No evidence of MEC has been observed to date. Phase I sampling was limited in that only a few surface soil samples were collected; no soil concentrations exceeded the PALs. The data were determined to be inconclusive until an intrusive subsurface investigation is conducted.

- A UXO Technician will be required during MC sampling, and UXO avoidance procedures will be practiced.
- Excavations will be conducted (test pits).
- Hand dig
- Soil samples collected

1.2 PREVIOUS ENVIRONMENTAL SAMPLING STUDIES

A Phase I RFI was conducted at SWMU 77 in 2010. This included the use of surface and subsurface geophysical equipment to locate metallic items that could be suspect MEC, MPPEH, or non-munitions-related debris. Initially, visual and UXO detector-aided surface surveys were performed at four of the six subareas to investigate the presence of surface items.

MEC/MPPEH are only a concern at the Rifle Range Subarea, Potential OB/OD Subarea and Potential Munitions Trench Subarea. MEC/MPPEH expended items determined to be on these sites include shotgun, ball, linked, and blank cartridges (400,000+), hand smoke grenades (6), and 40-millimeter (mm) training smoke grenades (55). 40-mm CS M651 grenades (4), 37-mm CS (Tear Gas) grenade (1), Han-Ball CS 1902 grenade (1), 40-mm practice grenades (2) and expended blasting caps (2).

1.3 CONTAMINATION CHARACTERIZATION

Within each specific SWMU 77 subarea, surface and/or subsurface soil may be contaminated with a variety of constituents associated with site-specific munitions-related operations. The Potential OB/OD Subarea and Potential Munitions Trench Subarea may also be contaminated with constituents associated with landfilling activities. Previously collected soil data indicate there may be contamination present at the SWMU 77 subareas as a result of site uses. Therefore, defining the nature and extent of potential MC in surface and subsurface soil is an objective of this Full RFI investigation. Potential MC includes select

metals (antimony, arsenic, copper, lead and zinc), explosives, and NG, as applicable per subarea. If evidence of landfilling is noted at the Potential OB/OD Subarea or Potential Munitions Trench Subarea, potential contaminants may also include non-MC-related contaminants including volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, herbicides, polychlorinated biphenyls (PCBs), metals, and NG.

Other items that may be encountered on site are included in the open air demilitarization ban document NAVSEA AMPN/TWO24-AA-ORD-010. The following items are placed under a moratorium:

- Hexachloroethane (HC)
- Colored smokes, white phosphorous (WP)
- Red phosphorous (RP)
- Riot Control Munitions
 - Chloracetophenone (CN)
 - o-chlorobenzylmalononitril (CS).

Based on an evaluation of data in combination with historical information about the site, the primary contaminants of concern (COC) at this site are the metals antimony, arsenic and lead. It is anticipated that levels of lead will be encountered that are of concern to field crews. Exposure (via inhalation, ingestion, or skin contact) to these contaminants will be minimized through the use of PPE and good work hygiene practices. Table A-1-1 lists the current occupational exposure limits (OEL) for the COC.

**TABLE A-1-1
CURRENT OCCUPATIONAL EXPOSURE LIMITS**

COC	Highest Concentration Previously Detected	Amount of Dust-In-Air that would have to be generated to reach the OEL	Current OEL
Antimony	6510 mg/kg	19.2 mg/m ³	0.5 mg/m ³ TWA ₈
Arsenic	61 mg/kg	41.3 mg/m ³	0.01 mg/m ³ TWA ₈
Lead	118,000 mg/kg	0.11 mg/m ³	0.05 mg/m ³ TWA ₈

Table Notes:

TWA₈: Time-weighted average exposure concentration for a conventional 8-hour work period that is not to be exceeded.

mg/kg: milligrams per kilogram

mg/m³: milligrams per cubic meter

Based on current site information and these calculations, the amount of dust-in-air that could be generated is 0.11 mg/m³ (lead) whereas the OEL is 0.05 mg/m³ TWA₈. Therefore, if necessary dusts control methods will be used at this site to keep occupational exposures to a minimum. Area wetting methods will be used to control dust if visible dust generation is observed.

1.3.1 Lead

The effects of lead exposure are the same whether it enters the body through inhalation or ingestion. Lead can affect almost every organ and system in the body. The main target for lead toxicity is the central nervous system, both in adults and children. Long-term exposure to lead in adults can result in decreased performance in some tests that measure functions of the nervous system. It may also cause weakness in fingers, wrists, or ankles. Lead exposure also causes small increases in blood pressure, particularly in middle-aged and older people, and can cause anemia. Exposure to high lead levels can severely damage the brain and kidneys in adults or children and ultimately cause death. In pregnant women, high levels of exposure to lead may cause miscarriage. High level exposure in men can damage the organs responsible for sperm production.

1.3.2 Antimony

Exposure to antimony at high levels can result in a variety of adverse health effects. Breathing high levels for a long time can irritate your eyes and lungs and can cause heart and lung problems, stomach pain, diarrhea, vomiting, and stomach ulcers. In short-term studies, animals that breathed very high levels of antimony died. Animals that breathed high levels had lung, heart, liver, and kidney damage. In long-term studies, animals that breathed very low levels of antimony had eye irritation, hair loss, lung damage, and heart problems. Problems with fertility were also noted. In animal studies, problems with fertility have been seen when rats breathed very high levels of antimony for a few months. Ingesting large doses of antimony can cause vomiting. We don't know what other effects may be caused by ingesting it. Long-term animal studies have reported liver damage and blood changes when animals ingested antimony. Antimony can irritate the skin if it is left on it. Antimony can have beneficial effects when used for medical reasons. It has been used as a medicine to treat people infected with parasites.

1.3.3 Arsenic

Breathing high levels of inorganic arsenic can give you a sore throat or irritated lungs. Ingesting very high levels of arsenic can result in death. Exposure to lower levels can cause nausea and vomiting, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and a sensation of "pins and needles" in hands and feet. Ingesting or breathing low levels of inorganic arsenic for a long time can cause a darkening of the skin and the appearance of small "corns" or "warts" on the palms, soles, and torso. Skin contact with inorganic arsenic may cause redness and swelling. Almost nothing is known regarding health effects of organic arsenic compounds in humans. Studies in animals show that some simple organic arsenic compounds are less toxic than inorganic forms. Ingestion of methyl and dimethyl compounds can cause diarrhea and damage to the kidneys.

1.3.4 Explosive Compounds

Routes of exposure are inhalation, ingestion, skin and eye contact. Skin and eye contact are not prevalent routes however dermal contact may lead to inhalation or ingestion through poor work hygiene practices. Signs and symptoms of overexposure may include headaches, dizziness, nausea, hyperactivity, convulsions, seizures, fatigue, and irritability rashes, dry skin and itchy eyes, respiratory problems, joint pain, sore throat, and depression. These effects may be experienced quickly or several hours later. Some can be topically irritating to skin and eyes.

1.3.5 Potential Routes of Exposure

Inhalation: Based on the data from previous investigations at this worksite, worker exposure to airborne concentrations that could represent a health concern is considered to be possible, but not likely. Therefore, recognizing that the site conditions may present a health concern, a direct reading instrument will be used to monitor the breathing zone (scanning from the knees to the top of the head using a Z pattern). Instruments to be used and action levels are discussed in Section 7.0. However, it is important to keep in mind that the planned work area is outdoors, with ample natural ventilation that will reduce any airborne particulates through dilution and dispersion. Also the types of activities to be conducted on this site produce very low amounts of dust.

As a result of this, it is very unlikely that workers participating in these activities will encounter any airborne concentrations of the above metals that would represent an occupational exposure concern. Examples of onsite practices to be observed that will protect workers from exposure via inhalation include:

- Proper PPE use and hygiene care
- Proper airborne monitoring and use of area wetting techniques, when visible dust is generated
- Working upwind of equipment such as drill rigs that may be generating dust

Ingestion and Skin Contact: Potential exposure to this COC may also occur through ingesting or coming into direct skin contact with contaminated soils. However, the likelihood of worker exposure concerns through these two routes are considered very unlikely, provided that workers follow good personal hygiene and standard good sample collection/sample handling practices, and wear appropriate PPE as specified in this SSHP. Examples of onsite practices that are to be observed that will protect workers from exposure via ingestion or skin contact include the following:

- No hand-to-mouth activities on site (eating, drinking, smoking, etc.)

- Washing hands upon leaving the work area and prior to performing any hand to mouth activities
- Wearing proper gloves whenever handling potentially-contaminated media, including soils, hand tools, and sample containers.

2.0 HAZARD/RISK ANALYSIS

Work conducted in support of this project will be performed using the Activity Hazard Analysis (AHA) process to guide and direct field crews on a task by task basis. It is the SSO's responsibility to review the AHAs with the task participants as part of a pre-task tailgate briefing session.

Daily safety meetings will be conducted during site work and the task-specific AHA(s) will be reviewed prior to initiating any field activities. This effort will ensure that site-specific considerations and changing conditions are incorporated into the planning effort. Use of the APP will provide the line of communication for reviewing task-specific hazards and protective measures associated with each operation. The SSHP will be used as the primary reference for selecting levels of protection and control measures.

The FOL and/or the SSO will be responsible for making the parties aware of the contents and requirements of the APP. Any problems encountered with the protective measures required will be documented and brought to the attention of the SSO.

As an ongoing quality assurance effort, the SSO will review operations to ensure the AHAs adequately address potential hazards for the tasks being conducted. Where deficient, they will be corrected and that information shared with the field personnel. Amended AHAs will be forwarded to the PHSO for inclusion in future APPs for similar activities.

- Phase 1 – Mobilization
 - Site Preparation
 - Site Survey
 - Utility Clearance

- Phase 2 – RCRA Facility Investigation
 - Vegetation Management
 - Instrument Verification Strip (IVS) including installation and performance
 - UXO Detector-aided Surface Survey and Geophysical Investigation
 - Anomaly Intrusive Investigation
 - Manual (hand digs using hand tools and augers)
 - Mechanized (test pits with a backhoe or excavator)
 - Donor Explosives Handling
 - MEC Management
 - Treatment

- MPPEH Management
 - Inspection
 - Certification
 - Disposal
 - Soil sampling
 - Equipment decontamination
 - Investigation-derived waste (IDW) management
 - Site surveying
 - GPS
 - Land
-
- Phase 3 – Demobilization



ACTIVITY HAZARD ANALYSIS (AHA)

Activity/Work Task: Site Preparation (including mobilization)	Overall Risk Assessment Code (RAC) (Use highest code)	M				
Project Location: NAPR Full RFI	Risk Assessment Code (RAC) Matrix					
Contract Number: JM04	Severity	Probability				
Date Prepared: February 6, 2012		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by: R. Brooks	Catastrophic	E	E	H	H	M
Reviewed by: J. Laffey	Critical	E	H	H	M	L
	Marginal	H	M	M	L	L
Notes: (Field Notes, Review Comments, etc.)	Negligible	M	L	L	L	L
	Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)					RAC Chart
"Probability" is the likelihood to cause an incident, near miss, or accident and Identified as: Frequent, Likely, Occasional, Seldom, or Unlikely.						
"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible						
Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.						
		E= Extremely High Risk				
		H= High Risk				
		M= Moderate Risk				
		L= Low Risk				

JOB STEPS	HAZARDS	CONTROLS	RAC
<ul style="list-style-type: none"> • Assembling, Packing and unpacking equipment and supplies 	1. Equipment	1. Conduct initial site acceptance inspection prior to performing any work at this site. 2. Use the equipment inspection checklist.	L
	2. Minor cuts, abrasions or contusions	1. Wear cut-resistant gloves when handling items with sharp or rough edges.	M
<ul style="list-style-type: none"> • Performing initial inspections of the intended work areas • Arranging for utilities, site access, notifying appropriate client contacts 	3. Heavy lifting (muscle strains and pulls)	1. Practice safe lifting techniques. Use mechanical lifting devices such as a dolly whenever possible 2. Ensure clear path of travel. 3. Have a good grasp on object. Perform "test lift" to gauge ability to safely make the lift. 4. Lift with legs not back. Obtain help when needed to lift large, bulky, or heavy items).	M
<ul style="list-style-type: none"> • Performing equipment inspections of vehicles and equipment • Installation of Type II Storage Magazines 	4. Vehicular traffic when moving large equipment to the support area	1. Designate and mark vehicle and equipment staging areas. Inform the site personnel of heavy equipment areas and of their responsibility to stay clear of moving vehicles. 2. In high traffic areas, wear a high-visibility vest, shirt or jacket.	M
	5. Slips, Trips, Falls	1. Watch for tree branches, roots, weeds, limbs and other ground hazards. 2. Wear appropriate foot protection to prevent slips and trips. 3. Use caution when working on uneven and wet ground surfaces.	M

ACTIVITY HAZARD ANALYSIS (AHA)

Site Preparation

JOB STEPS	HAZARDS	CONTROLS	RAC
	6. Intermittent high noise levels	<ol style="list-style-type: none"> 1. Site personnel are to wear hearing protection if noise levels are such that they must raise their voice in order to communicate with someone who is within arm's reach (approx. 2') of them. 2. SSO is responsible for determining and designating when hearing protection is required. 3. Hearing protection is to consist of either ear muffs or plugs that have a noise reduction rating (NRR) of at least 25 decibels (dB). 	L
	7. Inclement weather	<ol style="list-style-type: none"> 1. The FOL and/or the SSHO will temporarily suspend outside activities in the event of electrical storms or high winds. 2. It is preferred that supported systems such as lightning detection devices or emergency weather broadcasts are employed. 3. However, when this is not possible field personnel should use the 30/30 Rule: <i>"If there is less than 30 seconds between thunder and lightning go inside and stay inside for at least 30 minutes after the last thunder."</i> 	M
	8. Implement Site Specific Hazard Communication Program	<ol style="list-style-type: none"> 1. Procure Material Safety Data Sheets (MSDSs) for chemicals used exclusively on this project 2. Label containers used on site for hazardous materials 3. Identification of any additional hazard communication training requirements 	L
EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS	
Hand tools (dollies, hand carts, hand knives, etc.)	Visual inspection prior to use by user.	Review of AHA during pre-task tailgate safety briefing with the intended task participants.	
<p>Personal Protective Equipment Minimum: Safety toe boots, safety glasses. Optional items: Hardhat, hearing protection. HTRW: None anticipated for this task.</p>	Initial PPE inspection performed by SSO. Ongoing (prior to each use) inspections responsibilities of PPE users.	PPE training in proper use, care, storage, and limitations. It is anticipated that this has been covered in employees' 40 hour HAZWOPER training, which is to be verified by the SSO through initial training documentation and review prior to permitting personnel to participate in any onsite activities, and will be confirmed by visual observations of worker activities.	

I have read and understand this AHA:

Name (Printed)	Signature	Date



ACTIVITY HAZARD ANALYSIS (AHA)

Activity/Work Task: Site Survey	Overall Risk Assessment Code (RAC) (Use highest code)	M
Project Location: NAPR Full RFI	Risk Assessment Code (RAC) Matrix	
Contract Number: JM04	Severity	Probability
Date Prepared: February 6, 2012		Frequent Likely Occasional Seldom Unlikely
Prepared by: R. Brooks	Catastrophic	E E H H M
Reviewed by: J. Laffey	Critical	E H H M L
	Marginal	H M M L L
	Negligible	M L L L L
Notes: (Field Notes, Review Comments, etc.)	Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)	
	"Probability" is the likelihood to cause an incident, near miss, or accident and Identified as: Frequent, Likely, Occasional, Seldom, or Unlikely.	
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.	
	RAC Chart	
	E= Extremely High Risk	
	H= High Risk	
	M= Moderate Risk	
	L= Low Risk	

JOB STEPS	HAZARDS	CONTROLS	RAC
<ul style="list-style-type: none"> • Evaluate GPS accuracy • Establish investigation area boundary • Determine any inaccessible areas 	1. Minor cuts, abrasions or contusions	1. Wear cut-resistant gloves when handling items with sharp or rough edges.	M
	2. Heavy lifting (muscle strains and pulls)	1. Practice safe lifting techniques. Use mechanical lifting devices such as a dolly whenever possible 2. Ensure clear path of travel. 3. Have a good grasp on object. Perform "test lift" to gauge ability to safely make the lift. 4. Lift with legs not back. Obtain help when needed to lift large, bulky, or heavy items).	M
	3. Vehicular traffic when moving large equipment to the support area	1. Designate and mark vehicle and equipment staging areas. Inform the site personnel of heavy equipment areas and of their responsibility to stay clear of moving vehicles. 2. In high traffic areas, wear a high-visibility vest, shirt or jacket.	M
	4. Slips, Trips, Falls	1. Watch for tree branches, roots, weeds, limbs and other ground hazards. 2. Wear appropriate foot protection to prevent slips and trips. 3. Use caution when working on uneven and wet ground surfaces.	M
	5. Intermittent high noise levels	1. Site personnel are to wear hearing protection if noise levels are such that they must raise their voice in order to communicate with someone who is within arm's reach (approx. 2') of them. 2. SSO is responsible for determining and designating when hearing	L

ACTIVITY HAZARD ANALYSIS (AHA)

Site Survey

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JOB STEPS	HAZARDS	CONTROLS	RAC
		protection is required. 3. Hearing protection is to consist of either ear muffs or plugs that have a noise reduction rating (NRR) of at least 25 decibels (dB).	
	6. Inclement weather	1. The FOL and/or the SSHO will temporarily suspend outside activities in the event of electrical storms or high winds. 2. It is preferred that supported systems such as lightning detection devices or emergency weather broadcasts are employed. 3. However, when this is not possible field personnel should use the 30/30 Rule: <i>"If there is less than 30 seconds between thunder and lightning go inside and stay inside for at least 30 minutes after the last thunder."</i>	M
	7. MEC/MPPEH hazards	1. UXO Avoidance will be conducted by trained UXO Technicians. Non-UXO personnel will be escorted while in the area of concern. Exclusion zone distances will be defined based on those specified in the Work Plan. Operations within the safe separation distance for team operations will immediately stop if MEC/MPPEH is discovered and UXO Technicians will secure the area. All non-UXO personnel will leave the area. 2. If MEC/MPPEH is observed, the UXO Technician will mark the area for UXO Avoidance. The team will stop operations in the immediate area and take the following precautions: <ul style="list-style-type: none"> • MEC/MPPEH will not be moved during this phase of the operation. • The UXO Technician will visually inspect the MEC/MPPEH to determine the type and condition if possible. This identification and the location will be recorded in the logbook. • Suspect MEC/MPPEH items discovered will be reported to the Navy RPM by the UXO PM. 	M
	8. Chemical Exposure	1. As direct contact will be minimal given the nature of the work, it is unlikely that exposure will occur.	L
EQUIPMENT TO BE USED		INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
Hand tools (dollies, hand carts, hand knives, etc.)		Visual inspection prior to use by user.	Review of AHA during pre-task tailgate safety briefing with the intended task participants.

ACTIVITY HAZARD ANALYSIS (AHA)

Site Survey

Page 2 of 3

EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<p>Personal Protective Equipment: <u>Minimum:</u> Safety toe boots, safety glasses. <u>Optional items:</u> High-visibility vests when near active traffic areas. For UXO Technicians - Steel toe/shank boots are required when working in areas where there is a danger of foot injuries due to falling or rolling objects or of objects piercing the sole. If steel toe footwear cannot be worn because of interferences with UXO detection devices, safety impact footwear with non-metallic toe protection (provided that the footwear satisfies ANSI Z-41 requirements for protective footwear) shall be used. HTRW: Metals and MEC.</p>	<p>Initial PPE inspection performed by SSO. Ongoing (prior to each use) inspections responsibilities of PPE users.</p>	<p>PPE training in proper use, care, storage, and limitations. It is anticipated that this has been covered in employees' 40 hour HAZWOPER training, which is to be verified by the SSO through initial training documentation and review prior to permitting personnel to participate in any onsite activities, and will be confirmed by visual observations of worker activities.</p>

I have read and understand this AHA:

Name (Printed)	Signature	Date



ACTIVITY HAZARD ANALYSIS (AHA)

Activity/Work Task: Vegetation Management	Overall Risk Assessment Code (RAC) (Use highest code)	M				
Project Location: NAPR Full RFI	Risk Assessment Code (RAC) Matrix					
Contract Number: JM04	Severity	Probability				
Date Prepared: February 6, 2012		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by: R. Brooks	Catastrophic	E	E	H	H	M
	Critical	E	H	H	M	L
Reviewed by: J. Laffey	Marginal	H	M	M	L	L
	Negligible	M	L	L	L	L
Notes: (Field Notes, Review Comments, etc.)	Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)					
	"Probability" is the likelihood to cause an incident, near miss, or accident and Identified as: Frequent, Likely, Occasional, Seldom, or Unlikely.				RAC Chart	
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible				E= Extremely High Risk	
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.				H= High Risk	
				M= Moderate Risk		
				L= Low Risk		

JOB STEPS	HAZARDS	CONTROLS	RAC
Clear vegetation in accordance with the work plan, if necessary.	1. Brush clearing equipment	<ol style="list-style-type: none"> 1. Power equipment will be inspected prior to use in accordance with operating instructions. 2. Equipment must be operated by knowledgeable field personnel. 3. The SUXOS is responsible to identify the area to be cleared and the means to clear it. 4. Prior to the start of clearing and grubbing the equipment to be used will be: <ul style="list-style-type: none"> • Using the Equipment Inspection Checklist for Hand and Power Tools provided in Attachment III, inspected prior to beginning work. • Only manufacturer approved parts may be used in repair of site equipment. • Only personnel directly supporting the clearance activity will remain in the area, others will stay at least 50-100 feet away from the point of operation. • Site personnel will be instructed in the location and operation of the emergency shut off devices. • Secure all loose clothing articles to avoid possible entanglement. 5. If hand tools (brush hooks, machetes, etc.) are used to clear brush and small trees the following precautions should be followed: <ul style="list-style-type: none"> • Inspect handles are they in good condition (no cracks, splinters, loose heads/cutting apparatus. • Check cutting tools edges all blades should be sharp without nicks 	M

ACTIVITY HAZARD ANALYSIS (AHA)

Vegetation Management

JOB STEPS	HAZARDS	CONTROLS	RAC
		or gouges in the blade. <ul style="list-style-type: none"> • All hand tools (brush hooks, machetes, etc.) should be kept in a sheath when not in use. • A 10-foot perimeter will be established around areas where brush clearing is being conducted. 	
	2. Minor cuts, abrasions or contusions	1. Wear cut-resistant gloves when handling items with sharp or rough edges.	M
	3. Intermittent high noise levels	1. Site personnel are to wear hearing protection if noise levels are such that they must raise their voice in order to communicate with someone who is within arm's reach (approx. 2') of them. 2. SSO is responsible for determining and designating when hearing protection is required. 3. Hearing protection is to consist of either ear muffs or plugs that have a noise reduction rating (NRR) of at least 25 decibels (dB).	L
	4. Insect/animal bites	1. Tape up joint between the bottoms of pant legs and top of work boot with duct tape. 2. Apply insect repellants containing at least 10% DEET. 3. Follow manufacturer's label instructions for proper application and re-application. 4. Perform close body inspections at the end of each day to detect/remove any insects. 5. If walking through high grass or brush areas avoid approaching or disturbing potential nesting areas.	M
	5. Inclement weather	1. If electrical storms or inclement weather are in the area, as determined through local forecasting or weather alerts issued, the SUXOS will suspend outside activities. 2. The 30-30 rule shall be applied, which is "if a time interval of 30 seconds or less is between lightning and its thunder, go inside (building/vehicle) and stay inside for at least 30 minutes." 3. If no additional lightning and/or thunder are noted within these 30 minutes, work may resume at the UXOQC/UXOSO/SUXOS direction. 4. Personnel will be directed to seek suitable shelter that will provide adequate protection from the elements. <ol style="list-style-type: none"> 1. Lightning threat detection will be coordinated within NAPR existing systems. 	M
	6. MEC/MPPEH Hazards	1. MEC/MPPEH operations will be conducted by trained UXO Technicians. 2. Non-UXO personnel will be clear of the area during initial surveys.	M

JOB STEPS	HAZARDS	CONTROLS	RAC
		3. Exclusion zone distances will be defined based on those specified in the Work Plan/ESS. 4. Magnetometers will be tested using inert MEC/surrogates or industry standard objects (ISO). 5. Any MEC/MPPEH items on the surface and near surface will be flagged for UXO Avoidance. MEC/MPPEH will not be moved during vegetation management. 6. UXO Technicians will clear vehicle and foot travel paths within the area. Support personnel and equipment will wait until the clearance is complete. <ul style="list-style-type: none"> • If MEC is observed, the UXO Technician making the observation will signal to stop operations and take the following precautions: • The UXO Technician will visually inspect the MEC/MPPEH to determine the type and condition if possible. • This identification and the location will be recorded in the logbook. • No MEC/MPPEH item discovered during vegetation management operations will be moved. • Suspect MEC/MPPEH items discovered will be reported to the Navy RPM by the UXO PM. 	
	7. Strains/sprains from heavy or improper lifting	1. Practice safe lifting techniques (use mechanical lifting devices such as a dolly whenever possible, ensure a clear path of travel and good grasp on objects, lift with legs not back, and obtain help when needed to lift large, bulky, or heavy items).	M
	8. Slip/trip/fall hazards	1. Implement and maintain good housekeeping practices throughout work areas. 2. Preview walking/working areas and maintain them to identify and avoid possible slipping/tripping hazards. 3. Preview work locations for unstable/uneven terrain.	L
	9. Chemical exposure	1. As direct contact will be minimal given the nature of the work, it is unlikely that exposure will occur.	L
EQUIPMENT TO BE USED		INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
Personal Protective Equipment: <u>Minimum:</u> Steel toe boots, hard hats, and safety impact eye protection, work gloves, work clothes. Optional items: Hearing protection at UXOQCS/SO/SUXOS		PPE inspection performed by the SUXOS. Ongoing (prior to each use) inspections are the responsibility of PPE users.	PPE training in proper use, care, storage, and limitations. It is anticipated that this has been covered in employees' 40-hour HAZWOPER training, which is

ACTIVITY HAZARD ANALYSIS (AHA)
Vegetation Management
Page 4 of 4

EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<p>discretion, Chainsaw Chaps and Loggers helmet with full face shield (when operating chainsaws and handheld brush cutters) High-visibility vests when near active traffic areas. For UXO Technicians - Steel toe/shank boots are required when working in areas where there is a danger of foot injuries due to falling or rolling objects or of objects piercing the sole. If steel toe footwear cannot be worn because of interferences with UXO detection devices, safety impact footwear with non-metallic toe protection (provided that the footwear satisfies ANSI Z-41 requirements for protective footwear) shall be used. HTRW: Metals and MEC</p>	<p>One UXO technician will be assigned the responsibility of safety observer to watch for any potential MEC/MPPEH. This individual will not operate equipment or otherwise be involved in vegetation clearance operations.</p>	<p>to be verified by the UXOQCS/SO through initial training documentation and reviewed prior to permitting personnel to participate in site activities, and will be confirmed by visual observations of worker activities.</p>

I have read and understand this AHA:

Name (Printed)	Signature	Date



ACTIVITY HAZARD ANALYSIS (AHA)

Activity/Work Task: UXO Detector-Aided Survey	Overall Risk Assessment Code (RAC) (Use highest code)	M				
Project Location: NAPR Full RFI	Risk Assessment Code (RAC) Matrix					
Contract Number: JM04	Severity	Probability				
Date Prepared: February 6, 2012		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by: R. Brooks	Catastrophic	E	E	H	H	M
	Critical	E	H	H	M	L
	Marginal	H	M	M	L	L
Reviewed by: J. Laffey	Negligible	M	L	L	L	L
Notes: (Field Notes, Review Comments, etc.)	Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)					
	"Probability" is the likelihood to cause an incident, near miss, or accident and Identified as: Frequent, Likely, Occasional, Seldom, or Unlikely.				RAC Chart	
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible				E= Extremely High Risk	
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.				H= High Risk	
				M= Moderate Risk		
				L= Low Risk		

JOB STEPS	HAZARDS	CONTROLS	RAC
Detector-Aided Surface Survey in step out transects (If step outs are required)	1. Insect/animal bites	1. Tape up joint between the bottoms of pant legs and top of work boot with duct tape. 2. Apply insect repellants containing at least 10% DEET. 3. Follow manufacturer's label instructions for proper application and re-application. 4. Perform close body inspections at the end of each day to detect/remove any insects. 5. If walking through high grass or brush areas avoid approaching or disturbing potential nesting areas.	M
	2. Minor cuts, abrasions or contusions	1. Wear cut-resistant gloves when handling items with sharp or rough edges.	M
	3. Intermittent high noise levels	1. Site personnel are to wear hearing protection if noise levels are such that they must raise their voice in order to communicate with someone who is within arm's reach (approx. 2') of them. 2. SSO is responsible for determining and designating when hearing protection is required. 3. Hearing protection is to consist of either ear muffs or plugs that have a noise reduction rating (NRR) of at least 25 decibels (dB).	L

ACTIVITY HAZARD ANALYSIS (AHA)

UXO Detector-Aided Survey

JOB STEPS	HAZARDS	CONTROLS	RAC
	4. Inclement weather	<ol style="list-style-type: none"> 1. If electrical storms or inclement weather are in the area, as determined through local forecasting or weather alerts issued, the SUXOS will suspend outside activities. 2. The 30-30 rule shall be applied, which is “if a time interval of 30 seconds or less is between lightning and its thunder, go inside (building/vehicle) and stay inside for at least 30 minutes.” 3. If no additional lightning and/or thunder are noted within these 30 minutes, work may resume at the UXOQC/UXOSO/SUXOS direction. 4. Personnel will be directed to seek suitable shelter that will provide adequate protection from the elements. 5. Lightning threat detection will be coordinated within NAPR existing systems. 	M
	5. MEC/MPPEH Hazards	<ol style="list-style-type: none"> 1. MEC/MPPEH operations will be conducted by trained UXO Technicians. 2. Non-UXO personnel will be clear of the area during initial surveys and intrusive investigation activities. 3. Exclusion zone distances will be defined based on those specified in the Work Plan/ESS. 4. Magnetometers will be tested using inert MEC/surrogates or Industry Standard Objects (ISO). 5. Any MEC/MPPEH items on the surface and near surface that has been determined to be safe to move, may be moved for later disposal, or disposed of using blow in place (BIP) procedures. 6. UXO Technicians will clear vehicle and foot travel paths within the area. Support personnel and equipment will wait until the clearance is complete. <ul style="list-style-type: none"> • If MEC is observed, the UXO Technician making the observation will signal to stop operations and take the following precautions: • The UXO Technician will visually inspect the MEC/MPPEH to determine the type and condition if possible. • This identification and the exact location will be recorded in the logbook. • Any suspect MEC/MPPEH item discovered during UXO Surface Survey operations which has been determined 	M

ACTIVITY HAZARD ANALYSIS (AHA)

UXO Detector-Aided Survey

JOB STEPS	HAZARDS	CONTROLS	RAC
		<p>safe to move, may be moved to a designated holding area for later disposal, or treated using BIP procedures as stated in the Work Plan and ESS.</p> <ul style="list-style-type: none"> • Suspect MEC/MPPEH items discovered will be reported to the Navy RPM by the UXO PM. • An inventory will be maintained by the SUXOS with locations and descriptions for suspect MEC/MPPEH discovered during this operation, and the Navy RPM will be provided an inventory update on a daily basis. 	
	6. Items under moratorium	<ol style="list-style-type: none"> 1. MEC/MPPEH CS rounds that are not safe to move will be reported to EOD. 2. EOD will either provide Level 1 response in which case EOD will handle all treatment and final disposition or direct a Level 2 response in which the on-site UXO team will perform treatment and final disposition of the item. 3. Material Document as an Explosive Hazard (MDEH) CS Rounds that are safe to move will be packaged and transported to Pine Bluff Arsenal for final disposition. 4. An interim hazard classification (IHC) will be obtained prior to shipment. 5. Assure the provision is made to assure no downwind hazards exist. 6. In addition, assure that appropriate protective full face gas masks are available for use by site personnel. 	M
	7. Strains/sprains from heavy or improper lifting	<ol style="list-style-type: none"> 1. Practice safe lifting techniques (use mechanical lifting devices such as a dolly whenever possible, ensure a clear path of travel and good grasp on objects, lift with legs not back, and obtain help when needed to lift large, bulky, or heavy items). 	M
	8. Slip/trip/fall hazards	<ol style="list-style-type: none"> 1. Implement and maintain good housekeeping practices throughout work areas. 2. Preview walking/working areas and maintain them to identify and avoid possible slipping/tripping hazards. 3. Preview work locations for unstable/uneven terrain. 	L
	9. Chemical exposure	<ol style="list-style-type: none"> 1. As direct contact will be minimal given the nature of the work, it is unlikely that exposure will occur. 	L

ACTIVITY HAZARD ANALYSIS (AHA)

UXO Detector-Aided Survey

EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<p>Personal Protective Equipment: <u>Minimum:</u> Steel toe boots, hard hats, and safety impact eye protection, work gloves, work clothes.</p> <p><u>Optional items:</u> Hearing protection at UXOQCS/SO/SUXOS discretion, High-visibility vests when near active traffic areas. For UXO Technicians - Steel toe/shank boots are required when working in areas where there is a danger of foot injuries due to falling or rolling objects or of objects piercing the sole. If steel toe footwear cannot be worn because of interferences with UXO detection devices, safety impact footwear with non-metallic toe protection (provided that the footwear satisfies ANSI Z-41 requirements for protective footwear) shall be used.</p> <p>If respiratory protection is needed a North 54500 Series air-purifying respirator with a 40CBRN Canister</p> <p>HTRW: Metals and MEC</p>	<p>PPE inspection performed by the SUXOS. Ongoing (prior to each use) inspections are the responsibility of PPE users. One UXO technician will be assigned the responsibility of safety observer to watch for any potential MEC/MPPEH. This individual will not operate equipment or otherwise be involved in vegetation clearance operations.</p>	<p>PPE training in proper use, care, storage, and limitations. It is anticipated that this has been covered in employees' 40-hour HAZWOPER training, which is to be verified by the UXOQCS/SO through initial training documentation and reviewed prior to permitting personnel to participate in site activities, and will be confirmed by visual observations of worker activities.</p> <p>Explosive handling and transportation will be conducted by qualified UXO Technicians. This training and background is considered sufficient for this task.</p>

I have read and understand this AHA:

Name (Printed)	Signature	Date



ACTIVITY HAZARD ANALYSIS (AHA)

Activity/Work Task: GPS Positional Data Collection	Overall Risk Assessment Code (RAC) (Use highest code)	M
Project Location: NAPR Full RFI	Risk Assessment Code (RAC) Matrix	
Contract Number: JM04	Severity	Probability
Date Prepared: February 6, 2012		Frequent Likely Occasional Seldom Unlikely
Prepared by: R. Brooks	Catastrophic	E E H H M
Reviewed by: J. Laffey	Critical	E H H M L
	Marginal	H M M L L
	Negligible	M L L L L
Notes: (Field Notes, Review Comments, etc.)	Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)	
	"Probability" is the likelihood to cause an incident, near miss, or accident and Identified as: Frequent, Likely, Occasional, Seldom, or Unlikely.	RAC Chart
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	E= Extremely High Risk
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.	H= High Risk
		M= Moderate Risk
		L= Low Risk

JOB STEPS	HAZARDS	CONTROLS	RAC
Perform Daily QC checks. Record and report the necessary data.	1. Insect/animal bites	1. Tape up joint between the bottoms of pant legs and top of work boot with duct tape. 2. Apply insect repellants containing at least 10% DEET. 3. Follow manufacturer's label instructions for proper application and re-application. 4. Perform close body inspections at the end of each day to detect/remove any insects. 5. If walking through high grass or brush areas avoid approaching or disturbing potential nesting areas.	M
	2. Inclement weather	1. If electrical storms or inclement weather are in the area, as determined through local forecasting or weather alerts issued, the SUXOS will suspend outside activities. 2. The 30-30 rule shall be applied, which is "if a time interval of 30 seconds or less is between lightning and its thunder, go inside (building/vehicle) and stay inside for at least 30 minutes." 3. If no additional lightning and/or thunder are noted within these 30 minutes, work may resume at the UXOQC/UXOSO/SUXOS direction. 4. Personnel will be directed to seek suitable shelter that will provide adequate protection from the elements. 5. Lightning threat detection will be coordinated within NAPR existing systems.	M

ACTIVITY HAZARD ANALYSIS (AHA)
GPS Positional Data Collection
Page 2 of 4

JOB STEPS	HAZARDS	CONTROLS	RAC
	3. MEC/MPPEH Hazards	<ol style="list-style-type: none"> 1. MEC/MPPEH operations will be conducted by trained UXO Technicians. 2. Non-UXO personnel will be clear of the area during initial surveys. 3. Exclusion zone distances will be defined based on those specified in the Work Plan/ESS. 4. Magnetometers will be tested using inert MEC/surrogates or Industry Standard Objects (ISO). 5. Any MEC/MPPEH items on the surface and near surface will be flagged for UXO Avoidance. MEC/MPPEH will not be moved during GPS Data Collection. 6. UXO Technicians will clear vehicle and foot travel paths within the area. Support personnel and equipment will wait until the clearance is complete. <ul style="list-style-type: none"> • If MEC is observed, the UXO Technician making the observation will signal to stop operations and take the following precautions: • The UXO Technician will visually inspect the MEC/MPPEH to determine the type and condition if possible. • This identification and the location will be recorded in the logbook. • No MEC/MPPEH item discovered during GPS Data Collection operations will be moved. • Suspect MEC/MPPEH items discovered will be reported to the Navy RPM by the UXO PM. 	M
	4. Strains/sprains from heavy or improper lifting	<ol style="list-style-type: none"> 1. Practice safe lifting techniques (use mechanical lifting devices such as a dolly whenever possible, ensure a clear path of travel and good grasp on objects, lift with legs not back, and obtain help when needed to lift large, bulky, or heavy items). 	M
	5. Slip/trip/fall hazards	<ol style="list-style-type: none"> 1. Implement and maintain good housekeeping practices throughout work areas. 2. Preview walking/working areas and maintain them to identify and avoid possible slipping/tripping hazards. 3. Preview work locations for unstable/uneven terrain. 	L
	6. Chemical exposure	<ol style="list-style-type: none"> 1. As direct contact will be minimal given the nature of the work, it is unlikely that exposure will occur. 	L
	7. Minor cuts, abrasions or contusions	<ol style="list-style-type: none"> 1. Wear cut-resistant gloves when handling items with sharp or rough edges. 	M
	8. Intermittent high noise levels	<ol style="list-style-type: none"> 1. Site personnel are to wear hearing protection if noise levels are such that they must raise their voice in order to communicate with someone who is 	L

ACTIVITY HAZARD ANALYSIS (AHA)
GPS Positional Data Collection
Page 3 of 4

JOB STEPS	HAZARDS	CONTROLS	RAC
		within arm's reach (approx. 2') of them. 2. SSO is responsible for determining and designating when hearing protection is required. 3. Hearing protection is to consist of either ear muffs or plugs that have a noise reduction rating (NRR) of at least 25 decibels (dB).	
EQUIPMENT TO BE USED		INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<p>Personal Protective Equipment: <u>Minimum:</u> Steel toe boots, hard hats, and safety impact eye protection, work gloves, work clothes.</p> <p><u>Optional items:</u> Hearing protection at UXOQCS/SO/SUXOS discretion, High-visibility vests when near active traffic areas. For UXO Technicians - Steel toe/shank boots are required when working in areas where there is a danger of foot injuries due to falling or rolling objects or of objects piercing the sole. If steel toe footwear cannot be worn because of interferences with UXO detection devices, safety impact footwear with non-metallic toe protection (provided that the footwear satisfies ANSI Z-41 requirements for protective footwear) shall be used.</p> <p><u>HTRW:</u> Metals and MEC</p>		PPE inspection performed by the SUXOS. Ongoing (prior to each use) inspections are the responsibility of PPE users. One UXO technician will be assigned the responsibility of safety observer to watch for any potential MEC/MPPEH. This individual will not operate equipment or otherwise be involved in vegetation clearance operations.	PPE training in proper use, care, storage, and limitations. It is anticipated that this has been covered in employees' 40-hour HAZWOPER training, which is to be verified by the UXOQCS/SO through initial training documentation and reviewed prior to permitting personnel to participate in site activities, and will be confirmed by visual observations of worker activities.

I have read and understand this AHA:

Name (Printed)	Signature	Date



ACTIVITY HAZARD ANALYSIS (AHA)

Activity/Work Task: Donor Explosives Handling and Storage	Overall Risk Assessment Code (RAC) (Use highest code)				M	
Project Location: NAPR Full RFI	Risk Assessment Code (RAC) Matrix					
Contract Number: JM04	Severity	Probability				
Date Prepared: February 6, 2012		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by: R. Brooks	Catastrophic	E	E	H	H	M
Reviewed by: J. Laffey	Critical	E	H	H	M	L
	Marginal	H	M	M	L	L
Notes: (Field Notes, Review Comments, etc.)	Negligible	M	L	L	L	L
	Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)					
	"Probability" is the likelihood to cause an incident, near miss, or accident and Identified as: Frequent, Likely, Occasional, Seldom, or Unlikely.				RAC Chart	
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible				E= Extremely High Risk	
Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.				H= High Risk		
				M= Moderate Risk		
				L= Low Risk		
JOB STEPS	HAZARDS	CONTROLS			RAC	
This activity includes receipt, storage, and transfer of explosives and explosive components.	1. Explosive handling	1. Only UXO Technicians will be permitted to handle and/or transport explosives and detonators. 2. Only UXO Technicians will be permitted to load and detonate explosive materials per this scope of work.			M	
	2. Initiating explosions	1. Segregation - Strict adherence will be practiced with regard to the segregation of initiating devices (cord and detonators) from the donor explosives during storage and transport. 2. Non-essential personnel will be restricted from operating area			M	
	3. Storage Precautions	1. The following requirements shall be adhered to when storing explosives: <ul style="list-style-type: none"> • Store explosives and explosives devices in an authorized storage facility (e.g., secured magazine repository, vault, cubicle, room, or separate facility). • Assure that each container of explosives is properly labeled. • Segregate explosives from detonating devices, incompatible materials. • Environmental conditions within the storage facility shall be maintained as not to subject the explosives to excessive heat and/or cold. Humidity levels above 60% will prevent static electrical 			M	

JOB STEPS	HAZARDS	CONTROLS	RAC
		<p>accumulation and discharge. If humidity is below 60%, personnel will establish a ground prior to handling explosives.</p> <ul style="list-style-type: none"> • Stacks of explosives shall be arranged so that air freely circulates to all parts of the stack. • Pallets or appropriate cribbing shall be used to ensure that containers are not stacked directly on the magazine floor. • Maintain a running inventory. • Inspect storage locations and explosives containers at least once a week to ensure continued safe storage. • Storage buildings should be kept clear of combustible or flammable storage/debris at least 25-feet surrounding the perimeter. • If lights are used within the building they shall be intrinsically safe configuration. • All temporary storage facilities will be properly grounded to provide protection against electrical hazards. • Appropriate signage indicating storage content as well as safety signs (NO SMOKING, NO OPEN FLAMES OR SPARK PRODUCING DEVICES) will be placed surrounding the storage. 	
	<p>4. Hazard Communication/ Emergency action procedures</p>	<ol style="list-style-type: none"> 1. Hazard communication will be an integral part of explosive handling to alert transport workers and emergency response personnel of the presence of explosives, extensive hazard communication requirements apply to explosives. These include identifying materials on transport documents, providing specific emergency response information with the transport document and a 24-hour telephone number where more detailed information may be obtained, markings and labels on packaging as well as placarding of the transport units. 2. Each employee is required to be trained on the hazards of materials they handle and their specific responsibilities. <ul style="list-style-type: none"> • Toxicity - Explosives materials, explosives components (additives or adhesives), and materials such as organic solvents used in the explosives processing procedure that can be toxic when inhaled, ingested, or absorbed through the skin. • The most frequently reported effect from working with explosives is a skin rash resulting from skin contact with explosives materials, or with solvents and adhesives used with explosives operations. The following general precautions should be used to: <ul style="list-style-type: none"> - Know the health hazard and controls before beginning operations. 	<p>M</p>

ACTIVITY HAZARD ANALYSIS (AHA)
Donor Explosives Handling and Storage
Page 3 of 5

JOB STEPS	HAZARDS	CONTROLS	RAC
		<ul style="list-style-type: none"> - Read the MSDS. If you have questions ask the SUXOS and/or the UXOSO for clarification. - Handle materials in a well-ventilated area; where this is not possible local exhaust ventilation is preferred. - Avoid skin contact; use surgeon's gloves when necessary to avoid direct skin contact and absorption. - Cotton coveralls are also recommended. - The UXOSO may recommend additional PPE based on site specific conditions. - Practice good work/personal hygiene. - Wash before eating, drinking, or smoking (hand to mouth activities), or using toilet facilities; end-of-shift showers 	
	6. Insect/animal bites	<ol style="list-style-type: none"> 1. Tape up joint between the bottoms of pant legs and top of work boot with duct tape. 2. Apply insect repellants containing at least 10% DEET. 3. Follow manufacturer's label instructions for proper application and re-application. 4. Perform close body inspections at the end of each day to detect/remove any insects. 5. If walking through high grass or brush areas avoid approaching or disturbing potential nesting areas. 	M
	7. Inclement weather	<ol style="list-style-type: none"> 1. If electrical storms or inclement weather are in the area, as determined through local forecasting or weather alerts issued, the SUXOS will suspend outside activities. 2. The 30-30 rule shall be applied, which is "if a time interval of 30 seconds or less is between lightning and its thunder, go inside (building/vehicle) and stay inside for at least 30 minutes." 3. If no additional lightning and/or thunder are noted within these 30 minutes, work may resume at the UXOQC/UXOSO/SUXOS direction. 4. Personnel will be directed to seek suitable shelter that will provide adequate protection from the elements. 5. Lightning threat detection will be coordinated within NAPR existing systems. 	M
	8. MEC/MPPEH Hazards	<ol style="list-style-type: none"> 1. MEC/MPPEH operations will be conducted by trained UXO Technicians. 2. Non-UXO personnel will be clear of the area during donor explosives handling and storage activities. 	M

ACTIVITY HAZARD ANALYSIS (AHA)
Donor Explosives Handling and Storage
Page 4 of 5

JOB STEPS	HAZARDS	CONTROLS	RAC
		3. Exclusion zone distances will be defined based on those specified in the Work Plan/ESS.	
	9. Items under moratorium	1. MEC/MPPEH CS rounds that are not safe to move will be reported to EOD. 2. EOD will either provide Level 1 response in which case EOD will handle all treatment and final disposition or direct a Level 2 response in which the on-site UXO team will perform treatment and final disposition of the item. 3. MDEH CS Rounds that are safe to move will be packaged and transported to Pine Bluff Arsenal for final disposition. 4. An IHC will be obtained prior to shipment. 5. Assure the provision is made to assure no downwind hazards exist. 6. In addition, assure that appropriate protective full face gas masks are available for use by site personnel.	
	10. Strains/sprains from heavy or improper lifting	1. Practice safe lifting techniques (use mechanical lifting devices such as a dolly whenever possible, ensure a clear path of travel and good grasp on objects, lift with legs not back, and obtain help when needed to lift large, bulky, or heavy items).	M
	11. Slip/trip/fall hazards	1. Implement and maintain good housekeeping practices throughout work areas. 2. Preview walking/working areas and maintain them to identify and avoid possible slipping/tripping hazards. 3. Preview work locations for unstable/uneven terrain.	L
	12. Chemical exposure	1. As direct contact will be minimal given the nature of the work, it is unlikely that exposure will occur.	L
	13. Minor cuts, abrasions or contusions	1. Wear cut-resistant gloves when handling items with sharp or rough edges.	M
	14. Intermittent high noise levels	1. Site personnel are to wear hearing protection if noise levels are such that they must raise their voice in order to communicate with someone who is within arm's reach (approx. 2') of them. 2. SSO is responsible for determining and designating when hearing protection is required. 3. Hearing protection is to consist of either ear muffs or plugs that have a noise reduction rating (NRR) of at least 25 decibels (dB).	L

ACTIVITY HAZARD ANALYSIS (AHA)
Donor Explosives Handling and Storage
 Page 5 of 5

EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<p>Personal Protective Equipment: <u>Minimum</u>: Steel toe boots, hard hats, and safety impact eye protection, work gloves, work clothes.</p> <p><u>Optional items</u>: Hearing protection at UXOQCS/SO/SUXOS discretion, High-visibility vests when near active traffic areas. For UXO Technicians - Steel toe/shank boots are required when working in areas where there is a danger of foot injuries due to falling or rolling objects or of objects piercing the sole. If steel toe footwear cannot be worn because of interferences with UXO detection devices, safety impact footwear with non-metallic toe protection (provided that the footwear satisfies ANSI Z-41 requirements for protective footwear) shall be used.</p> <ul style="list-style-type: none"> • Soft sole shoes without metal fasteners (will not interfere with metal detectors/magnetometers) • Coveralls (No metal fasteners) • Surgeons glove for handling explosives • No outer or inner garments having static-electricity-generating characteristics. <p>If respiratory protection is needed a North 54500 Series air-purifying respirator with a 40CBRN Canister</p> <p>HTRW: Metals and MEC</p>	<p>PPE inspection performed by the SUXOS. Ongoing (prior to each use) inspections are the responsibility of PPE users. One UXO technician will be assigned the responsibility of safety observer to watch for any potential MEC/MPPEH. This individual will not operate equipment or otherwise be involved in vegetation clearance operations.</p>	<p>PPE training in proper use, care, storage, and limitations. It is anticipated that this has been covered in employees' 40-hour HAZWOPER training, which is to be verified by the UXOQCS/SO through initial training documentation and reviewed prior to permitting personnel to participate in site activities, and will be confirmed by visual observations of worker activities.</p> <p>Explosive handling and transportation will be conducted by qualified UXO Technicians. This training and background is considered sufficient for this task.</p>

I have read and understand this AHA:

Name (Printed)	Signature	Date



ACTIVITY HAZARD ANALYSIS (AHA)

Activity/Work Task: MEC/MPPEH Management <ul style="list-style-type: none"> Treatment Inspection Certification Disposal 	Overall Risk Assessment Code (RAC) (Use highest code)	H																								
Project Location: NAPR Full RFI	Risk Assessment Code (RAC) Matrix																									
Contract Number: JM04	Severity	Probability																								
Date Prepared: February 6, 2012		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Frequent</td> <td style="width: 15%;">Likely</td> <td style="width: 15%;">Occasional</td> <td style="width: 15%;">Seldom</td> <td style="width: 15%;">Unlikely</td> </tr> <tr> <td style="text-align: center;">Catastrophic</td> <td style="text-align: center;">E</td> <td style="text-align: center;">E</td> <td style="text-align: center;">H</td> <td style="text-align: center;">H</td> </tr> <tr> <td style="text-align: center;">Critical</td> <td style="text-align: center;">E</td> <td style="text-align: center;">H</td> <td style="text-align: center;">H</td> <td style="text-align: center;">M</td> </tr> <tr> <td style="text-align: center;">Marginal</td> <td style="text-align: center;">H</td> <td style="text-align: center;">M</td> <td style="text-align: center;">M</td> <td style="text-align: center;">L</td> </tr> <tr> <td style="text-align: center;">Negligible</td> <td style="text-align: center;">M</td> <td style="text-align: center;">L</td> <td style="text-align: center;">L</td> <td style="text-align: center;">L</td> </tr> </table>	Frequent	Likely	Occasional	Seldom	Unlikely	Catastrophic	E	E	H	H	Critical	E	H	H	M	Marginal	H	M	M	L	Negligible	M	L	L
Frequent	Likely	Occasional	Seldom	Unlikely																						
Catastrophic	E	E	H	H																						
Critical	E	H	H	M																						
Marginal	H	M	M	L																						
Negligible	M	L	L	L																						
Prepared by: R. Brooks																										
Reviewed by: J. Laffey																										
Notes: (Field Notes, Review Comments, etc.)	Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)																									
	"Probability" is the likelihood to cause an incident, near miss, or accident and Identified as: Frequent, Likely, Occasional, Seldom, or Unlikely.																									
	RAC Chart																									
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	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.																									
	E= Extremely High Risk	H= High Risk																								
	M= Moderate Risk	L= Low Risk																								

JOB STEPS	HAZARDS	CONTROLS	RAC
This activity includes receipt, storage, and transfer of explosives and explosive components.	1. Explosive handling	1. Only UXO Technicians will be permitted to handle and/or transport explosives and detonators. 2. Only UXO Technicians will be permitted to load and detonate explosive materials per this scope of work.	M
	2. Initiating explosions	1. Segregation - Strict adherence will be practiced with regard to the segregation of initiating devices (cord and detonators) from the explosives during storage and transport. 2. Non-essential personnel will be restricted from operating area	M
	3. Storage Precautions	1. The following requirements shall be adhered to when storing explosives: <ul style="list-style-type: none"> Store explosives and explosives devices in an authorized storage facility (e.g., secured magazine repository, vault, cubicle, room, or separate facility). Assure that each container of explosives is properly labeled. 	M

JOB STEPS	HAZARDS	CONTROLS	RAC
		<ul style="list-style-type: none"> • Segregate explosives from detonating devices, incompatible materials. • Environmental conditions within the storage facility shall be maintained as not to subject the explosives to excessive heat and/or cold. Humidity levels above 60% will prevent static electrical accumulation and discharge. If humidity is below 60%, personnel will establish a ground prior to handling explosives. • Stacks of explosives shall be arranged so that air freely circulates to all parts of the stack. • Pallets or appropriate cribbing shall be used to ensure that containers are not stacked directly on the magazine floor. • Maintain a running inventory. • Inspect storage locations and explosives containers at least once a week to ensure continued safe storage. • Storage buildings should be kept clear of combustible or flammable storage/debris at least 25-feet surrounding the perimeter. • If lights are used within the building they shall be intrinsically safe configuration. • All temporary storage facilities will be properly grounded to provide protection against electrical hazards. • Appropriate signage indicating storage content as well as safety signs (NO SMOKING, NO OPEN FLAMES OR SPARK PRODUCING DEVICES) will be placed surrounding the storage. 	
	<p>4. Hazard Communication/ Emergency action procedures</p>	<ol style="list-style-type: none"> 1. Hazard communication will be an integral part of explosive handling to alert transport workers and emergency response personnel of the presence of explosives, extensive hazard communication requirements apply to explosives. These include identifying materials on transport documents, providing specific emergency response information with the transport document and a 24-hour telephone number where more detailed information may be obtained, markings and labels on packaging as well as placarding of the transport units. 2. Each employee is required to be trained on the hazards of materials they handle and their specific responsibilities. <ul style="list-style-type: none"> • Toxicity - Explosives materials, explosives components (additives or adhesives), and materials such as organic solvents used in the explosives processing procedure that can be toxic when inhaled, ingested, or absorbed through the skin. 	M

JOB STEPS	HAZARDS	CONTROLS	RAC
		<ul style="list-style-type: none"> • The most frequently reported effect from working with explosives is a skin rash resulting from skin contact with explosives materials, or with solvents and adhesives used with explosives operations. The following general precautions should be used to: <ul style="list-style-type: none"> - Know the health hazard and controls before beginning operations. - Read the MSDS. If you have questions ask the SUXOS and/or the UXOSO for clarification. - Handle materials in a well-ventilated area; where this is not possible local exhaust ventilation is preferred. - Avoid skin contact; use surgeon's gloves when necessary to avoid direct skin contact and absorption. - Cotton coveralls are also recommended. - The UXOSO may recommend additional PPE based on site specific conditions. - Practice good work/personal hygiene. - Wash before eating, drinking, or smoking (hand to mouth activities), or using toilet facilities; end-of-shift showers 	
	5. Insect/animal bites	<ol style="list-style-type: none"> 1. Tape up joint between the bottoms of pant legs and top of work boot with duct tape. 2. Apply insect repellants containing at least 10% DEET. 3. Follow manufacturer's label instructions for proper application and re-application. 4. Perform close body inspections at the end of each day to detect/remove any insects. 5. If walking through high grass or brush areas avoid approaching or disturbing potential nesting areas. 	M
	6. Inclement weather	<ol style="list-style-type: none"> 1. If electrical storms or inclement weather are in the area, as determined through local forecasting or weather alerts issued, the SUXOS will suspend outside activities. 2. The 30-30 rule shall be applied, which is "if a time interval of 30 seconds or less is between lightning and its thunder, go inside (building/vehicle) and stay inside for at least 30 minutes." 3. If no additional lightning and/or thunder are noted within these 30 minutes, work may resume at the UXOQC/UXOSO/SUXOS direction. 4. Personnel will be directed to seek suitable shelter that will provide adequate protection from the elements. 5. Lightning threat detection will be coordinated within NAPR existing systems. 	M

JOB STEPS	HAZARDS	CONTROLS	RAC
	7. MEC/MPPEH Hazards	<p>MEC/MPPEH operations will be conducted by trained UXO Technicians.</p> <ul style="list-style-type: none"> • Non-UXO personnel will be clear of the area during MEC/MPPEH Management activities. • Exclusion zone distances will be defined based on those specified in the Work Plan/ESS. • Any MEC/MPPEH items on the surface and near surface that has been determined to be safe to move, may be moved for later disposal, or disposed of using blow in place (BIP) procedures. • UXO Technicians will clear vehicle and foot travel paths within the area. Support personnel and equipment will wait until the clearance is complete. • If MEC is observed, the UXO Technician making the observation will signal to stop operations and take the following precautions: • The UXO Technician will visually inspect the MEC/MPPEH to determine the type and condition if possible. • This identification and the location will be recorded in the logbook. • MEC/MPPEH item discovered during UXO Survey operations which has been determined safe to move, may be moved to a designated holding area for later disposal, or treated using BIP procedures as stated in the Work Plan and ESS. • An inventory will be maintained by the SUXOS with locations and disposition of MEC/MPPEH discovered during this operation, and the Navy RPM will be provided an inventory update on a daily basis. • MDAS will be secured separate from MEC/MPPEH/MDEH • MDEH will be treated as MEC. 	H
	8. Items under moratorium	<ol style="list-style-type: none"> 1. MEC/MPPEH CS rounds that are not safe to move will be reported to EOD. 2. EOD will either provide Level 1 response in which case EOD will handle all treatment and final disposition or direct a Level 2 response in which the on-site UXO team will perform treatment and final disposition of the item. 3. MDEH CS Rounds that are safe to move will be packaged and transported to Pine Bluff Arsenal for final disposition. 4. An IHC will be obtained prior to shipment. 5. Assure the provision is made to assure no downwind hazards exist. 6. In addition, assure that appropriate protective full face gas masks 	H

ACTIVITY HAZARD ANALYSIS (AHA)

MEC/MPPEH Management

JOB STEPS	HAZARDS	CONTROLS	RAC
		are available for use by site personnel.	
	9. Strains/sprains from heavy or improper lifting	1. Practice safe lifting techniques (use mechanical lifting devices such as a dolly whenever possible, ensure a clear path of travel and good grasp on objects, lift with legs not back, and obtain help when needed to lift large, bulky, or heavy items).	M
	10. Slip/trip/fall hazards	1. Implement and maintain good housekeeping practices throughout work areas. 2. Preview walking/working areas and maintain them to identify and avoid possible slipping/tripping hazards. 3. Preview work locations for unstable/uneven terrain.	L
	11. Chemical Exposure	1. As direct contact will be minimal given the nature of the work, it is unlikely that exposure will occur. 2. If working with HC, colored smokes, WP, RP CN, and CS respirator protection may be required at the UXOSO/SUXOS discretion.	L
	12. Minor cuts, abrasions or contusions	1. Wear cut-resistant gloves when handling items with sharp or rough edges.	M
	13. Intermittent high noise levels	1. Site personnel are to wear hearing protection if noise levels are such that they must raise their voice in order to communicate with someone who is within arm's reach (approx. 2') of them. 2. SSO is responsible for determining and designating when hearing protection is required. 3. Hearing protection is to consist of either ear muffs or plugs that have a noise reduction rating (NRR) of at least 25 decibels (dB).	L
EQUIPMENT TO BE USED		INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<p>Personal Protective Equipment: <u>Minimum</u>: Steel toe boots, hard hats, and safety impact eye protection, work gloves, work clothes.</p> <p><u>Optional items</u>: Hearing protection at UXOSO/SUXOS discretion, High-visibility vests when near active traffic areas. For UXO Technicians - Steel toe/shank boots are required when working in areas where there is a danger of foot injuries due to falling or rolling objects or of objects piercing the sole. If steel toe footwear cannot be worn because of interferences with UXO detection devices, safety impact footwear with non-metallic toe protection (provided that the footwear satisfies ANSI Z-41 requirements for protective footwear) shall be used.</p>		<p>PPE inspection performed by the SUXOS. Ongoing (prior to each use) inspections are the responsibility of PPE users. One UXO technician will be assigned the responsibility of safety observer to watch for any potential MEC/MPPEH.</p>	<p>PPE training in proper use, care, storage, and limitations. It is anticipated that this has been covered in employees' 40-hour HAZWOPER training, which is to be verified by the UXOSO/SO through initial training documentation and reviewed prior to permitting personnel to participate in site activities, and will be confirmed by visual observations of worker activities.</p> <p>Explosive handling and transportation</p>

EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<ul style="list-style-type: none"> • Soft sole shoes without metal fasteners (will not interfere with metal detectors/magnetometers) • Coveralls (No metal fasteners) • Surgeons glove for handling explosives • No outer or inner garments having static-electricity-generating characteristics. • Work gloves for handling sand bags <p>If respiratory protection is needed a North 54500 Series air-purifying respirator with a 40CBRN Canister</p> <p>HTRW: Metals and MEC</p>		<p>will be conducted by qualified UXO Technicians. This training and background is considered sufficient for this task.</p>

I have read and understand this AHA:

Name (Printed)	Signature	Date



ACTIVITY HAZARD ANALYSIS (AHA)

Activity/Work Task: Geophysical Equipment Calibration, Maintenance, Testing, and Inspection	Overall Risk Assessment Code (RAC) (Use highest code)	M				
Project Location: NAPR Full RFI	Risk Assessment Code (RAC) Matrix					
Contract Number: JM04	Severity	Probability				
Date Prepared: February 6, 2012		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by: R. Brooks	Catastrophic	E	E	H	H	M
	Critical	E	H	H	M	L
Reviewed by: J. Laffey	Marginal	H	M	M	L	L
	Negligible	M	L	L	L	L
Notes: (Field Notes, Review Comments, etc.)	Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)					
	"Probability" is the likelihood to cause an incident, near miss, or accident and Identified as: Frequent, Likely, Occasional, Seldom, or Unlikely.				RAC Chart	
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible				E= Extremely High Risk	
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.				H= High Risk	
M= Moderate Risk						
L= Low Risk						

JOB STEPS	HAZARDS	CONTROLS	RAC
Daily Testing of Geophysical Equipment UXO Escort	1. Insect/animal bites	1. Tape up joint between the bottoms of pant legs and top of work boot with duct tape. 2. Apply insect repellants containing at least 10% DEET. 3. Follow manufacturer's label instructions for proper application and re-application. 4. Perform close body inspections at the end of each day to detect/remove any insects. 5. If walking through high grass or brush areas avoid approaching or disturbing potential nesting areas.	M
	2. Inclement weather	1. If electrical storms or inclement weather are in the area, as determined through local forecasting or weather alerts issued, the SUXOS will suspend outside activities. 2. The 30-30 rule shall be applied, which is "if a time interval of 30 seconds or less is between lightning and its thunder, go inside (building/vehicle) and stay inside for at least 30 minutes." 3. If no additional lightning and/or thunder are noted within these 30 minutes, work may resume at the UXOQC/UXOSO/SUXOS direction. 4. Personnel will be directed to seek suitable shelter that will provide adequate protection from the elements.	M

ACTIVITY HAZARD ANALYSIS (AHA)
Geophysical Equipment Calibration, Maintenance, Testing and Inspection
Page 2 of 4

JOB STEPS	HAZARDS	CONTROLS	RAC
		5. Lightning threat detection will be coordinated within NAPR existing systems.	
	3. MEC/MPPEH Hazards	1. UXO Escort operations will be conducted by trained UXO Technicians. 2. Non-UXO personnel will be clear of the area during initial survey activities. 3. Non-UXO personnel will be escorted while in the area of concern. 4. Exclusion zone distances will be defined based on those specified in the Work Plan/ESS. 5. Magnetometers will be tested using inert MEC/surrogates or industry standard objects (ISO). 6. UXO Technicians will clear vehicle and foot travel paths within the area. Support personnel and equipment will wait until the clearance is complete. <ul style="list-style-type: none"> • If MEC/MPPEH is observed, the UXO Technician will mark the area for UXO Avoidance. The team will stop operations in the immediate area and take the following precautions: • MEC/MPPEH will not be moved during this phase of the operation. • The UXO Technician will visually inspect the MEC/MPPEH to determine the type and condition if possible. • This identification and the location will be recorded in the logbook. • Suspect MEC/MPPEH items discovered will be reported to the Navy RPM by the UXO PM. 	M
	4. Strains/sprains from heavy or improper lifting	1. Practice safe lifting techniques (use mechanical lifting devices such as a dolly whenever possible, ensure a clear path of travel and good grasp on objects, lift with legs not back, and obtain help when needed to lift large, bulky, or heavy items).	M
	5. Slip/trip/fall hazards	1. Implement and maintain good housekeeping practices throughout work areas. 2. Preview walking/working areas and maintain them to identify and avoid possible slipping/tripping hazards. 3. Preview work locations for unstable/uneven terrain.	L
	6. Chemical exposure	1. As direct contact will be minimal given the nature of the work, it is unlikely that exposure will occur.	L
7. Minor cuts, abrasions or contusions	1. Wear cut-resistant gloves when handling items with sharp or rough edges.	M	

ACTIVITY HAZARD ANALYSIS (AHA)
Geophysical Equipment Calibration, Maintenance, Testing and Inspection
 Page 3 of 4

JOB STEPS	HAZARDS	CONTROLS	RAC
	8. Intermittent high noise levels	1. Site personnel are to wear hearing protection if noise levels are such that they must raise their voice in order to communicate with someone who is within arm's reach (approx. 2') of them. 2. SSO is responsible for determining and designating when hearing protection is required. 3. Hearing protection is to consist of either ear muffs or plugs that have a noise reduction rating (NRR) of at least 25 decibels (dB).	L
EQUIPMENT TO BE USED		INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<p>Personal Protective Equipment: <u>Minimum:</u> Steel toe boots, hard hats, and safety impact eye protection, work gloves, work clothes.</p> <p><u>Optional items:</u> Hearing protection at UXOQCS/SO/SUXOS discretion, High-visibility vests when near active traffic areas. For UXO Technicians - Steel toe/shank boots are required when working in areas where there is a danger of foot injuries due to falling or rolling objects or of objects piercing the sole. UXO and Geophysical Mapping personnel - If steel toe footwear cannot be worn because of interferences with UXO detection devices, safety impact footwear with non-metallic toe protection (provided that the footwear satisfies ANSI Z-41 requirements for protective footwear) shall be used.</p> <p><u>HTRW:</u> Metals and MEC</p>		PPE inspection performed by the SUXOS. Ongoing (prior to each use) inspections are the responsibility of PPE users. One UXO technician will be assigned the responsibility of safety observer to watch for any potential MEC/MPPEH. This individual will not operate equipment or otherwise be involved in vegetation clearance operations.	PPE training in proper use, care, storage, and limitations. It is anticipated that this has been covered in employees' 40-hour HAZWOPER training, which is to be verified by the UXOQCS/SO through initial training documentation and reviewed prior to permitting personnel to participate in site activities, and will be confirmed by visual observations of worker activities.

ACTIVITY HAZARD ANALYSIS (AHA)
Geophysical Equipment Calibration, Maintenance, Testing and Inspection
Page 4 of 4

I have read and understand this AHA:

Name (Printed)	Signature	Date



ACTIVITY HAZARD ANALYSIS (AHA)

Activity/Work Task: GSV <ul style="list-style-type: none"> IVS (Instillation and removal) Blind Seeding 	Overall Risk Assessment Code (RAC) (Use highest code)	M				
Project Location: NAPR Full RFI	Risk Assessment Code (RAC) Matrix					
Contract Number: JM04	Severity	Probability				
Date Prepared: February 6, 2012		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by: R. Brooks	Catastrophic	E	E	H	H	M
Reviewed by: J. Laffey	Critical	E	H	H	M	L
	Marginal	H	M	M	L	L
	Negligible	M	L	L	L	L
Notes: (Field Notes, Review Comments, etc.)	Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above) "Probability" is the likelihood to cause an incident, near miss, or accident and Identified as: Frequent, Likely, Occasional, Seldom, or Unlikely.					RAC Chart
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible					E= Extremely High Risk
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.					H= High Risk
						M= Moderate Risk
						L= Low Risk
JOB STEPS	HAZARDS	CONTROLS				RAC
IVS Instillation Detector Aided Survey of instillation and seeding area.	1. Insect/animal bites	<ol style="list-style-type: none"> 1. Tape up joint between the bottoms of pant legs and top of work boot with duct tape. 2. Apply insect repellants containing at least 10% DEET. 3. Follow manufacturer's label instructions for proper application and re-application. 4. Perform close body inspections at the end of each day to detect/remove any insects. 5. If walking through high grass or brush areas avoid approaching or disturbing potential nesting areas. 				M
Recording of IVS and seed locations for reporting.	2. Inclement weather	<ol style="list-style-type: none"> 1. If electrical storms or inclement weather are in the area, as determined through local forecasting or weather alerts issued, the SUXOS will suspend outside activities. 2. The 30-30 rule shall be applied, which is "if a time interval of 30 seconds or less is between lightning and its thunder, go inside (building/vehicle) and stay inside for at least 30 minutes." 3. If no additional lightning and/or thunder are noted within these 30 minutes, work may resume at the UXOQC/UXOSO/SUXOS direction. 4. Personnel will be directed to seek suitable shelter that will provide adequate protection from the elements. 				M

ACTIVITY HAZARD ANALYSIS (AHA)

GSV – IVS and Blind Seeding

JOB STEPS	HAZARDS	CONTROLS	RAC
	3. MEC/MPPEH Hazards	5. Lightning threat detection will be coordinated within NAPR existing systems. 1. UXO Escort operations will be conducted by trained UXO Technicians. 2. Non-UXO personnel will be clear of the area during initial survey activities. 3. Non-UXO personnel will be escorted while in the area of concern. 4. Exclusion zone distances will be defined based on those specified in the Work Plan/ESS. 5. Magnetometers will be tested using inert MEC/surrogates or industry standard objects (ISO). 6. UXO Technicians will clear vehicle and foot travel paths within the area. Support personnel and equipment will wait until the clearance is complete. <ul style="list-style-type: none"> • If MEC/MPPEH is observed, the UXO Technician will mark the area for UXO Avoidance. The team will stop operations in the immediate area and take the following precautions: • MEC/MPPEH will not be moved during this phase of the operation. • The UXO Technician will visually inspect the MEC/MPPEH to determine the type and condition if possible. • This identification and the location will be recorded in the logbook. • Suspect MEC/MPPEH items discovered will be reported to the Navy RPM by the UXO PM. 	M
	4. Strains/sprains from heavy or improper lifting	1. Practice safe lifting techniques (use mechanical lifting devices such as a dolly whenever possible, ensure a clear path of travel and good grasp on objects, lift with legs not back, and obtain help when needed to lift large, bulky, or heavy items).	M
	5. Slip/trip/fall hazards	1. Implement and maintain good housekeeping practices throughout work areas. 2. Preview walking/working areas and maintain them to identify and avoid possible slipping/tripping hazards. 3. Preview work locations for unstable/uneven terrain.	L
	6. Chemical exposure	1. As direct contact will be minimal given the nature of the work, it is unlikely that exposure will occur.	L
	7. Minor cuts, abrasions or contusions	1. Wear cut-resistant gloves when handling items with sharp or rough edges.	M
	8. Intermittent high noise levels	1. Site personnel are to wear hearing protection if noise levels are such that they must raise their voice in order to communicate with someone who is within arm's reach (approx. 2') of them. 2. SSO is responsible for determining and designating when hearing protection is required. 3. Hearing protection is to consist of either ear muffs or plugs that have a noise reduction rating (NRR) of at least 25 decibels (dB).	L

ACTIVITY HAZARD ANALYSIS (AHA)
GSV – IVS and Blind Seeding
Page 3 of 3

EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<p>Personal Protective Equipment: <u>Minimum</u>: Steel toe boots, hard hats, and safety impact eye protection, work gloves, work clothes.</p> <p><u>Optional items</u>: Hearing protection at UXOQCS/SO/SUXOS discretion, High-visibility vests when near active traffic areas. For UXO Technicians - Steel toe/shank boots are required when working in areas where there is a danger of foot injuries due to falling or rolling objects or of objects piercing the sole. UXO and Geophysical Mapping personnel - If steel toe footwear cannot be worn because of interferences with UXO detection devices, safety impact footwear with non-metallic toe protection (provided that the footwear satisfies ANSI Z-41 requirements for protective footwear) shall be used.</p> <p><u>HTRW</u>: Metals and MEC</p>	<p>PPE inspection performed by the SUXOS. Ongoing (prior to each use) inspections are the responsibility of PPE users. One UXO technician will be assigned the responsibility of safety observer to watch for any potential MEC/MPPEH. This individual will not operate equipment or otherwise be involved in vegetation clearance operations.</p>	<p>PPE training in proper use, care, storage, and limitations. It is anticipated that this has been covered in employees' 40-hour HAZWOPER training, which is to be verified by the UXOQCS/SO through initial training documentation and reviewed prior to permitting personnel to participate in site activities, and will be confirmed by visual observations of worker activities.</p>

I have read and understand this AHA:

Name (Printed)	Signature	Date



ACTIVITY HAZARD ANALYSIS (AHA)

Activity/Work Task: Anomaly Reacquisition	Overall Risk Assessment Code (RAC) (Use highest code)	M
Project Location: NAPR Full RFI	Risk Assessment Code (RAC) Matrix	
Contract Number: JM04	Severity	Probability
Date Prepared: February 6, 2012		Frequent Likely Occasional Seldom Unlikely
Prepared by: R. Brooks	Catastrophic	E E H H M
	Critical	E H H M L
Reviewed by: J. Laffey	Marginal	H M M L L
	Negligible	M L L L L
Notes: (Field Notes, Review Comments, etc.)	Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)	
	"Probability" is the likelihood to cause an incident, near miss, or accident and Identified as: Frequent, Likely, Occasional, Seldom, or Unlikely.	
	RAC Chart	
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.	
	E= Extremely High Risk	
	H= High Risk	
	M= Moderate Risk	
	L= Low Risk	

JOB STEPS	HAZARDS	CONTROLS	RAC
Anomaly Reacquisition.	1. Insect/animal bites	1. Tape up joint between the bottoms of pant legs and top of work boot with duct tape. 2. Apply insect repellants containing at least 10% DEET. 3. Follow manufacturer's label instructions for proper application and re-application. 4. Perform close body inspections at the end of each day to detect/remove any insects. 5. If walking through high grass or brush areas avoid approaching or disturbing potential nesting areas.	M
	2. Inclement weather	1. If electrical storms or inclement weather are in the area, as determined through local forecasting or weather alerts issued, the SUXOS will suspend outside activities. 2. The 30-30 rule shall be applied, which is "if a time interval of 30 seconds or less is between lightning and its thunder, go inside (building/vehicle) and stay inside for at least 30 minutes." 3. If no additional lightning and/or thunder are noted within these 30 minutes, work may resume at the UXOQC/UXOSO/SUXOS direction. 4. Personnel will be directed to seek suitable shelter that will provide adequate protection from the elements. 5. Lightning threat detection will be coordinated within NAPR existing	M

ACTIVITY HAZARD ANALYSIS (AHA)

Anomaly Reacquisition

JOB STEPS	HAZARDS	CONTROLS	RAC
		systems.	
	3. MEC/MPPEH Hazards	<ol style="list-style-type: none"> 1. UXO Escort operations will be conducted by trained UXO Technicians. 2. Non-UXO personnel will be clear of the area during initial survey activities. 3. Non-UXO personnel will be escorted while in the area of concern. 4. Exclusion zone distances will be defined based on those specified in the Work Plan/ESS. 5. Magnetometers will be tested using inert MEC/surrogates or industry standard objects (ISO). 6. UXO Technicians will clear vehicle and foot travel paths within the area. Support personnel and equipment will wait until the clearance is complete. <ul style="list-style-type: none"> • If MEC/MPPEH is observed, the UXO Technician will mark the area for UXO Avoidance. The team will stop operations and take the following precautions: • MEC/MPPEH will not be moved during this phase of the operation. • The UXO Technician will visually inspect the MEC/MPPEH to determine the type and condition if possible. • This identification and the location will be recorded in the logbook. • Suspect MEC/MPPEH items discovered will be reported to the Navy RPM by the UXO PM. 	M
	4. Strains/sprains from heavy or improper lifting	<ol style="list-style-type: none"> 1. Practice safe lifting techniques (use mechanical lifting devices such as a dolly whenever possible, ensure a clear path of travel and good grasp on objects, lift with legs not back, and obtain help when needed to lift large, bulky, or heavy items). 	M
	5. Slip/trip/fall hazards	<ol style="list-style-type: none"> 1. Implement and maintain good housekeeping practices throughout work areas. 2. Preview walking/working areas and maintain them to identify and avoid possible slipping/tripping hazards. 3. Preview work locations for unstable/uneven terrain. 	L
	6. Chemical exposure	<ol style="list-style-type: none"> 1. As direct contact will be minimal given the nature of the work, it is unlikely that exposure will occur. 	L
	7. Minor cuts, abrasions or contusions	<ol style="list-style-type: none"> 1. Wear cut-resistant gloves when handling items with sharp or rough edges. 	M

ACTIVITY HAZARD ANALYSIS (AHA)

Anomaly Reacquisition

JOB STEPS	HAZARDS	CONTROLS	RAC
	8. Intermittent high noise levels	<ol style="list-style-type: none"> 1. Site personnel are to wear hearing protection if noise levels are such that they must raise their voice in order to communicate with someone who is within arm's reach (approx. 2') of them. 2. SSO is responsible for determining and designating when hearing protection is required. 3. Hearing protection is to consist of either ear muffs or plugs that have a noise reduction rating (NRR) of at least 25 decibels (dB). 	L
EQUIPMENT TO BE USED		INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<p>Personal Protective Equipment: <u>Minimum</u>: Steel toe boots, hard hats, and safety impact eye protection, work gloves, work clothes.</p> <p><u>Optional items</u>: Hearing protection at UXOQCS/SO/SUXOS discretion, High-visibility vests when near active traffic areas. For UXO Technicians - Steel toe/shank boots are required when working in areas where there is a danger of foot injuries due to falling or rolling objects or of objects piercing the sole. UXO and Geophysical Reacquisition personnel - If steel toe footwear cannot be worn because of interferences with UXO detection devices, safety impact footwear with non-metallic toe protection (provided that the footwear satisfies ANSI Z-41 requirements for protective footwear) shall be used.</p> <p><u>HTRW</u>: Metals and MEC</p>		<p>PPE inspection performed by the SUXOS. Ongoing (prior to each use) inspections are the responsibility of PPE users. One UXO technician will be assigned the responsibility of safety observer to watch for any potential MEC/MPPEH. This individual will not operate equipment or otherwise be involved in vegetation clearance operations.</p>	<p>PPE training in proper use, care, storage, and limitations. It is anticipated that this has been covered in employees' 40-hour HAZWOPER training, which is to be verified by the UXOQCS/SO through initial training documentation and reviewed prior to permitting personnel to participate in site activities, and will be confirmed by visual observations of worker activities.</p>

I have read and understand this AHA:

Name (Printed)	Signature	Date



ACTIVITY HAZARD ANALYSIS (AHA)

Activity/Work Task: Digital Geophysical Mapping (DGM)	Overall Risk Assessment Code (RAC) (Use highest code)	M
Project Location: NAPR Full RFI	Risk Assessment Code (RAC) Matrix	
Contract Number: JM04	Severity	Probability
Date Prepared: February 6, 2012		Frequent Likely Occasional Seldom Unlikely
Prepared by: R. Brooks	Catastrophic	E E H H M
	Critical	E H H M L
Reviewed by: J. Laffey	Marginal	H M M L L
	Negligible	M L L L L
Notes: (Field Notes, Review Comments, etc.)	Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)	
	"Probability" is the likelihood to cause an incident, near miss, or accident and Identified as: Frequent, Likely, Occasional, Seldom, or Unlikely.	
	RAC Chart	
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.	
	E= Extremely High Risk	
	H= High Risk	
	M= Moderate Risk	
	L= Low Risk	

JOB STEPS	HAZARDS	CONTROLS	RAC
Digital Geophysical Mapping. UXO Escort (If step outs are required.)	1. Insect/animal bites	1. Tape up joint between the bottoms of pant legs and top of work boot with duct tape. 2. Apply insect repellants containing at least 10% DEET. 3. Follow manufacturer's label instructions for proper application and re-application. 4. Perform close body inspections at the end of each day to detect/remove any insects. 5. If walking through high grass or brush areas avoid approaching or disturbing potential nesting areas.	M
	2. Inclement weather	1. If electrical storms or inclement weather are in the area, as determined through local forecasting or weather alerts issued, the SUXOS will suspend outside activities. 2. The 30-30 rule shall be applied, which is "if a time interval of 30 seconds or less is between lightning and its thunder, go inside (building/vehicle) and stay inside for at least 30 minutes." 3. If no additional lightning and/or thunder are noted within these 30 minutes, work may resume at the UXOQC/UXOSO/SUXOS direction. 4. Personnel will be directed to seek suitable shelter that will provide adequate protection from the elements.	M

JOB STEPS	HAZARDS	CONTROLS	RAC
		5. Lightning threat detection will be coordinated within NAPR existing systems.	
	3. MEC/MPPEH Hazards	1. UXO Escort operations will be conducted by trained UXO Technicians. 2. Non-UXO personnel will be clear of the area during initial survey activities. 3. Non-UXO personnel will be escorted while in the area of concern. 4. Exclusion zone distances will be defined based on those specified in the Work Plan/ESS. 5. Magnetometers will be tested using inert MEC/surrogates or industry standard objects (ISO). 6. 7. UXO Technicians will clear vehicle and foot travel paths within the area. Support personnel and equipment will wait until the clearance is complete. <ul style="list-style-type: none"> • If MEC/MPPEH is observed, the UXO Technician will mark the area for UXO Avoidance. The team will stop operations and take the following precautions: • The UXO Technician will visually inspect the MEC/MPPEH to determine the type and condition if possible. • This identification and the location will be recorded in the logbook. • Suspect MEC/MPPEH items discovered will be reported to the Navy RPM by the UXO PM. 	M
	4. Strains/sprains from heavy or improper lifting	1. Practice safe lifting techniques (use mechanical lifting devices such as a dolly whenever possible, ensure a clear path of travel and good grasp on objects, lift with legs not back, and obtain help when needed to lift large, bulky, or heavy items).	M
	5. Slip/trip/fall hazards	1. Implement and maintain good housekeeping practices throughout work areas. 2. Preview walking/working areas and maintain them to identify and avoid possible slipping/tripping hazards. 3. Preview work locations for unstable/uneven terrain.	L
	6. Chemical exposure	1. As direct contact will be minimal given the nature of the work, it is unlikely that exposure will occur.	L
	7. Minor cuts, abrasions or contusions	1. Wear cut-resistant gloves when handling items with sharp or rough edges.	M

JOB STEPS	HAZARDS	CONTROLS	RAC
	8. Intermittent high noise levels	1. Site personnel are to wear hearing protection if noise levels are such that they must raise their voice in order to communicate with someone who is within arm's reach (approx. 2') of them. 2. SSO is responsible for determining and designating when hearing protection is required. 3. Hearing protection is to consist of either ear muffs or plugs that have a noise reduction rating (NRR) of at least 25 decibels (dB).	L
EQUIPMENT TO BE USED		INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<p>Personal Protective Equipment: <u>Minimum</u>: Steel toe boots, hard hats, and safety impact eye protection, work gloves, work clothes.</p> <p><u>Optional items</u>: Hearing protection at UXOQCS/SO/SUXOS discretion, High-visibility vests when near active traffic areas. For UXO Technicians - Steel toe/shank boots are required when working in areas where there is a danger of foot injuries due to falling or rolling objects or of objects piercing the sole. UXO and Geophysical Mapping personnel - If steel toe footwear cannot be worn because of interferences with UXO detection devices, safety impact footwear with non-metallic toe protection (provided that the footwear satisfies ANSI Z-41 requirements for protective footwear) shall be used.</p> <p><u>HTRW</u>: Metals and MEC</p>		PPE inspection performed by the SUXOS. Ongoing (prior to each use) inspections are the responsibility of PPE users. One UXO technician will be assigned the responsibility of safety observer to watch for any potential MEC/MPPEH. This individual will not operate equipment or otherwise be involved in vegetation clearance operations.	PPE training in proper use, care, storage, and limitations. It is anticipated that this has been covered in employees' 40-hour HAZWOPER training, which is to be verified by the UXOQCS/SO through initial training documentation and reviewed prior to permitting personnel to participate in site activities, and will be confirmed by visual observations of worker activities.

I have read and understand this AHA:

Name (Printed)	Signature	Date



ACTIVITY HAZARD ANALYSIS (AHA)

Activity/Work Task: Anomaly Intrusive Investigation	Overall Risk Assessment Code (RAC) (Use highest code)	H
Project Location: NAPR Full RFI	Risk Assessment Code (RAC) Matrix	
Contract Number: JM04	Severity	Probability
Date Prepared: February 6, 2012		Frequent Likely Occasional Seldom Unlikely
Prepared by: R. Brooks	Catastrophic	E E H H M
Reviewed by: J. Laffey	Critical	E H H M L
	Marginal	H M M L L
Notes: (Field Notes, Review Comments, etc.)	Negligible	M L L L L
	Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)	
	"Probability" is the likelihood to cause an incident, near miss, or accident and Identified as: Frequent, Likely, Occasional, Seldom, or Unlikely.	
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	
Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.		RAC Chart
		E= Extremely High Risk
		H= High Risk
		M= Moderate Risk
		L= Low Risk

JOB STEPS	HAZARDS	CONTROLS	RAC
Intrusively Investigate Anomalies.	1. Insect/animal bites	1. Tape up joint between the bottoms of pant legs and top of work boot with duct tape. 2. Apply insect repellants containing at least 10% DEET. 3. Follow manufacturer's label instructions for proper application and re-application. 4. Perform close body inspections at the end of each day to detect/remove any insects. 5. If walking through high grass or brush areas avoid approaching or disturbing potential nesting areas.	M
	2. Inclement weather	1. If electrical storms or inclement weather are in the area, as determined through local forecasting or weather alerts issued, the SUXOS will suspend outside activities. 2. The 30-30 rule shall be applied, which is "if a time interval of 30 seconds or less is between lightning and its thunder, go inside (building/vehicle) and stay inside for at least 30 minutes." 3. If no additional lightning and/or thunder are noted within these 30 minutes, work may resume at the UXOQC/UXOSO/SUXOS direction. 4. Personnel will be directed to seek suitable shelter that will provide adequate protection from the elements. 5. Lightning threat detection will be coordinated within NAPR existing	M

JOB STEPS	HAZARDS	CONTROLS	RAC
	3. MEC/MPPEH Hazards	<p>systems.</p> <ol style="list-style-type: none"> 1. MEC/MPPEH operations will be conducted by trained UXO Technicians. 2. Non-UXO personnel will be clear of the area during intrusive investigation activities. 3. Exclusion zone distances will be defined based on those specified in the Work Plan/ESS. 4. Magnetometers will be tested using inert MEC/surrogates or industry Standard Objects (ISO). 5. Any MEC/MPPEH items discovered that has been determined to be safe to move, may be moved for later disposal, or disposed of using blow in place (BIP) procedures. 6. UXO Technicians will clear vehicle and foot travel paths within the area. Support personnel and equipment will wait until the clearance is complete. <ul style="list-style-type: none"> • If MEC/MPPEH is observed, the UXO Technician making the observation will signal to stop operations and take the following precautions: • The UXO Technician will visually inspect the MEC/MPPEH to determine the type and condition if possible. • This identification and the exact location will be recorded in the logbook. • Any suspect MEC/MPPEH item discovered during UXO intrusive operations which has been determined safe to move, may be moved to a designated holding area for later disposal, or treated using BIP procedures as stated in the Work Plan and ESS. • Suspect MEC/MPPEH items discovered will be reported to the Navy RPM by the UXO PM. • An inventory will be maintained by the SUXOS with locations and descriptions for suspect MEC/MPPEH discovered during this operation, and the Navy RPM will be provided an inventory update on a daily basis. • Use Proper UXO Digging procedures while investigating anomalies. 	H
	4. Strains/sprains from heavy or improper lifting	1. Practice safe lifting techniques (use mechanical lifting devices such as a dolly whenever possible, ensure a clear path of travel and good grasp on objects, lift with legs not back, and obtain help when needed	M

ACTIVITY HAZARD ANALYSIS (AHA)
Anomaly Intrusive Investigation
Page 3 of 4

JOB STEPS	HAZARDS	CONTROLS	RAC
		to lift large, bulky, or heavy items).	
	5. Slip/trip/fall hazards	<ol style="list-style-type: none"> 1. Implement and maintain good housekeeping practices throughout work areas. 2. Preview walking/working areas and maintain them to identify and avoid possible slipping/tripping hazards. 3. Preview work locations for unstable/uneven terrain. 	L
	6. Chemical exposure	<ol style="list-style-type: none"> 1. As direct contact will be minimal given the nature of the work, it is unlikely that exposure will occur. 	L
	7. Minor cuts, abrasions or contusions	<ol style="list-style-type: none"> 1. Wear cut-resistant gloves when handling items with sharp or rough edges. 	M
	8. Intermittent high noise levels	<ol style="list-style-type: none"> 1. Site personnel are to wear hearing protection if noise levels are such that they must raise their voice in order to communicate with someone who is within arm's reach (approx. 2') of them. 2. SSO is responsible for determining and designating when hearing protection is required. 3. Hearing protection is to consist of either ear muffs or plugs that have a noise reduction rating (NRR) of at least 25 decibels (dB). 	L
Hydraulic excavator/backhoe operations	1. Equipment rollover	<ol style="list-style-type: none"> 1. Heavy equipment must have a rollover protective structure (ROPS) meeting OSHA requirements. 2. The ROPS is designed to protect the operator if the machine tips over. 3. A seat belt must be worn so that the operator will not be thrown out of the seat during a rollover or upset situation. 4. If working on slopes, try to avoid moving across the face of the slope. 5. Try to operate up and down the slope face if possible. 6. Use extreme caution when operating near open excavations. 	M
	2. Struck by	<ol style="list-style-type: none"> 1. Make site workers aware of the machine's established swing area (the radius of the excavator or backhoe arm as it swings) and blind spots (areas to the sides or rear of the machine that are blocked from or beyond the operator's range of vision) before the operator works the machine. 2. Mark swing areas with rope, tape, or other barriers to keep site workers out of the area. 3. Do not stand under suspended loads or suspended machine components such as the boom, arm, or bucket. 4. Wear high visibility clothing when in the work area. 	M

ACTIVITY HAZARD ANALYSIS (AHA)
Anomaly Intrusive Investigation
 Page 4 of 4

JOB STEPS	HAZARDS	CONTROLS	RAC
	3. Falling	1. Operators should use the three-point contact rule when climbing onto or off heavy equipment. 2. The three-point rule means having both feet and one hand, or one foot and both hands in contact with the ladder.	M
EQUIPMENT TO BE USED		INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<p>Personal Protective Equipment: <u>Minimum</u>: Steel toe boots, hard hats, and safety impact eye protection, work gloves, work clothes.</p> <p><u>Optional items</u>: Hearing protection at UXOQCS/SO/SUXOS discretion, High-visibility vests when near active traffic areas. For UXO Technicians - Steel toe/shank boots are required when working in areas where there is a danger of foot injuries due to falling or rolling objects or of objects piercing the sole. If steel toe footwear cannot be worn because of interferences with UXO detection devices, safety impact footwear with non-metallic toe protection (provided that the footwear satisfies ANSI Z-41 requirements for protective footwear) shall be used.</p> <p><u>HTRW</u>: Metals and MEC</p>		<p>PPE inspection performed by the SUXOS. Ongoing (prior to each use) inspections are the responsibility of PPE users. One UXO technician will be assigned the responsibility of safety observer to watch for any potential MEC/MPPEH. This individual will not operate equipment or otherwise be involved in vegetation clearance operations.</p>	<p>PPE training in proper use, care, storage, and limitations. It is anticipated that this has been covered in employees' 40-hour HAZWOPER training, which is to be verified by the UXOQCS/SO through initial training documentation and reviewed prior to permitting personnel to participate in site activities, and will be confirmed by visual observations of worker activities.</p> <p>Explosive handling and transportation will be conducted by qualified UXO Technicians. This training and background is considered sufficient for this task.</p>

I have read and understand this AHA:

Name (Printed)	Signature	Date



ACTIVITY HAZARD ANALYSIS (AHA)

Activity/Work Task: Demobilization	Overall Risk Assessment Code (RAC) (Use highest code)	M
Project Location: NAPR Full RFI	Risk Assessment Code (RAC) Matrix	
Contract Number: JM04	Severity	Probability
Date Prepared: February 6, 2012		Frequent Likely Occasional Seldom Unlikely
Prepared by: R. Brooks	Catastrophic	E E H H M
	Critical	E H H M L
Reviewed by: J. Laffey	Marginal	H M M L L
	Negligible	M L L L L
Notes: (Field Notes, Review Comments, etc.)	Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)	
	"Probability" is the likelihood to cause an incident, near miss, or accident and Identified as: Frequent, Likely, Occasional, Seldom, or Unlikely.	
	RAC Chart	
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.	
	E= Extremely High Risk	
	H= High Risk	
	M= Moderate Risk	
	L= Low Risk	

JOB STEPS	HAZARDS	CONTROLS	RAC
<ul style="list-style-type: none"> Uninstall IVS Package, Ship, and Return Equipment Close out all necessary field forms Demobilization 	1. Insect/animal bites	1. Tape up joint between the bottoms of pant legs and top of work boot with duct tape. 2. Apply insect repellants containing at least 10% DEET. 3. Follow manufacturer's label instructions for proper application and re-application. 4. Perform close body inspections at the end of each day to detect/remove any insects. 5. If walking through high grass or brush areas avoid approaching or disturbing potential nesting areas.	M
	2. Inclement weather	1. If electrical storms or inclement weather are in the area, as determined through local forecasting or weather alerts issued, the SUXOS will suspend outside activities. 2. The 30-30 rule shall be applied, which is "if a time interval of 30 seconds or less is between lightning and its thunder, go inside (building/vehicle) and stay inside for at least 30 minutes." 3. If no additional lightning and/or thunder are noted within these 30 minutes, work may resume at the UXOQC/UXOSO/SUXOS direction. 4. Personnel will be directed to seek suitable shelter that will provide adequate protection from the elements. 5. Lightning threat detection will be coordinated within NAPR existing	M

ACTIVITY HAZARD ANALYSIS (AHA)

Demobilization

JOB STEPS	HAZARDS	CONTROLS	RAC
		systems.	
	3. MEC/MPPEH Hazards	<ol style="list-style-type: none"> 1. MEC/MPPEH operations will be conducted by trained UXO Technicians. 2. Non-UXO personnel will be escorted while conducting demobilization activities in the area of concern. 3. Exclusion zone distances will be defined based on those specified in the Work Plan/ESS. 4. Magnetometers will be tested using inert MEC/surrogates or industry standard objects (ISO). 5. Any MEC/MPPEH items on the surface and near surface will be flagged for UXO Avoidance. MEC/MPPEH will not be moved during demobilization activities. 6. UXO Technicians will clear vehicle and foot travel paths within the area. Support personnel and equipment will wait until the clearance is complete. <ul style="list-style-type: none"> • If MEC is observed, the UXO Technician making the observation will signal to stop operations and take the following precautions: • The UXO Technician will visually inspect the MEC/MPPEH to determine the type and condition if possible. • This identification and the location will be recorded in the logbook. • Suspect MEC/MPPEH items discovered will be reported to the Navy RPM by the UXO PM. 	M
	4. Strains/sprains from heavy or improper lifting	<ol style="list-style-type: none"> 1. Practice safe lifting techniques (use mechanical lifting devices such as a dolly whenever possible, ensure a clear path of travel and good grasp on objects, lift with legs not back, and obtain help when needed to lift large, bulky, or heavy items). 	M
	5. Slip/trip/fall hazards	<ol style="list-style-type: none"> 1. Implement and maintain good housekeeping practices throughout work areas. 2. Preview walking/working areas and maintain them to identify and avoid possible slipping/tripping hazards. 3. Preview work locations for unstable/uneven terrain. 	L
	6. Chemical exposure	<ol style="list-style-type: none"> 1. As direct contact will be minimal given the nature of the work, it is unlikely that exposure will occur. 	L

ACTIVITY HAZARD ANALYSIS (AHA)

Demobilization

Page 3 of 4

JOB STEPS	HAZARDS	CONTROLS	RAC
	7. Minor cuts, abrasions or contusions	1. Wear cut-resistant gloves when handling items with sharp or rough edges.	M
	8. Intermittent high noise levels	1. Site personnel are to wear hearing protection if noise levels are such that they must raise their voice in order to communicate with someone who is within arm's reach (approx. 2') of them. 2. SSO is responsible for determining and designating when hearing protection is required. 3. Hearing protection is to consist of either ear muffs or plugs that have a noise reduction rating (NRR) of at least 25 decibels (dB).	L
EQUIPMENT TO BE USED		INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<p>Personal Protective Equipment: <u>Minimum</u>: Steel toe boots, hard hats, and safety impact eye protection, work gloves, work clothes.</p> <p><u>Optional items</u>: Hearing protection at UXOQCS/SO/SUXOS discretion, High-visibility vests when near active traffic areas. For UXO Technicians - Steel toe/shank boots are required when working in areas where there is a danger of foot injuries due to falling or rolling objects or of objects piercing the sole. If steel toe footwear cannot be worn because of interferences with UXO detection devices, safety impact footwear with non-metallic toe protection (provided that the footwear satisfies ANSI Z-41 requirements for protective footwear) shall be used.</p> <p>HTRW: Metals and MEC</p>		PPE inspection performed by the SUXOS. Ongoing (prior to each use) inspections are the responsibility of PPE users. One UXO technician will be assigned the responsibility of safety observer to watch for any potential MEC/MPPEH. This individual will not operate equipment or otherwise be involved in vegetation clearance operations.	PPE training in proper use, care, storage, and limitations. It is anticipated that this has been covered in employees' 40-hour HAZWOPER training, which is to be verified by the UXOQCS/SO through initial training documentation and reviewed prior to permitting personnel to participate in site activities, and will be confirmed by visual observations of worker activities. Explosive handling and transportation will be conducted by qualified UXO Technicians. This training and background is considered sufficient for this task.

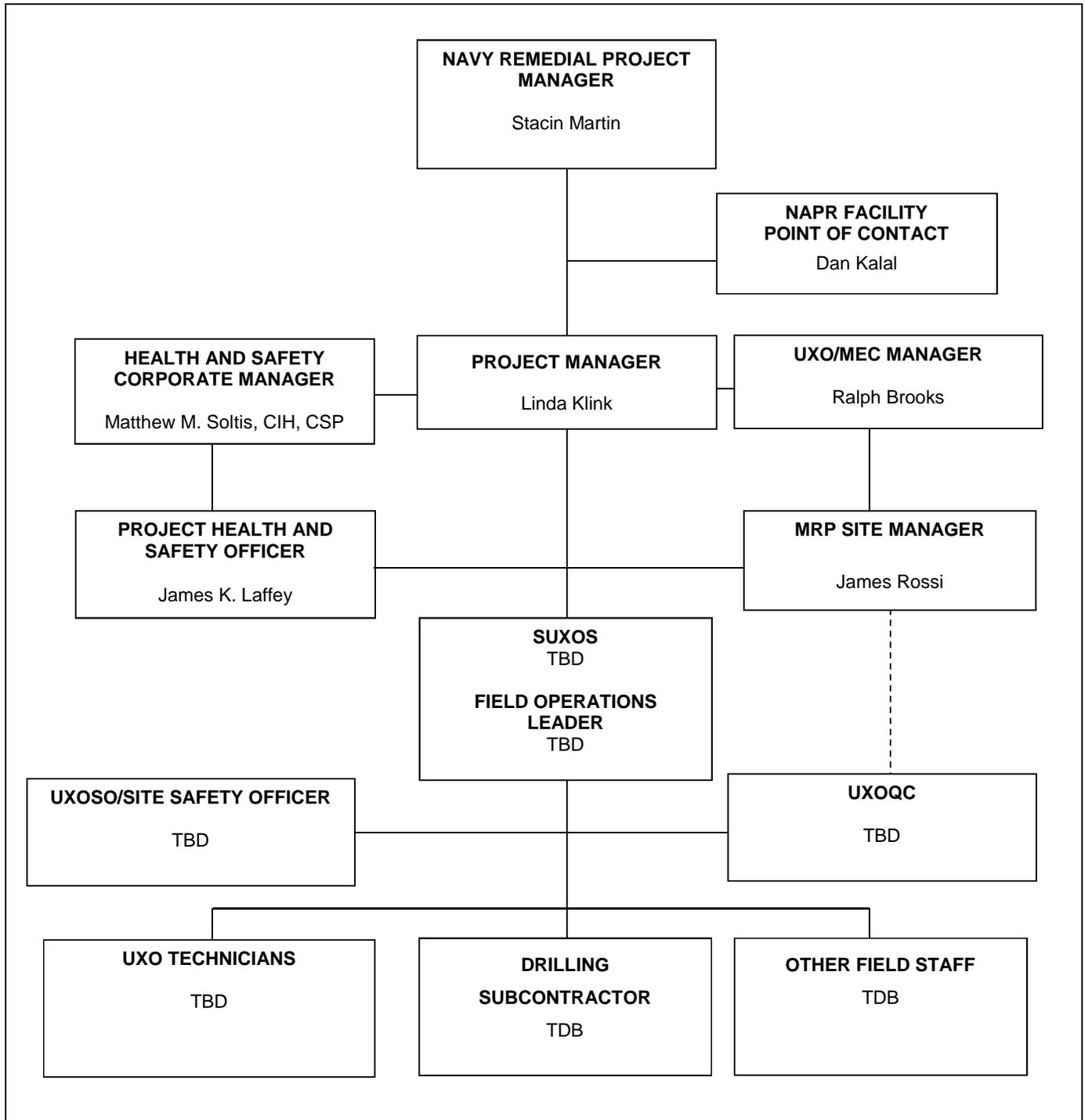
I have read and understand this AHA:

Name (Printed)	Signature	Date

3.0 STAFF ORGANIZATION, QUALIFICATIONS AND RESPONSIBILITIES

The organization chart presenting the lines of authority is provided as Figure A-3-1.

**FIGURE A-3-1
ORGANIZATION CHART
FIELD ACTIVITIES AT NAPR**



3.1 KEY PROJECT PERSONNEL AND ORGANIZATION

This section defines responsibility for safety and health for Tetra Tech and subcontractor employees engaged in onsite activities. Personnel assigned to these positions will exercise the primary responsibility for onsite health and safety. These persons will be the primary point of contact for any questions regarding the safety and health procedures and the selected control measures that are to be implemented for onsite activities.

3.1.1 Project Manager

The Tetra Tech PM is responsible for the overall direction and implementation of health and safety for this work. The PM coordinates closely with the Navy RPM who is responsible to oversee the project implementation, including scoping, data review, and evaluation for the Navy. This includes the responsibility for ensuring that:

- Work is appropriately planned and executed in accordance with contractual, regulatory, and internal requirements
- Adequate resources (including personnel, equipment, and supplies) are assembled, and made available to the FOL and SSO to safely and effectively accomplish the work

3.1.2 Project Health and Safety Officer

The PHSO is responsible for developing this APP and SSHP in accordance with applicable OSHA regulations. Specific responsibilities include:

- Providing information regarding site contaminants and physical hazards associated with the site
- Establishing air monitoring and decontamination procedures
- Assigning personal protective equipment based on task and potential hazards
- Determining emergency response procedures and emergency contacts
- Stipulating training requirements and reviewing training and medical surveillance certificates
- Providing standard work practices to minimize potential injuries and exposures
- Modifying this SSHP, as necessary

3.1.3 Field Operations Leader

The Tetra Tech FOL is responsible for implementation of the project work plans in accordance with the SSHP, with the assistance of the Unexploded Ordnance Safety Officer (UXOSO) and SSO. The FOL

manages field activities, executes the SAP, and enforces safety procedures as applicable to the SAP. Other duties include:

- Ensuring that the proper notifications are made prior to beginning work
- Verifying training and medical clearance of onsite personnel status in relation to site activities
- Selecting, applying, inspecting, and maintaining personal protective equipment
- Implementing Hazard Communication, Respiratory Protection Programs, and other health and safety programs as needed
- Providing site-specific training for onsite personnel
- Investigating accidents and injuries

3.1.4 Senior UXO Supervisor (SUXOS)

The SUXOS is responsible for implementation of the project work plans in accordance with the ESS and the APP and SSHP with the assistance of the UXOSO. The SUXOS manages field activities, executes the work plan, and enforces safety procedures as applicable to the work plan. Other duties include:

- Ensuring that the proper notifications are made prior to beginning work
- Directing and overseeing field activities such as UXO surveys and intrusive investigations
- Verifying training and medical clearance of onsite UXO personnel
- Selecting, applying, inspecting, and maintaining personal protective equipment and instruments necessary to detect and manage MEC/MPPEH
- Implementing Hazard Communication, Respiratory Protection Programs, and other health and safety programs as needed
- Providing site-specific MEC training for onsite personnel
- Scheduling and executing site MEC activities
- Responsible for MEC documentation
- Investigating accidents and injuries

The SUXOS implements and adheres to the site-specific Work Plan, associated ESS, and Unexploded Ordnance and Chemical Warfare Agents Activities SOP. The SUXOS has the overall responsibility for the day-to-day MEC operations at the site, and directs site personnel resources at the site on MEC support issues to ensure their safety. The SUXOS is responsible for preparing and maintaining the project related MEC documentation.

3.1.5 Unexploded Ordnance Safety Officer (UXOSO)

The UXOSO is responsible for advising the FOL and SUXOS on MEC safety-related matters, including the measures that will be necessary to effectively implement and adhere to the site-specific Work Plan, ESS, and Unexploded Ordnance and Chemical Warfare Agents Activities SOP. Responsibilities of the UXOSO include:

- Coordinating with emergency response personnel including establishing communications
- Training site UXO personnel in accordance with the APP and SSHP
- Establishing and maintaining required work zones including the EZs
- Implementing the MEC safety program
- Analyzing MEC and explosives operational risks, hazards, and safety requirements
- Enforcing personnel limits and safety EZs for MEC operations
- Conducting safety inspections
- Participating in site specific training sessions
- Maintaining familiarity with the Tetra Tech MRP SOPs
- Conducting daily and in progress functional tests on instruments used in the survey

3.1.6 Site Safety Officer

The Site Safety Officer (SSO) supports site activities by advising the FOL on the aspects of health and safety on site. These duties may include the following:

- Coordinate health and safety activities with the FOL
- Select, inspect, implement, and maintain personal protective equipment
- Establish work zones and control points
- Implements air-monitoring program for onsite activities
- Verify training and medical status of onsite personnel status in relation to site activities
- Coordinate emergency services
- Provide site specific training for onsite personnel
- Investigate accidents and injuries
- Developing and maintaining current chemical inventories and MSDS files for hazardous chemicals that will be used/stored at that workplace
- Ensuring that onsite personnel who may use hazardous chemicals have access to and review pertinent MSDSs prior to using or dispensing such chemicals
- Ensuring compliance with container labeling requirements

- Identify new chemicals brought on site that may present new hazards requiring additional training then add information to chemical inventory and MSDS files
- Providing input to the FOL regarding the need to modify this APP and SSHP or other health and safety documents as per site-specific requirements

Compliance with the requirements stipulated in this APP and SSHP is monitored by the SSO and coordinated through the Tetra Tech HSM. In some cases one person may be designated responsibilities for more than one position. This action will be performed only as credentials, experience, and availability permits.

3.1.7 UXO Quality Control (UXOQC)

The UXOQC function is independent from the SUXOS and reports directly to the MRP Site Manager for quality control issues. The MRP Site Manager also has a separate reporting line from the PM and is responsible for management of the UXO QC Program. This ensures that the QC program will be unbiased. Although the UXOQC is separate and independent from the SUXOS, he is part of the problem resolution process and must maintain close and open communication with the SUXOS. The UXOQC is responsible for:

- Implementing the Quality Control Plan
- Conducting quality control indoctrination training for project personnel and for site visitors.
- Initiating QC surveillance and inspection consistent with the CQ program/QC policies and procedures
- Identifying, evaluating, initiating, and approving corrective action to ensure work complies with the contract
- Recommending changes to the QC program
- Providing project QC update to the SUXOS
- Communicating with client QA project oversight
- Conducting inspection and surveillance activity
- Completing reports and other documentation; maintaining a daily log of activities
- Implementing the three-phase control process: preparatory, initial, and follow up inspections
- The UXOQC has the authority to stop-work whenever a condition is identified that has a negative effect on the quality of the product

3.1.8 Health and Safety Manager

The HSM is responsible for the development and administration of the company health and safety program. The HSM will act in an advisory capacity to PM and site personnel for project-specific health

and safety issues. The Tetra Tech PM will establish a liaison between the Navy RPM and the HSM on matters relating to health and safety. In the fulfillment of the duties of this position, the HSM will enlist the support of safety and occupational health professionals, as appropriate. The HSM is responsible for the following actions:

- Developing, maintaining, and overseeing implementation of this APP and SSHP
- Visiting project sites as needed to audit the effectiveness of the APP and SSHP
- Remaining available to respond to project emergencies
- Developing modifications to the APP and SSHP, as needed
- Evaluating occupational exposure monitoring/air sampling data and adjusting APP and SSHP as necessary
- Serving as a Quality Control staff member
- Approving the APP and SSHP by signature

3.1.9 Site Personnel

In addition to the line and staff management functions, each individual performing work under this contract has the responsibility for their own personal health and safety, as well as assisting in assuring the health and safety of their co-workers. This element is also the first one listed in our corporate Health and Safety Policy Statement, which requires that "each employee recognize a *personal* responsibility for their own health and safety and for actions that affect the health and safety of fellow employees." This employee responsibility includes observing specified health and safety requirements and communicating with the designated SSO on matters such as the effectiveness of specified control measures, identification of new potential hazards, and other related issues.

An employee's failure to adhere to the requirements of this Accident Prevention Plan, the Project Specific Work and Safety Plans, or to observe specified safety requirements and restrictions or to properly use identified protective equipment may lead to injury or illness. As a result, deviation from safety and health procedures is not tolerated. Failure to comply with health and safety procedures and requirements will lead to reprimand up to and including dismissal.

Health and safety-related information will be communicated to employees through meetings, postings, written communications, and reporting of hazards.

3.2 SITE INFORMATION AND PERSONNEL ASSIGNMENTS**Site Name:** NAPR **Address:** Building 2439 Ceiba, Puerto Rico**Facility POC:** Dan Kalal **Phone Number:** 757.685.3450**Navy RPM:** Stacin Martin **Phone Number:** 757.322.4780

Tetra Tech Personnel:	Discipline/Tasks Assigned:	Office Phone:
<u>Linda Klink</u>	<u>PM</u>	<u>412.921.8650</u>
<u>Ralph Brooks</u>	<u>UXO Manager</u>	<u>770.413.0965x231</u>
<u>James Rossi</u>	<u>MRP Site Manager</u>	<u>770.413.0965</u>
<u>Charles Warino</u>	<u>FOL</u>	<u>610.382.8361</u>
<u>Matthew M. Soltis</u>	<u>HSM</u>	<u>412.921.8912</u>
<u>James K. Laffey</u>	<u>PHSO</u>	<u>412.921.8678</u>
<u>TBD</u>	<u>SSO</u>	<u></u>
<u>TBD</u>	<u>SUXOS</u>	<u>770.413.0965</u>
<u>TBD</u>	<u>UXOSO/UXOQC</u>	<u>770.413.0965</u>
<u>TBD</u>	<u>UXO Technician II</u>	<u>770.413.0965</u>
Non-Tetra Tech Personnel:	Affiliation/Task Assigned:	Phone:
<u>Drilling Subcontractor</u>	<u>Drilling Services</u>	<u>TBD</u>
<u>Land Survey Subcontractor</u>	<u>Surveying Services</u>	<u>TBD</u>
<u>IDW Subcontractor</u>	<u>Investigation-Derived Waste</u>	<u>TBD</u>

3.3 RESPONSIBILITIES OF HEALTH AND SAFETY PERSONNEL

The HSM, dependent upon the contaminant-related hazards on the project, shall be a Certified Industrial Hygienist (CIH), Certified Safety Professional (CSP) or Certified Health Physicist (CHP).

- The HSM shall have 3 years of experience managing safety and occupational health at hazardous waste site cleanup operations.
- The HSM shall enlist the support of safety and occupational health professionals with appropriate education and experience when working on sites with multiple (chemical, safety, ionizing radiation) hazards.
- The HSM shall be responsible for the following actions:
 - Developing, maintaining, and overseeing implementation of the SSHP
 - Visiting the project as needed to audit the effectiveness of the SSHP
 - Remaining available for project emergencies
 - Developing modifications to the SSHP as needed
 - Evaluating occupational exposure monitoring/air sampling data and adjusting SSHP requirements as necessary
 - Serving as a Quality Control staff member
 - Approving the SSHP by signature.

The SSO is required at site operations.

- The SSO shall have a minimum 1 year experience implementing safety and occupational health procedures at cleanup operations.
- The SSO shall have training and experience to conduct exposure monitoring/air sampling and select/adjust protective equipment use.
- The SSO shall have the authority and is responsible for the following actions
 - Being present anytime cleanup operations are being performed to implement the SSHP.
 - Inspecting site activities to identify safety and occupational health deficiencies and correct them.
 - Coordinating changes/modifications to the SSHP with the SHM, site superintendent, and contracting officer.
 - Conducting project specific training.

3.4 GENERAL SAFETY AND HEALTH PROVISIONS COMPETENT PERSON

A competent person is an individual who is capable of identifying existing and predictable hazards or working conditions that are hazardous, unsanitary, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate or control these hazards and conditions. The SSO and the UXOSO have many years of field supervision in excavation, soil sampling, and safety. Both meet the requirements as defined in the definitions of EM 385-1-1 and 29 CFR 1910.120 for knowledge of and experience in environmental sampling, 29 CFR 1926 for excavation, heavy equipment supervision, and OSHA construction safety.

The SSO/UXOSO, will conduct daily pre-shift tailgate safety meetings discussing the planned site activities, the hazards associated with each task, and the training required of personnel involved in these tasks. The related personal protective equipment or related work equipment will be inspected by the competent/qualified person before any work is started. Site operations involving excavation, heavy equipment operation or soil sampling will only be conducted when the SSO or task applicable Competent Person is present.

3.5 STOP WORK AUTHORIZATION

ALL employees are empowered, authorized, and responsible to STOP WORK at any time when an imminent and uncontrolled safety or health hazard is perceived. In a Stop Work event (immediately after the involved task has been shut down and the work area has been secured in a safe manner) the employee shall contact the PM and the Corporate Health and Safety Manager. Through observations and communication, all parties involved shall then develop, communicate, and implement corrective actions necessary and appropriate to modify the task and to resume work.

4.0 TRAINING, GENERAL AND PROJECT-SPECIFIC

4.1 GENERAL

Tetra Tech personnel must complete 40 hours of introductory hazardous waste site training prior to performing work at NAPR. Tetra Tech personnel who have had introductory training more than 12 months prior to site work must have completed 8 hours of refresher training within the previous 12 months before being cleared for site work. In addition, 8-hour supervisory training in accordance with 29 CFR 1910.120(e)(4) will be required for site supervisory personnel. At least two personnel on site must be trained in Basic First Aid, CPR, and blood borne pathogen (BBP) control and response. Documentation of Tetra Tech introductory, supervisory, and refresher training as well as site-specific training will be maintained at the site. Copies of certificates or other official documentation will be used to fulfill this requirement.

4.2 SITE SPECIFIC

The Tetra Tech SSO will provide site-specific training to Tetra Tech employees who will perform work on this project. Attachment I will be used to document the provision and content of the project-specific and associated training. Site personnel will be required to sign this form prior to commencement of site activities.

This training documentation will identify personnel who through record review and attendance of the site-specific training are cleared for participation in site activities. This document shall be maintained at the site to identify and maintain an active list of trained and cleared site personnel.

The Tetra Tech SSO will also conduct a pre-activities training session prior to initiating site work. This will consist of a brief meeting at the beginning of each day to discuss operations planned for that day, and a review of the appropriate AHAs with the planned task participants. A short meeting may also be held at the end of the day to discuss the operations completed and any problems encountered.

5.0 PERSONAL PROTECTIVE EQUIPMENT

The levels of personal protection to be used for work tasks at the NAPR site have been selected based on the nature of the planned work activities and on the known or anticipated hazards; types and concentrations of contaminants that may be encountered on site; and contaminant properties, toxicity, exposure routes, and matrixes.

PPE is selected by the PHSO when writing the SSHP, and is confirmed through a rigorous review process by the Tetra Tech HSM. To assure proper PPE has been selected, both the physical and chemical hazards present at the job site are taken into account in both developing and reviewing safety-related documents.

The anticipated levels of protection selected for use by field personnel during site activities is the U.S. Environmental Protection Agency (EPA) Level D. However, because of the potential to conduct detonations of the items under moratorium, there may be a need to upgrade PPE to Level C.

PPE levels can be upgraded or downgraded based on a change in site conditions or investigation findings. When a significant change in site conditions occurs, hazards will be reassessed.

PPE has been selected based on the results of task-specific hazard assessments. Through the completion of employee training (e.g., introductory 40-hour hazardous waste training, annual refresher training, etc.), Tetra Tech employees have been informed of the proper selection, use, and care of PPE items provided to them. After PPE is provided to an employee, the responsibility for using and caring for it appropriately is the responsibility of that employee. The SSO is responsible for assuring that these responsibilities are fulfilled through daily observations and work area inspections at the sites. The SSO is also responsible for assuring that appropriate and adequate supplies of PPE are maintained such that they are readily available for issuance/replacement and in a clean and sanitary manner and location. The site personnel will use the procedures presented in the SSHP to obtain optimum performance from PPE.

The levels of personal protection to be used for work tasks have been selected based on the nature of the planned work activities and on the known or anticipated hazards. Specific PPE selected for this project is listed, by task, in the AHAs located in Section 2.0 of the SSHP. The PPE may include variations of the following:

- Safety glasses with side shields
- Hard hat when near overhead hazards
- Long sleeve shirts and pants

- Water resistant steel toe safety shoe/boots with slip-resistant soles
 - Unexploded ordnance (UXO) personnel whose job tasks required protective footwear but require no metal parts in or on their footwear shall wear Conductive footwear (Cd) with protective toe cap/composite toe footwear.
- Tyvek[®] coverall type suits
- Boot covers
- Gloves

5.1 RESPIRATORY PROTECTION PROGRAM

5.1.1 Introduction

This program covers the use of respirators by Tetra Tech employees for protection from the items under moratorium at the NAPR site. This program establishes policies and procedures for the selection, use, and care of respiratory protective equipment and was developed in accordance with the requirements of Title 29 of the Code of Federal Regulations (CFR), Part 1910.134.

Respiratory protection is of primary importance because inhalation is the major route of exposure to hazardous materials. It is Tetra Tech's intent to provide a safe and healthy work environment free of recognized hazards. Whenever possible, exposure to hazardous atmospheres will be reduced using engineering controls and appropriate work practices. When effective engineering controls are not possible or while they are being instituted, employees may be required to wear respiratory personal protective equipment (PPE).

5.1.2 Purpose

Tetra Tech has determined that employees on this project may be potentially exposed to respiratory hazards (CS gas) while performing MEC RI operations. The purpose of this program is to ensure that all employees are protected from exposure to these respiratory hazards.

5.1.3 Scope and Application

This program applies to all on-site personnel while working within the SWMU 77 site boundary. All personnel will carry on their person an approved escape mask as indicated in section 5.1.5.4 or equivalent during on-site operations within the SWMU 77 site boundary. In the event of a chemical release personnel in the affected area will don the escape mask until a safe distance upwind has been reached and approval has been given by the site Safety officer that no hazard is present. At such time the escape masks may be removed. Employees participating in the respiratory protection program do so

at no cost to them. The expense associated with training, medical evaluations and respiratory protection equipment is borne by the company.

5.1.4 Responsibilities

5.1.4.1 Project Health and Safety Manager/Program Administrator

The Program Administrator is responsible for administering the respiratory protection program. Duties of the program administrator include:

- Identifying work areas, processes or tasks that require workers to wear respirators, and evaluating hazards.
- Selection of respiratory protection options.
- Monitoring respirator use to ensure that respirators are used in accordance with their certifications.
- Arranging for and/or conducting training.
- Ensuring proper storage and maintenance of respiratory protection equipment.
- Conducting qualitative fit testing with Bitrex.
- Administering the medical surveillance program.
- Maintaining records required by the program.
- Evaluating the program.
- Updating written program, as needed.

5.1.4.2 Supervisors

Supervisors including Program Manager, Project Manager and FOL are responsible for ensuring that the respiratory protection program is implemented in their particular areas. In addition to being knowledgeable about the program requirements for their own protection, supervisors must also ensure that the program is understood and followed by the employees under their charge. Duties of the supervisor include:

- Ensuring that employees under their supervision (including new hires) have received appropriate training, fit testing and annual medical evaluation.
- Ensuring the availability of appropriate respirators and accessories.
- Being aware of tasks requiring the use of respiratory protection.
- Enforcing the proper use of respiratory protection when necessary.
- Ensuring that respirators are properly cleaned, maintained, and stored according to the respiratory protection plan.

- Ensuring that respirators fit well and do not cause discomfort.
- Continually monitoring work areas and operations to identify respiratory hazards.
- Coordinating with the Program Administrator on how to address respiratory hazards or other concerns regarding the program.

5.1.4.3 Site Safety Officer

The SSO is responsible for ensuring that:

- Respiratory PPE is used appropriately as specified in this HASP
- Employees potentially exposed to hazardous materials wear NIOSH certified respirators and follow this respiratory protection program.

5.1.4.4 Employees

Each employee has the responsibility to wear his or her respirator when and where required and in the manner in which they were trained. Employees must also:

- Care for and maintain their respirators as instructed, and store them in a clean sanitary location.
- Inform their supervisor if the respirator no longer fits well, and request a new one that fits properly.
- Inform their supervisor or the Program Administrator of any respiratory hazards that they feel are not adequately addressed in the workplace and of any other concerns that they have regarding the program.

5.1.5 Program Elements

5.1.5.1 Selection Procedures

The Program Administrator has selected the respirator to be used by site personnel. This selection is based on the common hazards to which workers are exposed it is also in accordance with OSHA standards. The Program Administrator conducted a hazard evaluation for the anticipated operations, and potential work areas where airborne contaminants may be present.

The hazard evaluation has limited the exposure potential to aerosol of a volatile solvent, riot control agent CS gas due to the primary MGF.

Updating the Hazard Assessment: The Program Administrator must revise and update the hazard assessment as needed (i.e., any time work process changes may potentially affect exposure). If an

employee feels that respiratory protection is needed during a particular activity, he/she is to contact his or her supervisor or the Program Administrator. The Program Administrator will evaluate the potential hazard, arranging for outside assistance as necessary. The Program Administrator will then communicate the results of that assessment back to the employees. If it is determined that respiratory protection is necessary, all other elements of this program will be in effect for those tasks and this program will be updated accordingly.

NIOSH Certification: All respirators must be certified by the National Institute for Occupational Safety and Health (NIOSH) and shall be used in accordance with the terms of that certification. Also, all filters, cartridges, and canisters must be labeled with the appropriate NIOSH approval label. The label must not be removed or defaced while it is in use.

5.1.5.2 Medical Evaluation

Employees who are either required to wear respirators, or who choose to wear an APR voluntarily, must pass a medical exam before being permitted to wear a respirator on the job. Employees are not permitted to wear respirators until a physician has determined that they are medically able to do so. Any employee refusing the medical evaluation is not allowed to work in an area requiring respirator use.

A WorkCare licensed occupational physician, where all company medical services are provided, provide the medical evaluations. Medical evaluation procedures are as follows:

- The medical evaluation is conducted using the questionnaire provided in Appendix C of the respiratory protection standard. The Program Administrator provides a copy of this questionnaire to all employees requiring medical evaluations.
- To the extent feasible, the company assists employees who are unable to read the questionnaire (by providing help in reading the questionnaire). When this is not possible, the employee is sent directly to the physician for medical evaluation.
- Affected employees are given a copy of the medical questionnaire to fill out, along with a stamped and addressed envelope for mailing the questionnaire to the company physician.
- Employees are permitted to fill out the questionnaire on company time.
- Follow-up medical exams are granted to employees as required by the standard, and/or as deemed necessary by the WorkCare clinic physician.

- Employees are granted the opportunity to speak with the physician about their medical evaluation, if they so request.
- The Program Administrator has provided the WorkCare clinic physician with a copy of this program, a copy of the Respiratory Protection standard, the list of hazardous substances by work area, and for each employee requiring evaluation: his or her work area or job title, proposed respirator type and weight, length of time required to wear respirator, expected physical work load (light, moderate, or heavy), potential temperature and humidity extremes, and any additional protective clothing required.
- Any employee required for medical reasons to wear a positive pressure air purifying respirator is provided with a powered air purifying respirator.
- After an employee has received clearance and begun to wear his or her respirator, additional medical evaluations are provided under the following circumstances:
 - Employee reports signs and/or symptoms related to their ability to use a respirator, such as shortness of breath, dizziness, chest pains, or wheezing.
 - The WorkCare clinic physician or supervisor informs the Program Administrator that the employee needs to be reevaluated;
 - Information from this program, including observations made during fit testing and program evaluation, indicates a need for reevaluation;
 - A change occurs in workplace conditions that may result in an increased physiological burden on the employee.

All examinations and questionnaires are to remain confidential between the employee and the physician.

5.1.5.3 Fit Testing

Fit testing is required for employees wearing half-face piece APRs for exposure to suspended particulates in the atmosphere. Employees voluntarily wearing half-face piece APRs may also be fit tested upon request.

Employees who are required to wear half-face piece APRs will be fit tested:

- Prior to being allowed to wear any respirator with a tight fitting face piece.
- Annually.
- When there are changes in the employee's physical condition that could affect respiratory fit (e.g., obvious change in body weight, facial scarring, etc.).

Employees will be fit tested with the make, model, and size of respirator that they will actually wear. Employees will be provided with several models and sizes of respirators so that they may find an optimal fit.

The Program Administrator will conduct fit tests following the OSHA approved Bitrex Solution Aerosol QLFT Protocol in Appendix B (B4) of the Respiratory Protection standard.

5.1.5.4 Respirator Use

Only individuals who are in the program will be issued respirators. Others will refrain from entering atmospheres where respiratory protection is required.

General Use Procedures: Employees will use their respirators under conditions specified by this program, and in accordance with the training they receive on the use of each particular model. In addition, the respirator shall not be used in a manner for which it is not certified by NIOSH or by its manufacturer.

- All employees shall conduct user seal checks each time that they wear their respirator. Employees shall use either the positive or negative pressure check (depending on which test works best for them) specified in Appendix B-1 of the Respiratory Protection Standard.
- Employees are not permitted to wear tight-fitting respirators if they have any condition, such as facial scars, facial hair, or missing dentures, that prevents them from achieving a good seal. Employees are not permitted to wear headphones, jewelry, or other articles that may interfere with the face piece-to-face seal.
- Air Purifying filters provides respiratory protection against aerosols by removing dusts, mists, fumes, fibers, and other particles. Filters do not remove gases or vapors, or correct for oxygen deficiency. P100 Particulate Filter provides a 99.97% Minimum Filter Efficiency. Typical applications include but are not limited to asbestos or mold and lead.

- End of service life for filters is normally determined by the increase in breathing resistance sensed by the user. When it becomes difficult to breathe comfortably, the filters should be replaced.

Full Mask Air Purifying Respirator - The North 54500 Series is a comfortable and efficiently designed full mask respirator. All parts are replaceable, which will extend the useful life of the respirator.

Product Data Sheet Information

NORTH

Product: 54501CBRN GAS MASK



54501CBRN Gas Mask



40CBRN Canister



54BAG Carry Bag

Product Description

CBRN Facepiece: The North 54500 Series Gas Mask has a dual canister mount for USA Military, EN and NATO (40mm) type thread canisters. The dual canister mount enables the single canister to be mounted on either side of the facepiece for left or right hand configuration. The gas mask is black with a single polycarbonate lens, internal oral/nasal cup and four strap head harness. Available in two overlapping sizes.

CBRN Canister: The 40CBRN Canister is a non-reflective black, CAP-1* canister for Chemical and Biological Warfare Agents, Riot Control Agents and Toxic Industrial Materials. The filter is classified as a P100 particulate filter that will protect against all known biological agents. The Canister has a standard 40mm thread, which allows it to be used with all US and NATO military gas masks, including the North 54400 and 54500 Series.

Certification

NIOSH Approval: TC-14G-0273. CBRN Cap-1*

Permeation and service life test results are listed below

Meets NIOSH criteria including high and low temperature, humidity, vibration, rough handling and live agent leak testing to ensure that the 54500 Series Gas Mask and Canister will provide adequate protection after being subjected to normal transportation, storage and handling by the user.

Protection Type:

Non-IDLH, CBRN, TIC

The 54500 Series gas mask, canister and carry bag were designed for use by emergency responders in non-IDLH atmospheres containing chemical agents, biological agents and radioactive dust. Intended end users include Fire Personnel, Law Enforcement Personnel, Emergency Medical Service Personnel, Hazmat and other Emergency Response Teams.

* Cap-1: Capacity 1, NIOSH testing of minimum 15 minute duration

Product Data Sheet Information



Product: 54501CBRN GAS MASK

Shelf Life:

Five (5) Years

The shelf life of the 40CBRN canister is five years from date of manufacture. The "Use By" date for the canister is printed on the label located on the outside of the canister storage/shipping box.

Material Composition

54501 Facepiece

Canister connector (40mm)	Hard coated anodized aluminium
Canister connector gasket	EPDM rubber
Canister connector plug	Polyphenylene oxide
Canister gasket	EPDM rubber
Exhalation valve	Isoprene rubber
Exhalation valve guard	Polyphenylene oxide
Exhalation valve connector gasket	EPDM rubber
Exhalation housing gasket	EPDM rubber
Head harness	Thermoplastic elastomer
Inhalation valve	Neoprene rubber
Lens	Hard coated Polycarbonate with anti-fog coating
Lens clamp	Glass filled phenylene sulfide
Sealing flange	Thermoplastic elastomer
Oral/nasal cup	Thermoplastic elastomer

Note: all materials used in the 54501 facepiece are latex free

40CBRN Canister

Canister Shell	Coated aluminium
Filter Media	P100
Chemical Sorbents	meets NIOSH CBRN & TIC test criteria listed below

54Bag Carry Bag

Carry Bag	Nylon
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Weights & Dimensions:

Component Weights

54501 Facepiece	17 oz. (480 grams)
40CBRN Canister	11.5 oz. (326 grams)

Shipping Weights & Dimensions

54501CBRN Facepiece & Canister:	Weight: 3.22 lbs.	Dimensions: 11-1/2" L x 9-1/2" W x 8" H
54501 Facepiece	Weight: 2.19 lbs	Dimensions: 11-1/4" L x 8-1/4" W x 6-1/2" H
40CBRN Canister	Weight: 6 lbs.	Dimensions: 14-1/2" L x W x 9-3/4" x 6" H
54BAG	Weight: .3 lbs.	Dimensions: 7" L x 7" W x 2" H

Country of Origin:

Product Data Sheet Information**NORTH****Product: 54501CBRN GAS MASK**54501 Facepiece
40CBRN CanisterMexico
Netherlands**Permeation and Service Life Test Results****Facepiece Material Permeation**

<u>Challenge Agent</u>	<u>Challenge Concentration</u>	<u>Maximum Peak Excursion</u>	<u>Breakthrough Cumulative</u>	<u>Minimum Service Life</u>
Mustard Vapor (HD)	50 mg/m ³	.030mg/m ³	3.0 mg-min/m ³	8 hours
Mustard Liquid (HD)	.043 to .086 ml	.030mg/m ³	3.0 mg-min/m ³	2 hours
Sarin Vapor (GB)	210 mg/m ³	0.044mg/m ³	1.05 mg-min/m ³	8 hours

Tested by: Edgewood Arsenal, per NIOSH STP-CBRN-0350 and STP-CBRN-0351

Canister Service Life

<u>Challenge Agent</u>	<u>Challenge Concentration</u>	<u>Breakthrough Concentration</u>	<u>Service Time to Breakthrough (Minutes)</u>
Ammonia	2,500 ppm	12.5 ppm	>30
Cyanogen Chloride	300 ppm	2 ppm	>30
Cyclohexane	2,600 ppm	10 ppm	>30
Formaldehyde	500 ppm	1 ppm	>30
Hydrogen Cyanide	940 ppm	4.7 ppm	>30
Hydrogen Sulfide	1,000 ppm	5 ppm	>60
Nitrogen Dioxide	200 ppm	1 ppm	>30
Phosgene	250 ppm	1.25 ppm	>30
Phosphine	300 ppm	.3 ppm	>30
Sulfur Dioxide	1,500 ppm	5 ppm	>25

Tested per CBRN Gas Mask Standard. Flow rate 64 lpm. All testing performed at 25 ± 5 degrees C

Canister also meets NIOSH Cartridge Service Life conditions for Organic Vapor, Chlorine, Hydrogen Chloride and Hydrogen Fluoride.

Communication Test Results:**Overall performance >90%**

As defined by the NIOSH Statement of Standard for Full Facepiece Air Purifying Respirators, paragraph 4.6: "Communication requirements are based upon performance using a Modified Rhyme Test (MRT). The communications requirement is met if the overall performance rating is greater than or equal to seventy (70) percent. The MRT will be performed with a steady background noise of 60 dBA consisting of a broadband "pink" noise. The distance between the listeners and speakers shall be 3 meters.

Ordering Information:

Product Data Sheet Information



Product: 54501CBRN GAS MASK

Part #	Description	Packaging	Order Multiple	Case Pack
Gas Mask Kit, complete				
54501CBRN	Respirator Gas Mask, complete. Includes 54501 Gas Mask 40CBRN canister and carry bag. Size Medium/Large	Each	1	1
54501SCBRN	Respirator Gas Mask, complete. Includes 54501 Gas Mask 40CBRN canister and carry bag. Size Small	Each	1	1
Gas Mask Replacement Components				
54501	Gas Mask with carry bag. Size Medium/Large	Each	1	1
54501S	Gas Mask with carry bag. Size Small	Each	1	1
40CBRN	Replacement CBRN 40mm canister	Each	6	6
54BAG	Replacement carry bag	Each	1	1
Accessories				
80100	Eye glass frame (plastic) no lenses with suction cup	Each	1	1
7003	Respirator refresher wipe pads, with alcohol (100 per box)	Box	10	10
7003A	Respirator refresher wipe pads, alcohol free 100 per box)	Box	10	10
770021	Fit Test Adapter for quantitative fit testing**	Each	1	1
770025	Facepiece converter for quantitative fit testing**	Each	1	1
80992	Cleaner/sanitizer powder (6 packers per each)	Each	12	12
80944A	Anti-Fog wipes. Ten individually packaged in foil bags.	Box	1	1

** Both 770021 and 770025 are required for quantitative fit testing

Warranties: North products are covered by and subject to the terms and conditions of the North Safety Products Limited Warranty that appears in our annual price list. The North Safety Products Limited Warranty is the only written warranty of any force and effect, and all other written warranties are disclaimed in their entirety. *In no event shall North Safety Products or any of its authorized dealers be liable for any damages in excess of the purchase price of the relevant product. This limitation applies to damages of any kind, including but not limited to direct or indirect damages or other special, incidental, exemplary or consequential damages, whether arising out of the use or inability to use the product, even if we or any of our authorized dealers has been advised of the possibility of the damages or any claim by any other party. Servicing of any product with parts not approved by us will void the warranty and may result in loss of any certification or approval applicable to the product.*



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www.northsafety.com

Emergency Procedures – This respirator will be worn as an emergency escape respirator when handling detonations of items under moratorium. In NAVSEA AMPN/TWO24-AA-ORD-010 these items are defined as:

- hexachloroethane (HC)
- colored smokes, white phosphorous (WP)
- red phosphorous (RP)
- Riot Control Munitions
 - chloracetophenone (CN)
 - o-chlorobenzylmalononitril (CS).

Respirator Malfunction - For any malfunction of an APR (e.g., such as breakthrough, face piece leakage, or improperly working valve), the respirator wearer should immediately leave the area and inform his or her supervisor that the respirator no longer functions as intended, and go to the designated safe area to maintain or replace the respirator. The supervisor must ensure that the employee receives the needed parts to repair the respirator, or is provided with a new re

Immediately Dangerous to Life and Health (IDLH) Procedures - Respirators will only be worn in areas declared to be free of IDLH situations.

5.1.5.5 Air Quality

The rodent sampling is scheduled to be outdoors. If traps are set inside a building, prior to entering personnel will confirm that the atmosphere contains the following and is acceptable for entry:

- An Identified hazardous atmosphere.
- Oxygen concentration (between 19.5% and 21%) for acceptable entry conditions.
- The atmosphere is below the IDLH based on monitoring information.
- The cartridge is acceptable for use in filtering the identified hazard.

Monitoring will be conducted continuously until all personnel exit the space. If the atmosphere changes during the entry and becomes unacceptable all personnel will immediately exit the space.

5.1.6 Cleaning, Maintenance, Change Schedules and Storage

As disposable respirators are to be used in this project regular cleaning will only be conducted when a respirator will be used on a following work shift.

5.1.6.1 Cleaning

Respirators issued for the exclusive use of an employee shall be cleaned as often as necessary.

The following procedure is to be used when cleaning and disinfecting respirators:

- Disassemble respirator, removing any filters, canisters, or cartridges.
- Wash the face piece and associated parts in a mild detergent with warm water. Do not use organic solvents.
- Rinse completely in clean warm water.
- Wipe the respirator with disinfectant wipes (70% Isopropyl Alcohol) to kill germs.
- Air-dry in a clean area.
- Reassemble the respirator and replace any defective parts.
- Place in a clean, dry plastic bag or other air tight container.

Note: The Program Administrator will ensure an adequate supply of appropriate cleaning and disinfection material at the cleaning station. If supplies are low, employees should contact their supervisor, who will inform the Program Administrator.

5.1.6.2 Maintenance

Respirators are to be properly maintained at all times in order to ensure that they function properly and adequately protect the employee. Maintenance involves a thorough visual inspection for cleanliness and defects. Worn or deteriorated parts will be replaced prior to use. No components will be replaced or repairs made beyond those recommended by the manufacturer. Repairs to regulators or alarms of atmosphere-supplying respirators will be conducted by the manufacturer.

The following checklist will be used when inspecting respirators:

- Face piece: cracks, tears, or holes facemask distortion cracked or loose lenses/faceshield
- Head straps: breaks or tears broken buckles
- Valves: residue or dirt, cracks or tears in valve material

- Filters/Cartridges: approval designation on cartridge, gaskets, cracks or dents in housing and proper cartridge for hazard

Employees are permitted to leave their work area to perform limited maintenance on their respirator in a designated area that is free of respiratory hazards. Situations when this is permitted include to wash their face and respirator face piece to prevent any eye or skin irritation, to replace the filter, cartridge or canister, and if they detect vapor or gas breakthrough or leakage in the face piece or if they detect any other damage to the respirator or its components.

5.1.6.3 Change Schedules

Employees wearing APRs with P100 HEPA filters for protection against lead shall change the cartridges on their respirators each day or when they first begin to experience difficulty breathing (i.e., resistance) while wearing their masks.

5.1.6.4 Storage

Respirators must be stored in a clean, dry area, and in accordance with the manufacturer's recommendations. Each employee will clean and inspect their own air-purifying respirator in accordance with the provisions of this program and will store their respirator in a plastic bag in their own locker. Each employee will have his/her name on the bag and that bag will only be used to store that employee's respirator.

The respirators will be stored by the FOL in their original manufacturer's packaging in an area that will protect them from the elements and from being damaged.

5.1.6.5 Defective Respirators

Respirators that are defective or have defective parts shall be taken out of service immediately and disposed.

5.1.7 Training

The Program Administrator will provide training to respirator users and their supervisors on the contents of this Respiratory Protection Program and their responsibilities under it, and on the OSHA Respiratory Protection standard. Workers will be trained prior to using a respirator in the workplace. Supervisors will also be trained prior to using a respirator in the workplace or prior to supervising employees that must wear respirators.

The training course will cover the following topics:

- Respiratory Protection Program for this project
- OSHA Respiratory Protection standard
- Respiratory hazards encountered at NAPR and the health effects
- Proper selection and use of respirators
- Limitations of respirators
- Respirator donning and user seal (fit) checks
- Fit testing
- Emergency use procedures
- Maintenance and storage
- Medical signs and symptoms limiting the effective use of respirators

Employees will be retrained annually or as needed (e.g., if they change departments and need to use a different respirator). Employees must demonstrate their understanding of the topics covered in the training through hands-on exercises and a written test. Respirator training will be documented by the Program Administrator and the documentation will include the type, model, and size of respirator for which each employee has been trained and fit tested.

5.1.8 Documentation and Recordkeeping

A written copy of this program and the OSHA standard is kept in Pittsburgh Office and is available to all who wish to review it.

Also maintained in the Program Administrator's office are copies of training and fit test records. These records will be updated as new employees are trained, as existing employees receive refresher training, and as new fit tests are conducted.

The Program Administrator will also maintain copies of the medical records for all employees covered under the respirator program. The completed medical questionnaire and the physician's documented findings are confidential and will remain at WorkCare Clinic. The company will only retain the physician's written recommendation regarding each employee's ability to wear a respirator.

5.1.9 Definitions

Approved: Respirators tested and listed as satisfactory by the National Institute for Occupational Safety and Health (NIOSH), or U.S. Department of Labor Mine Safety and Health Administration (MSHA) to provide adequate respiratory protection against a particular hazard for which it is designed.

Aerosol: A suspension of fine solid or liquid particles or fibers in air, such as dust, fog, fume, mist, smoke, or sprays.

Contaminant: A harmful, irritating, or nuisance material in concentrations exceeding those normally found in the ambient air.

Disinfection: The destruction of pathogenic organisms, especially by means of chemical substances.

Dust: Solid particles, mechanically produced, with a size ranging from submicroscopic to microscopic.

Elastomer: Materials with the ability to be stretched to twice their original length and to retract (rapidly) to their original length.

End-Of-Service-Life Indicator (ESLI): A system that warns the respirator user of the approach of the end of adequate respiratory protection; for example, that the sorbent is approaching saturation or is no longer effective.

Fog: A heavy concentration of a mist that can obscure vision.

Fumes: Solid particles generated by condensation from the gaseous state, generally after volatilization from molten metals, with a size usually less than one micron in diameter.

Gases: Substances that are gaseous at ordinary temperatures and pressures.

High-Efficiency Particulate Air (HEPA) Filter: A filter that is at least 99.97% efficient in removing monodisperse particles of 0.3 micrometers in diameter. The equivalent NIOSH 42 CFR 84 particulate filters are the N100, R100, and P100 filters.

Immediately Dangerous to Life or Health (IDLH): Environmental conditions which contain less than 19.5% oxygen or contaminants of high toxicity which even for short periods of exposure (at the proper concentrations) pose an immediate threat to life or health of employees.

Mists: Suspended liquid droplets generated by condensation or by breaking up of liquid with a size ranging from submicroscopic to microscopic.

Oxygen-Deficient Atmosphere: An atmosphere containing 19.5% or less of oxygen by volume.

Respirator: A device designed to provide the wearer protection against inhalation of airborne contaminants; and, for some devices, protection against oxygen-deficient atmospheres.

Respiratory Protective Equipment (RPE): Approved equipment that provides uncontaminated respirable air to the user.

Sanitize: The process of cleaning and removing potentially harmful bacteria, viruses, etc. by using disinfectant cleaning materials or immersion in hot water or a combination of the two processes.

Smoke: Particles generated by the incomplete combustion of an organic substance. Colors vary (e.g., thick black--hydrocarbon; gray--wood, paper).

Spray: Liquid particles suspended in air. This usually occurs by mechanical means, such as a leaking pipe.

Vapor: The gaseous state of a substance that is a solid or liquid at ordinary temperature and pressure.

6.0 MEDICAL SURVEILLANCE

Personnel performing onsite work that will result in exposure to contaminant-related health and safety hazards shall be enrolled in a medical surveillance program that complies with OSHA standards 29 CFR 1910.120 (f) and 29 CFR 1926.65 (f). Certification of medical surveillance program participation is appended to the SSHP. The certification shall include:

- Employee name
- Date of last examination
- Name of examining physician(s).

The required written occupational physician's opinion shall be made available upon request to the Navy Contracting Officers Representative. The medical records shall be maintained in accordance with 29 CFR 1910.1020. The Tetra Tech medical provider is board-certified in occupational medicine and is a specialist in toxicology.

Attachment I contains the certification of participation in a medical surveillance program.

7.0 EXPOSURE MONITORING/AIR SAMPLING PROGRAM

Based on previous sampling data the contaminants of concern are in the soil and are non-volatile. The area is next to a rainforest and therefore subject to daily rain showers. It is not anticipated that any airborne particulates will be generated during site activities. As a result direct reading instruments will not be required to monitor worker exposures at the site. Should site conditions change to warrant air monitoring, as determined by the FOL and/or SSO, this HASP will be modified accordingly and personnel will be trained on the need for and use of direct reading instrument(s).

8.0 TEMPERATURE EXTREMES

Because of the geographical location of the planned work, the seasonal weather conditions, and the physical exertion that can be anticipated with some of the planned tasks, it is necessary for the field team to be aware of the signs and symptoms and the measures appropriate to prevent heat and cold stress. While it is unlikely, if such conditions are encountered use the following information on heat and cold stress recognition, prevention and control.

Ambient temperature extremes (hot or cold working environments) may occur during performance of hazardous waste work depending on the project schedule. Work performed when ambient air temperatures are below 50 degrees Fahrenheit (°F) may result in varying levels of cold stress (frost nip, frost bite, and/or hypothermia) depending on environmental factors such as temperature, wind speed, and humidity; physiological factors such as metabolic rate and moisture content of the skin; and other factors such as work load and the protective clothing being worn. Work performed when ambient temperatures exceed 70°F may result in varying levels of heat stress (heat rash, heat cramps, heat exhaustion, and/or heat stroke) depending on factors similar to those presented above for cold stress.

In either case, these conditions can be debilitating and, when extreme, they can be fatal. An understanding of the importance in preventing heat/cold stress, coupled with the worker's awareness of the signs and symptoms of overexposure, can significantly reduce the potential for adverse health effects. If this hazard is present during site operations, each worker will be provided with information necessary to protect themselves, and site management will be instructed to permit frequent breaks in mild temperature rest areas having hot/cold fluids available for consumption. When site personnel are required to wear semi-permeable (Saranex, Tyvek) or impermeable protective clothing to perform their assigned tasks and ambient temperatures are 70° F or higher, biological monitoring may be performed and data compared to the most recent recommendations of the American Conference of Governmental Industrial Hygienists (ACGIH).

8.1 HEAT RELATED DISORDERS

There are four heat related disorders to monitor while performing work on site.

8.1.1 Heat Rash

Also known as prickly heat, this condition affects the skin. It occurs in situations where the skin remains wet most of the time. The sweat ducts become plugged and a skin rash soon appears.

Signs and Symptoms

- Skin rash will appear on affected areas of the body.
- Tingling or prickling sensation will be felt on the affected areas.

8.1.2 Heat Cramps

Heat cramps are muscle pains, usually in the lower extremities, the abdomen, or both, that occur after profuse sweating with accompanying salt depletion. Heat cramps most often afflict people in good physical condition, who overwork in conditions of high temperature and humidity. Untreated, heat cramps may progress to heat exhaustion.

Signs and Symptoms

- Cramps in the extremities and abdomen that begin suddenly during vigorous activity.
- Heat cramps can be mild with only slight abdominal cramping and tingling in the extremities, but more commonly present intense and incapacitating pain in the abdomen and extremities.
- Respiration rate will increase, decreasing after the pain subsides.
- Pulse rate will increase
- Skin will be pale and moist.
- Body temperature will be normal
- Generalized weakness will be noted as the pain subsides.
- Loss of consciousness and airway maintenance are seldom problems with this condition.

Treatment for heat cramps is aimed at eliminating the exposure and restoring the loss of salt and water.

8.1.3 Heat Exhaustion

Heat exhaustion is a more severe response to salt and water loss, as well as an initial disturbance in the body's heat-regulations system. Like heat cramps, heat exhaustion tends to occur in people working in hot environments. Heat exhaustion may progress to heat stroke. Treatment for heat exhaustion is similar in principle to that for heat cramps.

Signs and Symptoms

- Heat exhaustion may be accompanied present by a headache, fatigue, dizziness, or nausea with occasional abdominal cramping.

- More severe cases of heat exhaustion may result in partial or complete temporary loss of respiration and circulation due to cerebral ischemia.
- Sweating will be profuse.
- Pulse rate will be rapid and weak.
- Respiration rate will be rapid and shallow.
- The skin will be pale and clammy
- The body temperature will be normal or decreased.
- The person could be irritable and restless.

8.1.4 Heat Stroke

Heat stroke is caused by a severe disturbance in the body's heat-regulating system and is a profound emergency: The mortality rate ranges from 25 to 50 percent. It can also occur from having too much exposure to the sun or prolonged confinement in a hot atmosphere. Heat stroke comes on suddenly. As the sweating mechanism fails, the body temperature begins to rise precipitously, reaching 106°F (41°C) or higher within 10 to 15 minutes. If the situation is not corrected rapidly, the body cells -- especially the very vulnerable cells in the brain--are literally cooked, and the central nervous system is irreversibly damaged. The treatment for heat stroke is aimed at maintaining vital functions and causing as rapid a decrease of body temperature as possible.

Signs and Symptoms

- The person's pulse will be strong and bounding.
- The skin will be hot, dry, and flushed.
- The worker may experience headache, dizziness, and dryness of mouth
- Seizures and coma can occur.
- Loss of consciousness and airway maintenance problems can occur.

8.1.5 Controlling Heat Stress

The following control measures are only guidelines for heat related emergencies. Actual training in emergency medical care or basic first aid is recommended. Employees will monitor one another for signs of heat stress. If indications of heat stress occur, the following corrective measures will be performed:

- Inform affected workers of the signs and symptoms of heat stress and encourage co-worker observations.

-
- Schedule tasks that are physically-demanding in early morning and late afternoon timeframes when heavy loads would be less of an issue.
 - Notify the SSO who may perform biological monitoring to determine the extent of the heat related condition.
 - The SSO may alter the work regime that will provide adequate rest periods for cooling down. This may require additional shifts of workers.
 - The SSO may also recommend cooling devices such as vortex tubes or cooling vests be worn beneath protective garments.
 - When conditions where heat related disorders may be experienced, the SSO through site-specific training and safety briefing will inform site personnel of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress.
 - Provide adequate liquids to replace lost body fluids.
 - Personnel must replace water and salt lost from sweating.
 - Personnel must be encouraged to drink more than the amount required to satisfy thirst.
 - Thirst satisfaction is not an accurate indicator of adequate salt and fluid replacement.
 - Approximately 1 cup of cool water every 20 minutes is recommended.
 - Replacement fluids can be commercial mixes such as Gatorade®.
 - Move affected persons into a shaded cool rest area (below 77° F is best).
 - Personnel shall remove impermeable protective garments during rest periods.
 - Personnel shall not be assigned other tasks during rest periods.

One of the following biological monitoring procedures may be utilized by the SSO to monitor heat stress concerns.

- Heart rate (HR) shall be measured by the pulse for 30 seconds as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 110 beats/minute.
- If the HR is higher, the next work period should be shortened by 10 minutes (or 33%), while the length of rest period stays the same.
- If the pulse rate is 100 beats/minute at the beginning of the next rest period, the following work cycle should be shortened by 33%.
- The length of the initial work period will be determined by using the table below.

TABLE A-8-1
PERMISSIBLE HEAT EXPOSURE THRESHOLD LIMIT VALUES

Work-Rest Regimen	Work Load		
	<i>Light</i>	<i>Moderate</i>	<i>Heavy</i>
Continuous Work	80.0 F	80.0 F	77.0 F
75% Work - 25% Rest, Each Hour	87.0 F	82.4 F	78.6 F
50% Work - 50% Rest, Each Hour	88.5 F	85.0 F	82.2 F
25% Work - 75% Rest, Each Hour	90.0 F	88.0 F	86.0 F

Body temperature shall be measured orally with a digital thermometer with disposable probe covers or an aural/temporal temperature sensor as early as possible in the resting period. Oral temperature (OT) at the beginning of the rest period should not exceed 99°F. If it does, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest period stays the same. However, if the oral temperature exceeds 99.7°F at the beginning of the next rest period, the following work cycle shall be further shortened by 33%. OT should be measured at the end of the rest period to make sure that it has dropped below 99°F. At no time shall work begin with the oral temperature above 99°F.

NOTE: External temperatures in excess of those stated above shall be regarded as inclement weather.

8.1.6 Temperature Extremes – Heat Stress Indication

Temperature extremes are considered inclement weather. Steps should be taken to the extent possible protect site personnel from the effects of heat stress and the sun. Control measures include:

- Watch for signs of heat stress/exhaustion, see Table A-8-2
- Provide fluid replacement
- Provide adequate number of breaks within a cooler environment.

Care should be exercised when working outdoors due to harmful effects of the sun. To reduce the potential for sunburn and melanoma use the following measures:

- Wear a hat that shades the face, neck, and ears.
- Apply sunscreen with a SPF of 15 or higher liberally on any exposed skin at least 15 minutes before going outside, then at least every two hours, more if you are sweating a lot.
- Plan/provide suitable equipment to offer shade to avoid the midday sun since the sun's ultraviolet rays are most intense between 10 AM and 4 PM and can damage your skin even on hazy days. Portable canopies over the sample station are an example of this.
- Wear wrap-around sunglasses to protect the eyes and delicate skin around them.

TABLE A-8-2

HEAT STRAIN SYMPTOMS
Stop Work If Any Worker Demonstrates Any Of The Following

Heart Rate	Sustained (several minutes) heart rate minus worker's age > than 180 beats per minute (bpm) measured at any time.
Body Core Temperature	> 101.3°F (38.5° C)
Recovery Heart Rate	> 110 bpm (Measured 1 minute after peak work effort)
Other symptoms	Sudden and sever fatigue, nausea, dizziness, or headache

Individuals May Be at Greater Risk of Heat Stress If:

Profuse sweating is sustained over hours
Weight loss over a shift is > 1.5% of beginning body weight
24-hour urinary sodium excretion is less than 50 nmoles

8.1.7 Heat Stress Treatment and Field Management

8.1.7.1 First Aid for Heat Stroke

Take the following steps to treat a worker with heat stroke:

- Call NAPR Security and notify FOL/SSO.
- Move the affected individual to a cool shaded area.
- Cool the worker using methods such as:
 - Soaking their clothes with water.
 - Spraying, sponging, or showering them with water.
 - Fanning their body.

8.1.7.2 First Aid for Heat Exhaustion

Treat victim suffering from heat exhaustion with the following:

- Have them rest in a cool, shaded or air-conditioned area.
- Have them drink plenty of water or other cool, nonalcoholic beverages.
- Have them take a cool shower, bath, or sponge bath.

8.1.7.3 First Aid for Heat Cramps

Individuals with heat cramps should:

- Stop all activity, and sit in a cool place.
- Drink clear water, juice or a sports beverage.
- Do not return to strenuous work for a few hours after the cramps subside because further exertion may lead to heat exhaustion or heat stroke.
- Seek medical attention if any of the following apply:
 - The person has heart problems.
 - The person is on a low-sodium diet.
 - The cramps do not subside within one hour.

8.1.7.4 First Aid for Heat Rash

Workers experiencing heat rash should:

- Try to work in a cooler, less humid environment when possible.
- Keep the affected area dry.
- Dusting powder may be used to increase comfort.

8.2 COLD STRESS RELATED DISORDERS

Just as heat can present a problem for on-site personnel during certain activities, so can cold temperatures. Just as the heat related disorders are magnified by environmental conditions and the tasks to be completed, so are the cold related disorders. As above, the focus is on recognizing conditions contributing to cold related disorders and selecting the most appropriate control measure.

The ACGIH cold stress Threshold Limit Values (TLVs) are recommended to protect workers from the severest effects of cold stress (hypothermia) and cold injury and to describe exposures to cold working conditions under which it is believed that nearly all workers can be repeatedly exposed without adverse health effects. The TLV objective is to prevent the deep body temperature from falling below 36 degrees centigrade (°C) or (96.8°F) and to prevent cold injury to body extremities (deep body temperature is the core temperature of the body determined by conventional methods for rectal temperature measurements). For a single, occasional exposure to a cold environment, a drop in core temperature to no lower than 35°C (95°F) should be permitted. In addition to provisions for total body protection, the TLV objective is to protect all parts of the body with emphasis on hands, feet, and head from cold injury.

Fatal exposures to cold among workers have almost always resulted from accidental exposures involving failure to escape from low environmental air temperatures or from immersion in low temperature water. The single most important aspect of life-threatening hypothermia is the fall in the deep core temperature of the body. The clinical presentations of victims of hypothermia are shown in Table A-8-3. Workers should be protected from exposure to cold so that the deep core temperature does not fall below 36°C (96.8°F); lower body temperatures will very likely result in reduced mental alertness, reduction in rational decision making, or loss of consciousness with the threat of fatal consequences.

**TABLE A-8-3
PROGRESSIVE CLINICAL PRESENTATIONS OF HYPOTHERMIA***

Core Temperature		Clinical Signs
°C	°F	
37.6	99.6	"Normal" rectal temperature
37	98.6	"Normal" oral temperature
36	96.8	Metabolic rate increases in an attempt to compensate for heat loss
35	95.0	Maximum shivering
34	93.2	Victim conscious and responsive, with normal blood pressure
33	91.4	Severe hypothermia below this temperature
32	89.6	Consciousness clouded; blood pressure becomes difficult to obtain; pupils dilated but react to light; shivering ceases
31	87.8	
30	86.0	Progressive loss of consciousness; muscular rigidity increases; pulse and blood pressure difficult to obtain; respiratory rate decreases
29	84.2	
28	82.4	Ventricular fibrillation possible with myocardial irritability
27	80.6	Voluntary motion ceases; pupils nonreactive to light; deep tendon and superficial reflexes absent
26	78.8	Victim seldom conscious
25	77.0	Ventricular fibrillation may occur spontaneously
24	75.2	Pulmonary edema
22	71.6	Maximum risk of ventricular fibrillation
21	69.8	
20	68.0	Cardiac standstill
18	64.4	Lowest accidental hypothermia victim to recover
17	62.6	Isoelectric electroencephalogram
9	48.2	Lowest artificially cooled hypothermia patient to recover

* Presentations approximately related to core temperature. Reprinted from the American Family Physician, published by the American Academy of Family Physicians.

8.2.1 Signs and Symptoms

Pain in the extremities may be the first early warning of danger to cold stress.

During exposure to cold, maximum severe shivering occurs when the body temperature has fallen to 35°C (95°F). This must be taken as a sign of danger and exposure to cold should be immediately terminated when severe shivering becomes evident. Useful physical or mental work is limited when severe shivering occurs.

8.2.2 Control Measures

Since prolonged exposure to cold air, or to immersion in cold water, at temperatures well above freezing can lead to dangerous hypothermia, whole body protection must be provided.

- Adequate insulating dry clothing to maintain core temperatures above 36°C (96.8°F) must be provided to workers if work is performed in air temperatures below 4°C (40°F). Wind chill cooling rate and the cooling power of air are critical factors. [Wind chill cooling rate is defined as heat loss from a body

expressed in watts per meter squared which is a function of the air temperature and wind velocity upon the exposed body.] The higher the wind speed and the lower the temperature in the work area, the greater the insulation value of the protective clothing required. An equivalent chill temperature chart relating the actual dry bulb air temperature and the wind velocity is presented in Table A-8-4. The equivalent chill temperature should be used when estimating the combined cooling effect of wind and low air temperatures on exposed skin or when determining clothing insulation requirements to maintain the deep body core temperature.

- Unless there are unusual or extenuating circumstances, cold injury to other than hands, feet, and head is not likely to occur without the development of the initial signs of hypothermia. Older workers or workers with circulatory problems require special precautionary protection against cold injury. The use of extra insulating clothing and/or a reduction in the duration of the exposure period are among the special precautions which should be considered. The precautionary actions to be taken will depend upon the physical condition of the worker and should be determined with the advice of a physician with knowledge of the cold stress factors and the medical condition of the worker.
- Acclimatization – With exposure the body does undergo changes that will permit it to adjust to the cold weather better.
- Dehydration – Water and salt loss magnifies conditions associated with hypothermia. Warm, sweet nonalcoholic fluids should be employed for fluid replacement. Soup, non-caffeinated drinks including decaffeinated teas, coffees, etc. are suitable for this purpose.
- Diet – A balanced diet can provide the body with the necessary nutrients to aid in combating cold stress. Restrictive diets avoiding salts, carbohydrates, etc. may rob you of certain elements that you need. Caffeine and alcoholic drinks may increase the effects of a cold environment through the loss of water and salts.
- Engineering Controls such as wind shields/barriers may be used to control the potential affects of cold stress.
- Administrative controls such as worker rotation; work/warm regimens; required fluid intake; scheduling the work for warmer weather; assigning more workers to the task to complete it quicker.

TABLE A-8-4
COOLING POWER OF WIND ON EXPOSED FLESH EXPRESSED AS EQUIVALENT TEMPERATURE
(under calm conditions)*

Estimated Wind Speed (in mph)	Actual Temperature Reading (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Temperature (°F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little additional effect)	LITTLE DANGER In < hr with dry skin. Maximum danger of false sense of security			INCREASING DANGER Danger from freezing of exposed flesh within one minute.				GREAT DANGER Flesh may freeze within 30 seconds.				
	Trench foot and immersion foot may occur at any point on this chart.											

- Overall physical condition should always be considered when combating cold stress. Older persons and those on certain medications (blood pressure control) are vulnerable to cold environment and cold stress disorders.
- Environmental monitoring results will tell you if the conditions are such that cold related disorders can occur. Biological monitoring will provide real time information as to the progression of the cold related disorders within your field crew.

8.2.3 Monitoring

- Core temperature
 - Ensure that it does not drop below 96.8°F
- Weight Loss
 - Monitoring weight loss may be indicative of water and salt loss through dehydration.
 - >2% changes in body weight are indicative of water loss.
- Visual observation of signs and symptoms of overexposure.

8.2.4 Special Conditions - Evaluation and Control

For exposed skin, continuous exposure should not be permitted when the air speed and temperature results in an equivalent chill temperature of -32°C (-25.6°F). Superficial or deep local tissue freezing will occur only at temperatures below -1°C (30.2°F) regardless of wind speed.

At air temperatures of 2°C (35.6°F) or less, it is imperative that workers who become immersed in water or whose clothing becomes wet be immediately provided a change of clothing and be treated for hypothermia.

TLVs recommended for properly clothed workers for periods of work at temperatures below freezing are shown in Table A-8-5.

Special protection of the hands is required to maintain manual dexterity for the prevention of accidents:

- If fine work is to be performed with bare hands for more than 10-20 minutes in an environment below 16°C (60.8°F), special provisions should be established for keeping the workers' hands warm.

TABLE A-8-5

THRESHOLD LIMIT VALUES WORK/WARM-UP SCHEDULE FOR FOUR-HOUR SHIFT*

Air Temperature - Sunny Sky		No Noticeable Wind		5 mph Wind		10 mph Wind		15 mph Wind		20 mph Wind	
°C (approx)	°F (approx)	Max. Work Period	No. of Breaks								
-26° to -28°	-15° to -19°	(Norm Breaks)	1	(Norm Breaks)	1	75 min	2	55 min	3	40 min	4
-29° to -31°	-20° to -24°	(Norm Breaks)	1	75 min	2	55 min	3	40 min	4	30 min	5
-32° to -34°	-25° to -29°	75 min	2	55 min	3	40 min	4	30 min	5	Non-emergency work should cease	
-35° to -37°	-30° to -34°	55 min	3	40 min	2	30 min	5	Non-emergency work should cease			
-38° to -39°	-35° to -39°	40 min	4	30 min	1	Non-emergency work should cease					
-40° to -42°	-40° to -44°	30 min	5	Non-emergency work should cease							
-43° & below	-45° & below	Non-emergency work should cease									

NOTES:

- Schedule applies to moderate to heavy work activity with warm-up breaks of 10 minutes in a warm location. For Light-to-Moderate Work (limited physical movement): apply the schedule one step lower. For example, at 35°C (-30°F) with no noticeable wind (Step 4), a worker at a job with little physical movement should have a maximum work period of 40 minutes with 4 breaks in a 4-hour period (Step 5).
- The following is suggested as a guide for estimating wind velocity if accurate information is not available: 5 mph: light flag moves; 10 mph: light flag fully extended; 15 mph: raises newspaper sheet; 20 mph: blowing and drifting snow.
- If only the wind chill cooling rate is available, a rough rule of thumb for applying it rather than the temperature and wind velocity factors given above would be: (1) special warm-up breaks should be initiated at a wind chill cooling rate of about 1750 W/M²; (2) all non-emergency work should have ceased at or before a wind chill of 2250 W/m². In general, the warm-up schedule provided above slightly under-compensates for the wind at the warmer temperatures, assuming acclimatization and clothing appropriate for winter work. On the other hand, the chart slightly over-compensates for the actual temperatures in the colder ranges, since windy conditions rarely prevail at extremely low temperatures.
- TLVs apply only for workers in dry clothing.

* Adapted from Occupational Health & Safety Division, Saskatchewan Department of Labor.

- For this purpose, warm air jets, radiant heaters (fuel burner or electric radiator), or contact warm plates may be utilized.
- Metal handles of tools and control bars should be covered by thermal insulating material at temperatures below -1°C (30.2°F).
- If the air temperature falls below 16°C (60.8°F) for sedentary, 4°C (39.2°F) for light, -7°C (19.4°F) for moderate work and fine manual dexterity is not required, then gloves should be used by the workers.

To prevent contact frostbite, the workers should wear anti-contact gloves.

- When cold surfaces below -7°C (19.4°F) are within reach, a warning should be given to each worker by the supervisor to prevent inadvertent contact by bare skin.
- If the air temperature is -17.5°C (0°F) or less, the hands should be protected by mittens.
- Machine controls and tools for use in cold conditions should be designed so that they can be handled without removing the mittens.

Provisions for additional total body protection are required if work is performed in an environment at or below 4°C (39.2°F). The workers should wear cold protective clothing appropriate for the level of cold and physical activity:

- If the air velocity at the job site is increased by wind, draft, or artificial ventilating equipment, the cooling effect of the wind should be reduced by shielding the work area or by wearing an easily removable windbreak garment.
- If only light work is involved and if the clothing on the worker may become wet on the job site, the outer layer of the clothing in use may be of a type impermeable to water.
- With more severe work under such conditions, the outer layer should be water repellent, and the outerwear should be changed as it becomes wetted.
- The outer garments should include provisions for easy ventilation in order to prevent wetting of inner layers of sweat.

- If work is done at normal temperatures or in a hot environment before entering the cold area, the employee should make sure that clothing is not wet as a consequence of sweating.
- If clothing is wet, the employee should change into dry clothes before entering the cold area.
- The workers should change socks and any removable felt insoles at regular daily intervals or use vapor barrier boots.
- The optimal frequency of change should be determined empirically and will vary individually and according to the type of shoe worn and how much the individual's feet sweat.
- If exposed areas of the body cannot be protected sufficiently to prevent sensation of excessive cold or frostbite, protective items should be supplied in auxiliary heated versions.

If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work should be modified or suspended until adequate clothing is made available or until weather conditions improve.

8.2.5 Work - Warming Regimen

If work is performed continuously in the cold at an equivalent chill temperature (ECT) or below -7°C (19.4°F), heated warming shelters (tents, cabins, rest rooms, etc.) should be made available nearby. The workers should be encouraged to use these shelters at regular intervals, the frequency depending on the severity of the environmental exposure. The onset of heavy shivering, frostnip, the feeling of excessive fatigue, drowsiness, irritability, or euphoria are indications for immediate return to the shelter. When entering the heated shelter, the outer layer of clothing should be removed and the remainder of the clothing loosened to permit sweat evaporation or a change of dry work clothing provided. A change of dry work clothing should be provided as necessary to prevent workers from returning to work with wet clothing. Dehydration, or the loss of body fluids, occurs insidiously in the cold environment and may increase the susceptibility of the worker to cold injury due to a significant change in blood flow to the extremities. Warm sweet drinks and soups should be provided at the work site to provide caloric intake and fluid volume. The intake of coffee should be limited because of the diuretic and circulatory effects.

For work practices at or below -12°C (10.4°F) ECT, the following should apply:

- The worker should be under constant protective observation (buddy system or supervision).
- The work rate should not be so high as to cause heavy sweating that will result in wet clothing; if heavy work must be done, rest periods should be taken in heated shelters and opportunity for changing into dry clothing should be provided.
- New employees should not be required to work full time in the cold during the first days of employment until they become accustomed to the working conditions and required protective clothing.
- The weight and bulkiness of clothing should be included in estimating the required work performance and weights to be lifted by the worker.
- The work should be arranged in such a way that sitting still or standing still for long periods is minimized.
- Unprotected metal chair seats should not be used.
- The worker should be protected from drafts to the greatest extent possible.
- The workers should be instructed in safety and health procedures.
- The training program should include as a minimum instruction in:
 - Proper rewarming procedures and appropriate first aid treatment.
 - Proper clothing practices.
 - Proper eating and drinking habits.
 - Recognition of impending frostbite.
 - Recognition of signs and symptoms of impending hypothermia or excessive cooling of the body even when shivering does not occur.
 - Safe work practices.

Note: This information has been adopted from the 2010-1011 "Threshold Limit Values for Chemical Substances and Physical Agents and Biological Indices" by the American Conference of Governmental Industrial Hygienists (ACGIH).

As conditions may vary, it will be at the discretion of the Field Operations Leader and the Site Safety Officer representative to temporarily suspend or terminate activities as conditions dictate. All site activities will be terminated in the advent of electrical storms, tornadoes, and other hazardous weather conditions.

9.0 STANDARD OPERATING PROCEDURES, ENGINEERING CONTROLS AND WORK PRACTICES

In addition to the task-specific work practices and restrictions identified in the AHAs found in Section 2.0 of the SSHP, the following general safe work practices are to be followed when conducting work on-site.

9.1 SITE RULES/PROHIBITIONS

- Personnel engaged in on site activities will practice the "buddy system" to ensure the safety of personnel involved in this operation.
- Buddies should maintain visual contact with each other and with other on-site team members by remaining in close proximity to assist each other in case of emergency. At least one person will have outside communications and will test that communications system daily, (Cell Phone).
- Eating, drinking, chewing gum or tobacco, taking medication, or smoking in contaminated or potentially contaminated areas or where the possibility for the transfer of contamination exists is prohibited.
- Wash hands and face thoroughly upon leaving a contaminated or suspected contaminated area.
- The use of waterless hand cleaning products is acceptable if followed by actual hand-washing as soon as practicable upon exiting the site.
- Avoid contact with potentially contaminated substances including puddles, pools, mud, or other such areas.
- Do not enter an area where MEC may be present without escort by the UXO Technician II
- Do not enter any area not previously cleared by the UXO Technician II.
- Do not touch, kick, or in any way disturb potential MEC.
- If suspected MEC is found the UXO Technician II will be contacted immediately.
- Avoid, kneeling on the ground or leaning or sitting on equipment.

- Keep monitoring equipment away from potentially contaminated surfaces.
- Plan and mark entrance, exit, and emergency evacuation routes.
- Rehearse unfamiliar operations prior to implementation.
- Establish appropriate safety zones including support, contamination reduction, and EZs.
- Minimize the number of personnel and equipment in contaminated areas (such as the EZ). Non-essential vehicles and equipment should remain within the support zone.
- Establish appropriate decontamination procedures for leaving the site.
- Immediately report injuries, illnesses, and unsafe conditions, practices, and equipment to the SSO.
- Observe co-workers for signs of toxic exposure and heat or cold stress.
- Inform co-workers of potential symptoms of illness, such as headaches, dizziness, nausea, or blurred vision.

9.2 MATERIAL HANDLING PROCEDURES

Handling and storing materials involve many operations including handling drums and moving equipment. Improper handling and storing of materials often result in injuries. Whether moving materials manually or mechanically, know and understand the potential hazards associated with the task at hand and how to control the workplace to minimize danger.

Hazards include lifting heavy objects, falling objects, improperly stacked materials, and various types of equipment. Potential injuries that can occur when manually moving materials include the following:

- Strains and sprains from lifting loads improperly or from carrying loads that are either too large or too heavy.
- Fractures and bruises caused by being struck by materials or by being caught in pinch points.

- Cuts and bruises caused by falling materials that have been improperly stored or by incorrectly cutting ties or other securing devices.
- Manual lifting is likely to occur during many phases of the project.

Tetra Tech personnel should notify supervisors or designated safety representatives of pre-existing medical conditions that may be aggravated or re-injured by lifting activities, such that the Tetra Tech may evaluate safe operational procedures with regard to the required task.

- Proper lifting techniques (use of knees and not back) must be used when lifting any object.
- Plan storage and staging to minimize lifting or carrying distances.
- Use drum dollies/carts with a latching mechanism when handling full/loaded drums.
- Split heavy loads into smaller loads.
- Use mechanical lifting aids whenever possible.
- Have someone assist with the lift especially for heavy (>40 lbs.) or awkward loads.
- If site personnel are not capable of lifting 40 lbs., seek assistance from a team member to split the load.
- Make sure the path of travel is clear prior to the lift.

9.2.1 Drum/Container/Tank Handling

During the execution of the contract, various types and quantities of generated waste materials will be generated and may include, but not be limited to, PPE excess soil, and limited quantities of decontamination fluids. Personnel are permitted to handle and/or sample drums containing known waste sources/materials, but handling or sampling of other drums (unknowns) requires an APP/SSHP revision or amendment approved by the Tetra Tech HSM. The following control measures must be taken when managing drums containing waste sources/materials:

- Minimize transportation of drums or other containers with generated waste materials. However, where this is deemed necessary, appropriate drum dollies, hand trucks or other suitable material handling equipment shall be used to transfer drums of generated waste materials.
- Sample or open only labeled drums or drums known to contain generated waste materials.

- Unknown drums or drums that show evidence of excessive buckling/ bulging, corrosion, vapors, crystallization, unusual discoloration or other abnormalities may only be sampled with:
 - Evaluation of engineering controls,
 - Proper PPE air monitoring equipment and
 - Use of properly trained personnel familiar with the sampling of unknown drum contents.
- Use caution when sampling bulging or swollen drums. Relieve pressure slowly and step away from the drum as pressure is being released.
- If drums contain, or potentially contain, flammable materials, use non-sparking (i.e., brass) tools to open the drum. Picks, chisels, and firearms may not be used to open drums.
- Reseal bung holes or plugs whenever possible.
- Avoid mixing incompatible drum contents.
- Sample drums without leaning over the drum opening.
- Transfer the content of drums using a method that minimizes contact with material.
- PPE worn to minimize potential dermal to identified contaminants of concern.

Good personal hygiene practices and procedures must be maintained.

9.3 SPILL CONTINGENCY

It is anticipated that bulk quantities of potentially hazardous materials (greater than 55-gallons) will not be handled during the site activities. It is possible, however, that as the job progresses disposable PPE and other non-reusable items may be discarded and small quantities of investigation derived waste (IDW) will be generated. As needed, 55-gallon drums may be used to contain IDW generated during sampling activities. The drum(s) will be labeled with the site name and address, the type of contents, and the date the container was filled as well as an identified contact person. As warranted, samples will be collected and analyzed to characterize the material and determine appropriate disposal measures, as described in the project-specific SAP. Once characterized the drum(s) will be removed from the staging area and disposed of in accordance with Federal, State and local regulations.

9.3.1 Potential Spill Areas

Should drums contain liquid wastes, potential spill areas will be monitored in an ongoing attempt to prevent and control the spread of contamination into the environment. Areas designated for handling, loading, and unloading of potentially contaminated water and debris present limited potential for leaks or spills. Liquid waste other than IDW and decontamination fluids is not anticipated.

9.3.2 Leak and Spill Detection

To establish an early detection of potential spills or leaks, periodic inspections by the SSO will be conducted during working hours to visually confirm that containers are not leaking. If a leak is detected, the first approach will be to transfer the container contents using a hand pump into a new container. Other provisions for the transfer of container contents will be made and appropriate emergency contacts will be notified, if necessary. In most instances, leaks will be collected and contained using absorbents such as Oil-dry, vermiculite, and/or sand, which may be stored at the staging area in a conspicuously marked drum. This material too, will be containerized for disposal pending analyses. Inspections will be documented in the Project Logbook.

9.3.3 Personnel Training and Spill Prevention

Personnel will be instructed on the procedures for spill prevention, containment, and collection of hazardous materials in the site-specific training. The FOL and/or the SSO will serve as the Spill Response Coordinator for this operation should the need arise.

9.3.4 Spill Control Plan

This section describes the procedures Tetra Tech field crewmembers will employ upon the detection of a spill or leak of potentially contaminated material.

- Take immediate actions to stop the leak or to control the spill.
- Notify the FOL/SSO immediately.
- Avoid contacting container contents.
- The potential hazards will be evaluated to determine the proper personal protection levels, methods, and equipment necessary for the cleanup.
- Spread the absorbent material in the area of the spill covering completely.
- If necessary, the spill area will be evacuated, isolated, and secured.

It is not anticipated that a spill will occur of such magnitude that the field crew cannot handle it. Should this occur, however, the FOL/SSO will notify appropriate emergency response agencies and the NAPR POC immediately.

The following represents the types of equipment that may be maintained at the staging area for the purpose of supporting this Spill Containment Program (depending on the likelihood that drums and/or liquid wastes are generated).

- Sand, clean fill, vermiculite, or other noncombustible absorbent (oil-dry)
- Absorbent pads,
- 5-gallon buckets.
- Drums (55-gallon U.S. DOT 1A1 and/or 1A2)
- Shovels, rakes, and brooms
- Polyethylene sheeting,

10.0 SITE CONTROL MEASURES

This section outlines the means to delineate work zones and use these work zones in conjunction with decontamination procedures to prevent the spread of contaminants into previously unaffected areas.

10.1 CONTROL ZONES

It is anticipated that a three-zone approach will be used during work at this site. This approach will be comprised of an EZ, a contamination reduction zone, and a support zone. It is also anticipated that this approach will control access to site work areas, restricting access by the general public, minimizing the potential for the spread of contaminants, and protecting individuals who are not cleared to enter work areas. Site personnel entering the EZ and contamination reduction corridor will log-in and log-out with the FOL/SSO on a daily basis. This information will be kept in the FOL/SSO project log book.

10.1.1 Exclusion Zone

The EZ will be considered those areas of active operations plus an established safety zone depending on the task. The following represent the EZ boundaries for the following identified tasks:

- Monitoring well installation – height of mast plus 25 feet
- Groundwater sampling – 10 feet from point of sampling
- Low pressure decontamination activities – 10-feet
- High Pressure washing and heavy equipment decontamination operations – 35-feet
- IDW Storage area – Authorized personnel only
- UXO Activities – See ESS

EZs will be delineated using barrier tape, cones and/or drive poles, and postings to inform and direct facility site personnel and visitors, as necessary.

A pre-startup site visit will be conducted to identify proposed subsurface investigation locations, conduct utility clearances, and provide notices concerning scheduled activities.

10.1.2 Contamination Reduction Zone

The contamination reduction zone (CRZ) will be a buffer area between the EZ and any area of the site where contamination is not suspected. This area will also serve as a focal point in supporting EZ activities. This area will be marked using barrier tape, cones, and postings to inform and direct facility

personnel. Decontamination will be conducted at a central location. Equipment potentially contaminated will be bagged and taken to that location for decontamination.

10.1.3 Support Zone

The support zone for this project will include a staging area where site vehicles will be parked, equipment will be unloaded, and where food and drink containers will be maintained. The support zones will be established at areas of the site away from potential exposure to site contaminants during normal working conditions or foreseeable emergencies.

10.2 SITE VISITORS

Site visitors for the purpose of this document are identified as representing the following groups of individuals:

- Personnel invited to observe or participate in operations by Tetra Tech
- Regulatory personnel (i.e., DoD, EPA, OSHA)
- Authorized Navy Personnel
- Other authorized visitors

Non-Tetra Tech personnel working on this project are required to gain initial access to the facility by coordinating with the Tetra Tech FOL or designee and following established access procedures.

Site visitors will be escorted and restricted from approaching any work areas where they could potentially be exposed to hazardous chemicals or MEC. If a visitor has authorization from the client and from the Tetra Tech PM to approach our work areas, the FOL must assure that the visitor first provides documentation indicating that he/she/they have successfully completed the necessary OSHA introductory training, receive site-specific training from the SSO and UXO Technician II, and that they have been physically cleared to work on hazardous waste sites.

10.2.1 UXO Escort Operations

A UXO escort will be provided for each visitor and non-UXO qualified team or individual on site. The UXOSO will perform an operational risk assessment using Chief of Naval Operations Instruction (OPNAVINST) 5900.39C (2010) as a guide to determine the hazard visitors would pose on that day of activities. All activities involving work in areas potentially containing MEC hazards will be conducted in full compliance with the SAP regarding personnel, equipment, and procedures as follows:

- If any MEC/MPPEH are encountered by non-UXO personnel, the item will be avoided. The UXO escort will not attempt to identify the type or condition of the ordnance. Its location will be reported to the UXO team leader, and the item will be flagged for avoidance and addressed after the conclusion of UXO escort operations in the area. Potential exposure to chemical warfare material (CWM) at the site is not anticipated. In the event that hazardous, toxic, and radiological waste (HTRW) is encountered on site, the work site will be evacuated until the Project HSM and Navy RPM identify and implement appropriate protective measures.
- The UXO escort will clearly mark any area with visible MEC/MPPEH, and the area will be avoided. The visible MEC/MPPEH will be noted on field log sheets or in the field logbook. The UXO escort will report the MEC to the UXO team leader.
- No ordnance, munitions, explosives, or ordnance-related materials will be moved, removed, or disposed of during UXO escort duties.
- The UXO escort will conduct UXO avoidance surveys for all proposed survey stake locations using a metal detector to check for possible MEC/MPPEH. If an anomaly is encountered or if the UXO escort suspects the presence of MEC, the proposed stake location will be relocated to an area free of concerns/anomalies.

10.3 SITE SECURITY

Site security will be accomplished using Tetra Tech field personnel. Tetra Tech will retain complete control over active operational areas. As this activity takes place at a Navy facility open to public access, the first line of security will take place at the facility boundaries restricting the general public. The second line of security will take place at the work site referring interested parties to the Facility Contact. The Facility Contact will serve as a focal point for facility personnel, interested parties, and serve as the final line of security and the primary enforcement contact.

Site security will also be maintained to ensure that non-essential personnel do not access the EZ during UXO operations at the site. Barricades will be positioned with a red (BRAVO) flag on access routes a minimum of the HFD or K328 distances for the selected MGFs from the edges of the respective sites. Notification procedures will be posted on the barricades to ensure that non-essential personnel notify the team working in the area prior to entering the area during active operations. Barricades and red (BRAVO) flags will be removed when operations stop for the day. Refer to MRP SOPs 01 and 03 for more detail on setup and preliminary activities.

10.4 MATERIAL SAFETY DATA SHEET (MSDS) REQUIREMENTS

Tetra Tech and subcontractor personnel will provide MSDSs for chemicals brought on site. The contents of these documents will be reviewed by the SSO with the user(s) of the chemical substances prior to any actual use or application of the substances on site. A chemical inventory of the chemicals used on site will be developed. The MSDSs will then be maintained in a central location (i.e., temporary office) and will be available for anyone to review upon request. When a chemical is received from a manufacturer or distributor on site, the SSO is responsible for its receipt will verify that the container is properly labeled with the contents such as the name of the chemical substance, When a chemical is received from a manufacturer or distributor, the employee responsible for its receipt will verify that the container is properly labeled with the following information: the contents such as the name of the chemical substance; the appropriate hazard warning and the name and address of the chemical manufacturer.

10.5 COMMUNICATION

As personnel will be working in proximity to one another during field activities, a supported means of communication between field crew members will not be necessary.

External communication will be accomplished by using cell phones. Workers should enter the emergency and important phone numbers from Table A-14-1 into their cell phones prior to beginning work.

10.6 CONFINED SPACE ENTRY

It is not anticipated, under the proposed scope of work, that confined space and permit-required confined space activities will be conducted. **Therefore, personnel under the provisions of this SSHP are not allowed, under any circumstances, to enter confined spaces.** If confined space operations are to be performed as part of the scope of work, detailed procedures and training requirements will have to be addressed.

10.7 DRILL/INCIDENT AFTER-ACTION CRITIQUE

The FOL will conduct a drill or exercise to test the Emergency Action Plan. A critique with the site personnel after each drill or incident will be conducted. This critique provides a mechanism to review the incidents and exercises or drills to determine where improvements can be made. For incidents recorded in TOTAL, the FOL will utilize the Lessons Learned component for the critique.

11.0 PERSONAL HYGIENE AND DECONTAMINATION

This section provides decontamination procedures and guidelines for developing site and activity specific decontamination procedures.

11.1 RESPONSIBILITIES

The PHSO shall ensure that decontamination measures are adequately addressed in the Site Specific Health and Safety Plan. The SSO is responsible for establishing a decontamination area. The SSO also ensures that adequate decontamination procedures are followed to prevent contamination of individuals or the environment beyond the EZ. The PM will ensure that sufficient information has been provided to the PHSO to prepare adequate decontamination procedures for inclusion in the SSHP.

11.2 DECONTAMINATION

Decontamination involves physically removing contaminants and/or converting them chemically into harmless substances. Decontamination, proper PPE donning procedures, and safety zones minimize the chance of cross-contamination from protective clothing to wearer, equipment to personnel, and one area to another.

The decontamination will consist of a soap/water wash and rinse for outer protective equipment (e.g., boots, gloves, PVC splash suits, etc.). This function will take place at an area adjacent to the drilling operations bordering the support zone.

This decontamination procedure will consist of:

- Equipment drop
- Soap/water wash and rinse of outer gloves and outer boots, as applicable
- Soap/water wash and rinse of the outer splash suit, as applicable
- Wash hands and face, leave contamination reduction zone

The FOL/SSO will determine the organization and materials used. Factors that are considered include: the extent and type of hazard expected, meteorological conditions, topography, levels of protection selected, and availability of equipment and supplies.

11.3 CONTAMINATION AVOIDANCE

Avoiding contamination is the first and best method for preventing the transfer of contamination to personnel or to uncontaminated areas. Each person involved in site operations must regularly practice the methods, listed below, for contamination reduction.

- Know the limitations of the protective equipment being used.
- Do not sit or lean against anything in a contaminated area.
- Waste containers should be checked for incompatible materials.
- Do not set sampling equipment directly on contaminated areas.
- Use the proper tools to safely conduct the job.

11.4 DECONTAMINATION GUIDANCE

Personnel decontamination will consist of a soap/water wash and rinse for outer protective equipment (boots, gloves, splash suits, etc.). This function will take place at an area adjacent to the site activities.

Decontamination procedures will be reviewed with site personnel prior to entering the EZ. Each person will be given precise instructions and be acquainted with the procedure for moving through the decontamination line. Progress through the decontamination line will be deliberate, organized to minimize hazard contamination for personal.

11.5 CLOSURE OF THE DECONTAMINATION LINE

When the decontamination line is no longer needed, it will be closed down by site personnel. The disposable items used during the operation will be double-bagged and contained on site, or removed to an approved off-site disposal facility. Decontamination and rinse solutions may be discarded on site if approved by regulatory agencies. If not, they will be removed to an approved disposal facility. Reusable rubber clothing should be dried and prepared for future use. If gross contamination had occurred, additional decontamination or disposal of these items may be required. Cloth items must be bagged and removed from the site for final cleaning or disposal. Wash tubs, pails, containers, etc., must be thoroughly washed, rinsed, and dried before removal from the site.

12.0 EQUIPMENT DECONTAMINATION

Sampling equipment will be decontaminated as stated per the requirements in the Sampling and Analysis Plan and/or Work Plan. MSDS for any decon solutions (Alconox, methanol, isopropanol, hexane, etc.) will be obtained and used to determine proper handling / disposal methods and protective measures (PPE, first-aid, etc.). The sampling equipment used will require a complete decontamination between locations and prior to removal from the site.

The equipment used in the EZ will require a complete decontamination between locations and prior to removal from the site.

The FOL or the SSO will be responsible for evaluating equipment arriving on site and that which is to leave the site. No equipment will be authorized access or exit without this authorization.

Evaluation will consist of a visual inspection to ensure that visible contamination has been effectively removed.

13.0 EMERGENCY EQUIPMENT AND FIRST AID

The following emergency equipment will be strategically placed and maintained onsite:

- A first-aid kit that is labeled meeting the ANSI Z308.1 guidelines.

- Eye wash units (or bottles of disposable eyewash solution) are maintained during sampling activities due to the small quantities of corrosive preservatives and well construction activities due to the caustic nature of the cement/grout products.
 - These units are acceptable due to extremely small quantity of the corrosives.
 - These will be used as adjunct support until access to a fixed unit or the medical provider at San Pablo Del Este Hospital.
 - These units will be maintained in a clean location and inspected each week.

- Fire extinguishers will be maintained onsite and shall be immediately available for use in the event of an emergency. 2A:10BC for general support activities.

- If fuel will be transferred from portable fuel cans they will be Underwriters Laboratory (UL) approved safety cans properly labeled. If greater than 25 gallons is stored onsite a 5A:60BC fire extinguisher will be mounted within 50-feet of the fueling location.

- Fire extinguishers will be inspected monthly to ensure:
 - Sufficient charge
 - No physical damage
 - Tamper indicators are in place
 - Inspection tag documents inspection

- Site personnel will be trained in the use of the fire extinguisher as part of site specific training.

- Spill Pads – As the drilling equipment operates based on combustion engine driven hydraulic system, spill pads will be maintained at the operational area in order to support immediate response to a hydraulic line rupture.

13.1 FIRST AID

Tetra Tech personnel will perform rescue operations from emergency situations and may provide initial medical support for injury/illnesses requiring only "Basic First-Aid and Cardio Pulmonary Resuscitation (CPR)" level support, and only within the limits of training obtained by site personnel. At least two Tetra Tech personnel will have Basic First-Aid Training.

Basic First-Aid is considered treatment that can be rendered by a trained first aid provider at the injury location. Medical attention above First-Aid level support will require assistance from the designated emergency response agencies.

14.0 EMERGENCY RESPONSE AND CONTINGENCY PROCEDURES

In the event of an emergency during onsite work, the primary response action by onsite personnel will be to safely evacuate and assemble at an area unaffected by the emergency and notify the client and site contact, Pedro Ruiz. Workers who are ill or who have suffered a non-serious injury may be transported by site personnel to nearby medical facilities, provided that such transport does not aggravate or further endanger the welfare of the injured/ill person.

Site personnel will record any pertinent information regarding allergies to medications or other special conditions will be provided to medical services personnel. This information is listed on Medical Data Sheets which will be filed onsite. See Figure A-14-1.

The NAPR emergency response agencies listed in this plan are capable of providing the most effective response, and as such, will be designated as the primary responders. These agencies are located within a reasonable distance from the area of site operations, which ensures adequate emergency response time. The Navy Contact will be notified if these response agencies are contacted.

Tetra Tech personnel will provide insipient emergency prevention activities such as:

- Initial (e.g., non-structural) fire-fighting support (fire extinguisher) and prevention
- Initial spill control and containment measures and prevention
- Evacuate personnel from emergency situations
- Initial medical support for injury/illness requiring only first-aid level support

14.1 EMERGENCY PLANNING

Based on the nature of the planned activities, emergencies resulting primarily from physical hazards (contact with moving machinery, MEC etc.) could be encountered. To minimize or eliminate the potential for these emergency situations, pre-emergency planning activities will include the following (which are the responsibility of the SSO and/or the FOL):

- Coordinating with the local Emergency Response personnel prior to the commencement of work to ensure that Tetra Tech emergency action activities are compatible with existing emergency response procedures.

**FIGURE A-14-1
MEDICAL DATA SHEET**

This Medical Data Sheet must be completed by on-site personnel and kept in the command post during the conduct of site operations. This data sheet will accompany any personnel when medical assistance is needed or if transport to hospital facilities is required.

Project _____

Name _____ Home Telephone _____

Address _____

Age _____ Height _____ Weight _____

Person to notify in the event of an emergency: Name: _____

Phone: _____

Drug or other Allergies: _____

Particular Sensitivities: _____

Do You Wear Contacts? _____

What medications are you presently using? _____

Name, Address, and Phone Number of personal physician: _____

Note: Health Insurance Portability and Accountability Act (HIPAA) Requirements

HIPAA took effect May 14, 2003. Loosely interpreted, HIPAA regulates the disclosure of Protected Health Information (PHI) by the entity collecting that information. PHI is any information about health status (such as that you may report on this Medical Data Sheet), provision of health care, or other information. HIPAA also requires Tetra Tech to ensure the confidentiality of PHI. This Act can affect the ability of the Medical Data Sheet to contain and convey information you would want a Doctor to know if you were incapacitated. So before you complete the Medical Data Sheet understand that this form will not be maintained in a secure location. It will be maintained in a file box or binder accessible to other members of the field crew so that they can accompany an injured party to the hospital.

DO NOT include information that you do not wish others to know, only information that may be pertinent in an emergency situation or treatment.

Name (Print clearly)

Signature

Date

- Establishing and maintaining information at the project staging area (support zone) for easy access in the event of an emergency.
- Creating and maintaining documents onsite that can be important in the event of an emergency situation, including:
 - A Chemical Inventory of hazardous chemicals onsite
 - Corresponding Material Safety Data Sheets.
 - Completed Medical Data Sheets (Figure A-14-1) for onsite personnel.
 - A log book identifying personnel onsite each day.
 - Hospital route maps with directions.
 - Emergency Notification - phone numbers.

In the event of an onsite emergency, the Tetra Tech FOL will be responsible for the following tasks:

- Determining that an emergency situation exists, initiating a site evacuation, accounting for onsite personnel at the assembly area, and determining if/when return to work conditions resume
- With assistance from the SSO, educating site workers to the hazards and control measures associated with planned activities at the site, and providing early recognition and prevention.
- With assistance from the SSO, periodically performing practice drills to ensure site workers are familiar with incidental response measures.

14.2 PERSONNEL AND LINES OF AUTHORITY FOR EMERGENCY SITUATIONS

In the event of an emergency, personnel will evacuate and the NAPR Emergency Dispatch Center will be notified. It has been determined that the majority of potential emergency situations would be better supported by NAPR emergency responders. Based on this determination, Tetra Tech will not provide emergency response support beyond their on-site capabilities and their training. The emergency response agencies listed in this plan are capable of providing the most effective response, and as such, will be designated as the primary responders. These agencies are located within a reasonable distance from the area of site operations, which ensures adequate emergency response time. The NAPR POC will be notified anytime Tetra Tech must notify emergency response agencies.

14.3 CRITERIA AND PROCEDURES FOR EMERGENCY RECOGNITION AND SITE EVACUATION

Emergency situations may be encountered during site activities.

14.3.1 Emergency Recognition

Emergency situations that may be encountered during site activities will generally be recognized by visual observation. This will be done by the UXO Technicians clearing the surface of any potential ordnance related materials. In addition, the SUXOS/UXOSO will provide training and instruction on ordnance types that may be encountered and avoidance measures. If suspect MEC/MPPEH are discovered, it will be sorted, secured, and treated as necessary. The location will be recorded. Findings will be documented by the FOL and/or the SSO.

Visual observation will also play a role in detecting potential exposure events to chemical hazards. To adequately recognize chemical exposures, site personnel must have an awareness of signs and symptoms of exposure associated with the principle site contaminant of concern. Tasks to be performed at the site, potential hazards associated with those tasks and the recommended control methods are discussed in this SSHP and APP. Additionally, early recognition of hazards will be supported by daily site surveys to eliminate any situation predisposed to an emergency. The FOL and/or the SSO will be responsible for performing surveys of work areas prior to initiating site operations and periodically while operations are being conducted. Survey findings are documented by the FOL and/or the SSO in the Site Health and Safety logbook. Site personnel are responsible for reporting perceived hazardous situations.

The above actions will provide early recognition for potential emergency situations, and allow Tetra Tech to instigate necessary control measures. However, if the FOL and the SSO determine that control measures are not sufficient to eliminate the hazard, Tetra Tech will withdraw from the site and notify the appropriate response agencies.

14.3.2 Site Evacuation

An evacuation will be initiated whenever recommended hazard controls are insufficient to protect the health, safety or welfare of site workers. Specific examples of conditions that may initiate an evacuation include, but are not limited to the following: severe weather conditions; fire or explosion; and evidence of personnel overexposure to potential site contaminants.

In the event of an emergency requiring evacuation, personnel will immediately stop activities and report to the designated safe place of refuge unless doing so would pose additional risks. When evacuation to the

primary place of refuge is not possible, personnel will proceed to a designated alternate location and remain until further notification from the Tetra Tech FOL.

Safe places of refuge are identified below and in Figure A-14-2.

- Safe Place of Refuge #1
 - Pistol Range Subarea
 - Former Pistol Range Subarea
 - Potential Open Burn/Open Detonation (OB/OD) subarea
- Safe Place of Refuge #2
 - Detonation Area near Concrete Pad
 - Potential Munitions Trench Subarea
- Safe Place of Refuge #3
 - Rifle Range

However, depending on site conditions an alternate safe place of refuge may be identified prior to the commencement of site activities by the SSO. These locations will be conveyed to site personnel as part of the pre-activities training session. This information will be reiterated during daily safety meetings. Whenever possible, the safe place of refuge will also serve as the telecommunications point for that area. During an evacuation, personnel will remain at the refuge location until directed otherwise by the Tetra Tech FOL or the on-site Incident Commander of the Emergency Response Team. The FOL or the SSO will perform a head count at this location to account for and to confirm the location of site personnel. Emergency response personnel will be immediately notified of any unaccounted personnel. The SSO will document the names of personnel onsite (on a daily basis) in the site Health and Safety Logbook. This information will be utilized to perform the head count in the event of an emergency.

Evacuation procedures will be discussed during the pre-activities training session, prior to the initiation of project tasks. Evacuation routes from the site and safe places of refuge are dependent upon the location at which work is being performed and the circumstances under which an evacuation is required. Additionally, site location and meteorological conditions (i.e., wind speed and direction) may dictate evacuation routes. As a result, assembly points will be selected and communicated to the workers relative to the site location where work is being performed. Evacuation should always take place in an upwind direction from the site.

FIGURE A-14-2
SAFE PLACE OF REFUGE



14.3.3 Emergency Alarm Systems

Tetra Tech personnel will be working in close proximity to each other at NAPR. As a result, hand signals, two-way radio communications, voice commands, and line of site communication will be sufficient to alert site personnel of an emergency. When project tasks are performed simultaneously on different sites, vehicle horns will be used to communicate emergency situations. If an emergency warranting evacuation occurs, the following procedures are to be initiated:

- Initiate the evacuation via radio communications, hand signals, voice commands, line of site communication, or vehicle horns. The following signals shall be utilized when communication via vehicle horn is necessary:

HELP	three short blasts	(. . .)
EVACUATION	three long blasts	(- - -)

- Report to the designated refuge point.
- Once non-essential personnel are evacuated, appropriate response procedures will be enacted to control the situation.
- Describe to the FOL pertinent incident details.

14.4 DECONTAMINATION AND MEDICAL TREATMENT OF INJURED PERSONNEL

Based on the nature of the planned activities and on the nature and extent of contamination that may be encountered during these activities, the need for any specific personal decontamination activities in an emergency medical situation is highly unlikely. In the unlikely instance that such efforts become necessary, decontamination procedures will be performed only if doing so does not further jeopardize the welfare of the involved personnel. Decontamination will be postponed if the incident warrants immediate evacuation. As soon as possible and prior to transportation to a medical center the contaminated site worker will be:

- Washed and rinsed
- Contaminated clothing removed and disposed of as hazardous waste
- First aid treatment rendered

14.5 ROUTE MAPS AND PHONE NUMBERS FOR EMERGENCY RESPONDERS

Prior to initiating field activities, personnel will be thoroughly briefed on the emergency procedures to be followed in the event of an accident. All emergencies will be reported to the station's Emergency Services Dispatch Center. Table A-14-1 provides a list of emergency contacts and telephone numbers. This table must be posted where it is readily available to site personnel.

**TABLE A-14-1
EMERGENCY CONTACTS
NAPR**

CONTACT	PHONE NUMBER
NAPR SECURITY	787.672.4177
San Pablo Del Este Hospital	787.863.0505
Chemtrec	800.424.9300
National Response Center	800.424.8802
Poison Control Center	800.222.1222
Utility Clearance	811
Navy RPM: Stacin Martin	757.322.4780-office
Facility POC: Pedro Ruiz	757.286.9139-office
Facility POC: Dan Kalal	787.685.3450-office
Tetra Tech PM: Linda Klink	412.921.8650-office 412.720.1421-cell
Tetra Tech FOL/SUXOS: TBD	
Tetra Tech SSO: TBD	
Tetra Tech MRP Site Manager: James Rossi	770.413.0965 x233-office 707.845.6046-cell
Tetra Tech UXO Manager: Ralph Brooks	770.413.0965 x231-office 404.661.4916 -cell
Tetra Tech PHSO: James K. Laffey	412.921.8678-office 412.370.6668-cell
CLEAN HSM: Matt Soltis	412.921.8912-office 412.260.6681-cell

EMERGENCY ROUTE TO MEDICAL CENTER

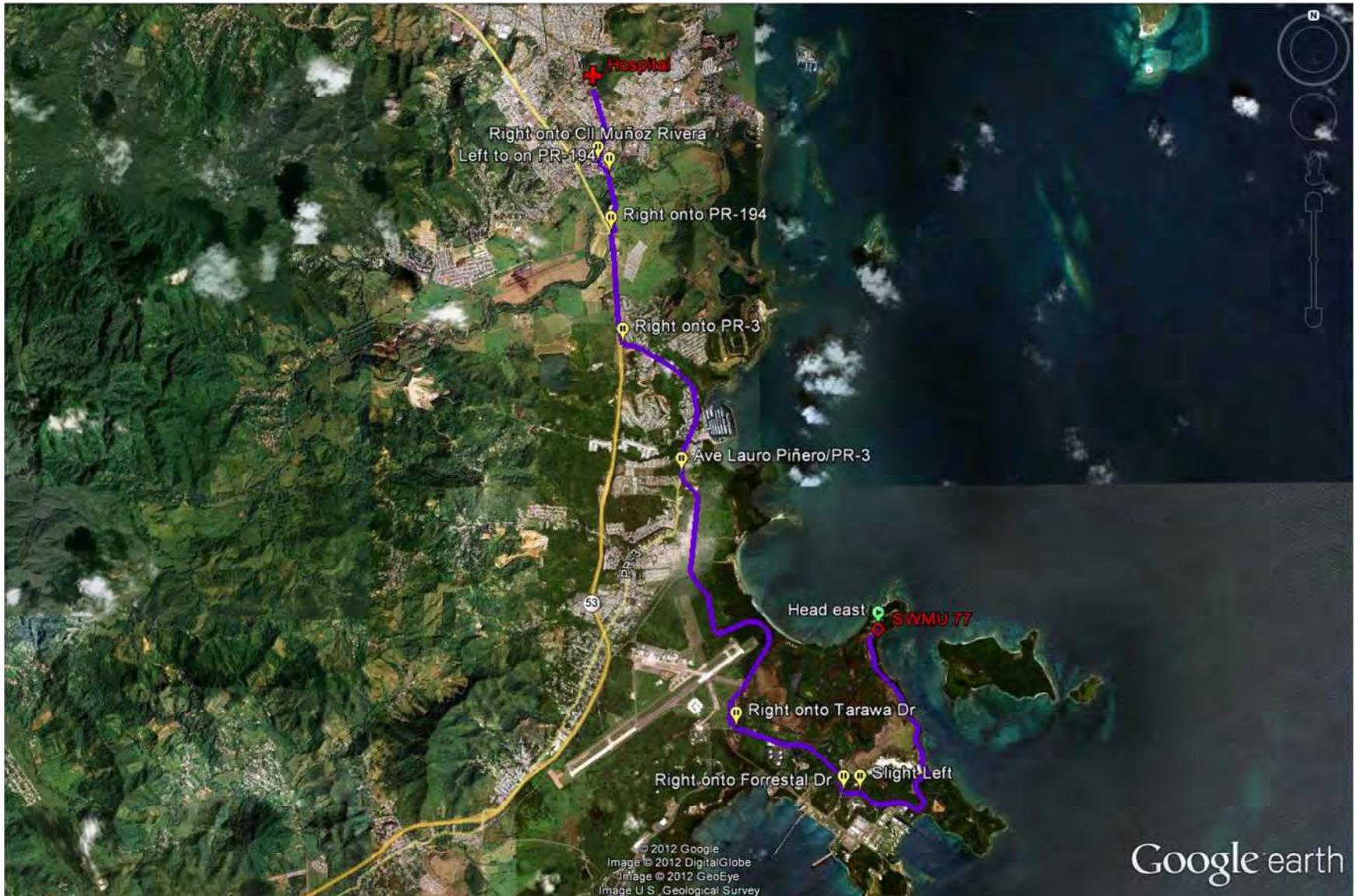
San Pablo Del Este Hospital
404 Ave Valero
Fajardo, Puerto Rico 00738
(787) 655-0505

A map showing the route from the worksite to the hospital is shown as Figure A-14-3. Directions to the hospital are as follows:

Distance 19.7 kilometers

- Head east 6 m
- Turn right toward Forrestal Drive 4.6 km
- Slight left toward Forrestal Drive 270 m
- Take the 2nd right onto Forrestal Drive 2.2 km
- Slight right onto Tarawa Drive 5.5 km
- Continue onto Ave Lauro Piñero/PR-3/PR-979
- Continue to follow PR-3 2.8 km
- Turn right to merge onto PR-3 1.8 km
- Turn right onto PR-194 1.0 km
- Turn left to stay on PR-194 270 m
- Turn right onto Calle Muñoz Rivera 550 m
- Continue onto PR-194/Ave Valero
- Hospital on the left 700 m

FIGURE A-14-3
ROUTE TO HOSPITAL



14.6 CRITERIA FOR ALERTING LOCAL COMMUNITY RESPONDERS

In the event of an emergency situation, the FOL and SSO will enact emergency notification procedures to secure additional assistance in the following manner:

- Dial **787.534.0941** and call other pertinent emergency contacts listed in Table A-14-1 and report the incident.

- Give the emergency operator the:
 - Location of the emergency
 - Type of emergency
 - Number of injured
 - A brief description of the incident.

- Stay on the phone and follow the instructions given by the operator.

- The operator will then notify and dispatch the proper emergency response agencies.

15.0 REFERENCES, MATERIALS AND DOCUMENTATION

United States Army Corps of Engineers (USACE). 15 November 2008. Engineer Manual (EM) 385-1-1, Safety and Health Requirements Manual. Available online at:

<http://www.usace.army.mil/inet/usace-docs/eng-manuals/em385-1-1/entire.pdf>

Department of the Army, 24 May 2011, Pamphlet 385-64 Ammunition and Explosive Safety Standards Available online at: http://armypubs.army.mil/epubs/pdf/P385_64.PDF

The Tetra Tech FOL shall ensure the following materials/documents are taken to the project site and used when required. The following documentation is to be posted or maintained at the site for quick reference purposes. For this project, the items so noted below will be maintained in the Tetra Tech work vehicle.

Explosives Safety Submission (maintained) - This document serves as the specifications for conducting work activities. The ESS details the scope of the project, the planned work activities, and potential hazards (including the maximum credible event) and the methods for their control.

Chemical Inventory Listing (posted) - This list represents the chemicals brought onsite, including decontamination solutions, sample preservations, fuel, etc. This list will be maintained in the Tetra Tech Work Vehicle.

Material Safety Data Sheets (MSDSs) (maintained) - The MSDSs will be maintained in the Tetra Tech Work vehicle. These documents should match the listings on the chemical inventory list for substances used onsite. It is acceptable to have these documents within a central folder and the chemical inventory as the table of contents.

Placards and Labels (maintained) - Where chemical inventories have been separated because of quantities and incompatibilities, these areas will be conspicuously marked using Department of Transportation (DOT) placards and acceptable (Hazard Communication 29 CFR 1910.1200(f)) labels.

The OSHA Job Safety & Health Protection Poster (posted) - This poster, as directed by 29 CFR 1903.2 (a)(1), should be conspicuously posted in places where notices to employees are normally posted. Each FOL shall ensure that this poster is not defaced, altered, or covered by other material. See Attachment V.

Site Clearance (maintained) - This list is found within the training section of the SSHP (see Attachment 1). This list identifies site personnel, dates of training (including site-specific training), and medical surveillance. The list indicates not only clearance but also status. If personnel do not meet these requirements, they do not enter the site while site personnel are engaged in activities. This list will be maintained in a vehicle on site during operations.

Emergency Phone Numbers and Directions to the Hospital(s) (posted) - This list of numbers and directions will be maintained at phone communications points and in each site vehicle.

Medical Data Sheets/Cards (maintained) - Medical Data Sheets will be completed by onsite personnel and filed in the Tetra Tech Work Vehicle. The Medical Data Sheet will accompany any injury or illness requiring medical attention to the medical facility. A copy of this sheet or a wallet card will be carry by site personnel. See Figure A-14-1.

Hearing Conservation Standard (29 CFR 1910.95) (posted) - This standard will be posted any time hearing protection or other noise abatement procedures are used.

Personnel Monitoring (maintained) - Results generated through personnel sampling (levels of airborne toxins, noise levels, etc.) will be posted to inform individuals of the results of that effort.

ATTACHMENT I

**SITE-SPECIFIC TRAINING DOCUMENTATION FORM
AND
EMPLOYEE TRAINING/QUALIFICATIONS/MEDICAL
CLEARANCE**

TO BE ATTACHED BY PM/FOL

**(40-Hour HAZWOPER Certificates; 8-Hour HAZWOPER
Refresher Certificates; First Aid/CPR Certificates; employee
resumes as required)**

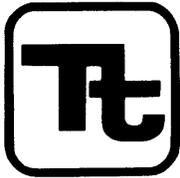
Insert employee documents here.

ATTACHMENT II

**UNEXPLODED ORDNANCE AND CHEMICAL
WARFARE AGENTS ACTIVITIES STANDARD
OPERATING PROCEDURE**

AND

**TABLE 4-1 OF THE DEPARTMENT OF DEFENSE
EXPLOSIVES SAFETY BOARD TECHNICAL PAPER #18**



TETRA TECH

STANDARD OPERATING PROCEDURES

Number	HS-2.0	Page	1 of 15
Effective Date	01/2012	Revision	2
Applicability	Tetra Tech, Inc.		
Prepared	Earth Sciences Department		

Subject
 UNEXPLODED ORDNANCE AND CHEMICAL
 WARFARE AGENTS ACTIVITIES

Approved
 J. Zimmerly

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1.0 GENERAL

This Standard Operating Procedure (SOP) was prepared in accordance with applicable U.S. Army Corps of Engineers procedures and policies governing field activities requiring Unexploded Ordnance (UXO) and Chemical Warfare Material (CWM) operations. All personnel conducting operations under this SOP must read and understand applicable parts of references listed in paragraph 9.1 below prior to commencing any work described within this SOP. Other documents supporting this SOP include project-specific Work Plans and Health and Safety Plans which are prepared for the purpose of accomplishing work that contain a UXO or CWM component.

2.0 PURPOSE

This SOP applies to all operations involving UXO and/or CWM support during field operations at various sites where Tetra Tech NUS (TtNUS) personnel are present. It provides procedural requirements for any activity involving UXO and CWM, as well as detailed procedures for the location, identification, documentation, and emergency response actions pertaining to UXO/CWM activities.

3.0 APPLICABILITY

This SOP applies to persons who may visit any site where TtNUS is performing work that involve some UXO or CWM component. Compliance the content of this SOP is mandatory for all TtNUS personnel, subcontractors, and visitors to any site where UXO/CWM activities are in progress.

4.0 RESPONSIBILITIES

Project Manager

Effective implementation of this SOP at the project level will be the ultimate responsibility of the assigned TtNUS Project Manager. The Project Manager is responsible for ensuring that all applicable rules and regulations are complied with, and that all necessary safety precautions are taken to conduct operations in accordance with this SOP. To fulfill this responsibility, the assigned Project Manager is required to ensure that appropriately-qualified technical staff are involved in all stages of project planning and field work, as well as for ensuring that appropriate resources are marshaled and used on his/her assigned projects. For projects involving UXO and/or CWM, this will involve ensuring that a suitably qualified and experienced UXO technician and a site Health and Safety Officers are part of the project team. In some cases, the assigned UXO Technician may also serve as the project site Health and Safety Officer.

It is also the responsibility of the Project Manager to ensure that all personnel conducting field activities in accordance with this SOP have proper training (including hazard control briefings) and, if required, the proper certifications for the job being performed.

UXO Technician

A suitably qualified and experienced UXO Technician will be included as part of the project team where these types of concern are known or suspected to exist. The UXO Technician will be primarily responsible for advising the Project Manager on all UXO/CWM matters, including on the measures that will be necessary to effectively implement and adhere to this SOP. Other specific duties will include:

- Providing technical expertise and input into project planning activities and documents such as the project-specific Work Plan and Health and Safety Plan
- Clearing worksite areas of UXO/CWM concerns prior to the initiation of any other onsite activities

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- Participating in the development and conductance of site specific training sessions and daily tailgate meetings to communicate UXO/CWM matters to the field personnel
- Maintaining a sound familiarity with the contents of this SOP, the contents of the references listed in section 9.1, and keeping current with new information and technology pertinent to UXO/CWM matters

Site Health and Safety Officer

A suitably qualified and experienced health and safety professional will be assigned to all projects that involve fieldwork. Project-specific responsibilities will include:

- Effectively implementing the requirements and restrictions specified in the project-specific Health and Safety Plan
- Ensuring that all personnel participating in onsite activities have satisfied all appropriate medical and training qualifications prior to participating in any onsite intrusive activities.
- Conduct initial site-specific health and safety training for all personnel participating in onsite activities prior to their participation in any onsite intrusive activities.
- Conduct tail-gate safety briefings prior to the initiation of all tasks, but not less than daily.
- On certain projects, these duties may be assigned to the UXO Technician. This would be considered acceptable on field projects where the predominant concern is contact with UXO and/or CWM, and minimal health concerns or requirements (e.g., chemical exposures or monitoring) exist.

Corporate Health and Safety Manager

Perform periodic project audits and evaluations to determine the ongoing effectiveness of this SOP to address UXO/CWM concerns, and review and evaluate this SOP to determine any revisions that are appropriate.

5.0 LOCATION OF OPERATIONS

Activities where UXO and/or CWM concerns may exist may be encountered in support of various TtNUS contracts, with potential project sites located throughout the continental United States and abroad. Wherever the installation/site is located, it will be necessary to ensure that project planning activities include collecting available historical information that may be pertinent to these issues, as well as identifying and addressing contract/client-specific requirements and any location-specific requirements (e.g., State, local-level, or host-nation requirements). A detailed site description, discussion of known and/or suspected contamination sources, and results of previous studies will be provided to field personnel as part of their field mobilization and initial site-specific training activities.

The initial project evaluation must involve the performance of a preliminary risk assessment, including the investigation of probable contaminants, potential transport pathways, the identification of potential receptors, and a preliminary evaluation of human health and environmental concerns. Preliminary identification of applicable or relevant and appropriate requirements (ARARs) will also be made available to field personnel conducting activities at the installation.

6.0 PERSONNEL QUALIFICATIONS AND REQUIREMENTS

6.1 Personnel Qualifications: Qualifications of those personnel actively involved in UXO/CWM operations shall be as follows:

- a. UXO personnel shall be graduates of the U.S. Naval Explosive Ordnance Disposal (EOD) School, Indian Head, Maryland.
- b. The Senior UXO Supervisor (SUXOS) for the operation will have been awarded the Master EOD Badge and have served at least 15 years in military EOD assignments, of which more than 10 years were in a supervisory position.

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- c. UXO personnel are responsible for maintaining current status with training and medical surveillance requirements, as specified in the project-specific Health and Safety Plans and OSHA 29 CFR 1010.120, paragraphs (e) and (f).

6.2 Personnel Requirements: During any activity where the possibility that UXO and or CWM may be encountered (no matter how remote), the following requirements will be met:

- a. One UXO-qualified technician will be required to support each field team engaged in operations in areas that might contain UXO/CWM.
- b. One UXO-qualified technician will be present at the site during all activities to provide UXO/CWM support in the event their services are required.

7.0 PERSONNEL LIMITS

The activities to be conducted under most contracts will not normally be conducted in areas requiring maximum personnel limitations except for intrusive UXO activities. Work will not be permitted unless at least two persons are present in the work area. The provisions of 29 CFR 1910.120 concerning personnel qualifications and requirements will be followed while working on-site. Any additional personnel limitation requirements specified by the client or the project work location (e.g., state, local ordinance, host nation, etc.) will also be identified and adhered to at all times.

7.1 Personnel Limits for UXO Operations:

- a. UXO Avoidance Operations – Two UXO Technicians (one UXO Technician III and one UXO Technician II)
- b. UXO Intrusive Operations - Three UXO Technicians (one UXO Technician III and two UXO Technician II)

8.0 MATERIAL LIMITS

The properties and configurations of specific explosive materials are not addressed in this SOP. That level of detail is required to be addressed in project-specific Work Plans and Health and Safety Plans. This SOP must be maintained onsite along with these project-specific documents to aid in appropriate communication and implementation activities. Bulk liquids to be used for decontamination of equipment will be maintained in 2-gallon containers or less. Material Safety Data Sheets (MSDSs) will be kept on file in the TtNUS Command Post for any chemical substances brought to the project site by TtNUS and TtNUS subcontractor personnel. This is addressed in greater detail in section 5. of the TtNUS Health and Safety Guidance Manual.

9.0 SAFETY REQUIREMENTS

9.1 Referenced Safety Requirements: The safety requirements that apply to the UXO/CWM operations covered under this SOP are:

- a. OSHA 29 CFR 1910.120 and 1926.65 – Hazardous Waste Operations and Emergency Response (HAZWOPER). Available online at:
http://www.osha.gov/pls/oshaweb/owasrch.search_form?p_doc_type=STANDARDS&p_toc_level=0&p_keyvalue=OSHA_Std_toc.html

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- b. US Army Corps of Engineers Engineering Regulation 385-1-92, *Safety and Occupational Health Document Requirements for Hazardous, Toxic and Radioactive Waste (HTRW) and Ordnance and Explosive Waste (OE) Activities*.
- c. US Army Corps of Engineers Engineering Regulation (ER) 385-1-96, *Safety and Health Requirements*. Available on line at:
<http://www.usace.army.mil/publications/eng-manuals/em385-1-1/toc.htm>.
- d. US Army Corps of Engineers Engineering Pamphlet (EP) 1110-1-18, *Ordnance and Explosive (OE) Response*.
- e. US Army Corps of Engineers Engineering Pamphlet (EP) 75-1-2, *Unexploded Ordnance Support for Hazardous, Toxic and Radioactive Waste and Construction Activities*.
- f. US Army Corps of Engineers Engineering Pamphlet (EP) 75-1-3, *Chemical Warfare Material Response*.
- g. US Army Technical Manual 9-1300-206 (TM 9-1300-206), *Ammunition and Explosive Hazards*.
- h. Technical Manual 60A-1-1-31, *Explosive Ordnance Disposal Procedures, General Information on EOD Disposal Procedures*.

9.2 Specific Safety Requirements:

- a. All site operations will be suspended if any site worker encounters an item of suspected UXO/CWM. Site work will remain suspended until the item is inspected and cleared by the UXO Technician.
- b. All site operations will be suspended if so ordered by an authorized client representative (i.e., Installation Range Control and/or Safety Office).
- c. A minimum of two UXO-qualified technicians will be present during all UXO-related activities.
- d. Standard work practices as outlined in project-specific Health and Safety Plans and/or Work Plans will be observed.

9.3 Inherent UXO/CWM Hazards: UXO/CWM operations have inherent safety and health risks associated with the various field activities conducted. All planned activities will be conducted in accordance with the requirements of the references listed in Section 9.1 above, as safety is the primary consideration in all UXO/CWM activities. Every effort should be made to determine all hazards associated with the site through a thorough research of archives, past site/range uses, and any other available information. Some of the hazards to consider are:

- a. Propellant, Explosives, and Pyrotechnics (PEP)
- b. Depleted Uranium (DU)
- c. White Phosphorus (WP)
- d. Corrosive chemicals (acids and bases) and decontamination agents
- e. Toxic gases, liquids and solids
- f. Corroded and damaged containers, munitions bodies, drums, etc.
- g. Fuze conditions
- h. Etiological agents

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10.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

Task-specific PPE will be identified in project-specific Health and Safety Plans. Typical PPE for project sites where the principle concern is for UXO/CWM will include the items listed below. Items marked with an asterisk (*) will be available and will be used as specified in the Health and Safety Plan and/or as determined by the TtNUS Site Health and Safety Officer.

- a. Safety glasses
- b. Safety shoes (and protective over boots or steel-toed rubber boots). NOTE: During geophysical survey operations, the UXO technicians will not wear steel-toed boots as they interfere with the magnetometer survey; however, around heavy equipment and activities where foot and overhead hazards may exist, steel-toed boots and hard hats will be worn.
- c. Cotton clothing (with protective coveralls*)
- d. Gloves (type to be specified for each project task in the Health and Safety Plan and/or by the site Health and Safety Officer)
- e. Respiratory protection equipment* (29CFR1910.134)
- f. Hearing protection*
- g. Hard hats*

11.0 EMERGENCY RESPONSE AND CONTINGENCY PLANS

11. Emergency Contacts: The identification of (and means to communicate with) appropriate local emergency response agencies must be identified as part of project planning/mobilization activities, and these agencies must be contacted prior to the initiation of any onsite work. These initial communications must determine the capabilities of these agencies to respond to foreseeable emergency situations, their willingness to respond, and their locations/driving directions/phone numbers. These details must be specified in the project-specific Health and Safety Plan and posted in the site Command Center/Field office.

At a minimum, the names and means of communication (phone number, radio frequency, etc.) of the following parties must be included in the project-specific Emergency Contacts procedure:

- a. Local Emergency Fire Response that will respond (i.e., local Fire Department)
- b. Emergency Medical Assistance (Hospital, Emergency Room, and ambulance service that will respond)
- c. Installation Safety Office or other client safety/emergency response contact
- d. Installation EOD Office/Detachment
- e. Installation Environmental Office

The senior TtNUS managing employee onsite (Project Manager, Site Manager, Site Supervisor, Field Operations Leader) is responsible for initiating these calls in the event of an emergency where such support is needed. If the Project Manager is not onsite at the time of an emergency event, he/she must be added to the above list of contacts.

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In the event of an emergency, all site personnel will be evacuated to a predetermined location away from the work place. Emergency Response Planning will be addressed in the project-specific Health and Safety Plan and will be in accordance with either 29 CFR 1910.38(a) or 1910.120(l). TtNUS will utilize the Installations Base Fire Protection and Emergency Services in emergencies or potential emergencies.

11.2 Contingency Plans: The following contingency plans will be implemented:

- a. Pre-Planning – Upon arrival at the site/installation, the TtNUS Field Operations Leader (FOL) and/or the Site Safety Officer will meet with the Base or local Fire Protection Department, Base Security Personnel or local Police Department, and onsite and/or offsite Emergency services to notify them of the activities that are to be undertaken, when, and where. All site personnel will be required to follow established base/local emergency procedures and will rely on base/local services to handle emergency calls when needed.
- b. Emergency Escape Procedures and Assignments – Upon notification of a site emergency that requires evacuation, all site personnel will proceed to predetermined locations based on emergency location and wind direction. An alternate assembly point will be designated in case personnel cannot reach these locations without danger to their lives and health. These primary and alternate escape routes and meeting places will be designated during the daily hazard control briefing. Personnel will be trained to remain at the assembly points until directed to either resume work or to leave the site.
- c. Procedures to Account for Site Personnel – The site work force is typically small enough that accounting for personnel will not be a problem via visual head counting. On projects with larger field team sizes, roll calls will be taken using the daily sign in logs, logbook entries, or the tail-gate briefing sheets. Accounting for personnel will be the Field Operations Leader's responsibility.
- d. Rescue and Medical Duties – TtNUS personnel will not be authorized to participate in emergency rescue operations. Typical first aid response equipment that is to be on hand at a project site includes suitable first aid kit, an emergency eye wash station, and Class ABC fire extinguishers.
- e. Activation of Emergency Response Procedures - Should an emergency occur which requires the support of outside services, the appropriate contacts will be made by the senior TtNUS managing employee onsite (Project Manager, Site Manager, Site Supervisor, Field Operations Leader). A list of appropriate contacts will be posted at the Command Post. Cellular phones, land-line phones, or hand-held radios will be the primary means of communication.
- f. Airborne Chemical Release Contingency Plan –
 - (1) Chemical Release Monitoring – every member of the site team will be responsible for observing and reporting any gross chemical releases or conditions that could lead to releases. Air monitoring will be performed as described in the project-specific Work Plans and Health and Safety Plans.
 - (2) Responses to Measured Airborne Chemical Releases – the readings on monitoring instrumentation will be compared to the action levels specified in the project-specific Work Plans and Health and Safety Plans. The primary purpose of appropriate real-time monitoring instruments will be monitor worker breathing zone areas for the protection of employee health. The project-specific Health and Safety Plan will specify actions that are

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to be taken in the event that monitoring instrument readings indicate that detected concentrations may represent a health threat to onsite workers. Area and perimeter monitoring as well as sample screening activities may also be called for in the Work Plan or Health and Safety Plan, but these are secondary purposes for the use of these instruments.

Unless otherwise specified in a project-specific Health and Safety Plan, the following monitoring instrument action levels and response measures will be observed on UXO/CWA sites:

<u>Parameter</u>	<u>Action Level</u>
Total Organic Vapors	Any sustained level above background
Airborne particulates	Readings >2.5 mg/m ³
Flammable Vapors	10% of the Lower Explosive Limit (LEL)

If such levels are noted at site perimeters or adjacent to neighboring residential or commercial property, the TtNUS Field Operations Leader and/or the Site Safety Officer will notify the appropriate client or base contacts.

- g. Liquid Release Monitoring – All field team members will be responsible for observing and reporting any liquid chemical releases or conditions that could lead to a release. If field operations on site result in a release of liquid chemicals in the absence of vapors, field personnel will attempt to contain the liquid by means of berms constructed with available equipment. If the work team cannot control the spill, they will leave the area for the assembly point quickly, without panic. The TtNUS Field Operations Leader and/or the Site Safety Officer will notify the appropriate client/base contact. This is not considered to be a significant probability during operations. However, in the unlikely instance that it should occur, field personnel may effect these types of defensive efforts, providing that such a response does not appear to present a chemical overexposure or other personal health or safety threat.

12.0 TYPICAL CLIENT/FACILITY SAFETY POINTS OF CONTACT

The following positions are typically encountered on UXO/CWA projects. Communication and coordination with these positions should be implemented and maintained throughout all project activities (from pre-field operations planning through to project close-out).

- a. Installation Safety Management Office
- b. Installation Ordnance Officer and/or EOD Officer
- c. Installation Radiation Officer
- d. Installation Environmental Office

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13.0 TOOLS AND EQUIPMENT

Tools and equipment necessary to safely and effectively accomplish the objectives of a project will be detailed in the project-specific Work Plans and Health and Safety Plans. Items commonly required for UXO/CWM operations are presented below:

13.1 Personal Protective Equipment

- a. Respiratory Protective Equipment (i.e., air purifying or air supplied devices)
- b. Dermal (chemical resistant) protective equipment (e.g., coveralls, gloves, eye and face protection)
- c. Physical safety PPE (hard hats, hearing protection, safety glasses, safety shoes, etc.)

13.2 Air Monitoring Equipment

- a. Explosive/O₂ Meter (Combustible Gas Indicator)
- b. Direct reading Organic Vapor Analyzer (PID or FID)
- c. Direct reading particulate meter
- d. Radiation Survey Meters and TLD Badges

13.3 Geophysical/Hydrology Survey Instrumentation

- a. Magnetometers (Cesium Vapor, Schonstedt)
- b. Electromagnetic Terrain Conductivity Meter (EM-31)
- c. Time-Domain Electromagnetic All-Metals Detector (EM-61)
- d. Water Level Indicator/Recorder
- e. pH/Temperature/Conductivity Meter for water samples (Horiba, etc.)
- f. Survey Equipment (transit, tripod, level, etc.) as required

13.4 UXO Support Equipment

- a. Schonstedt Magnetic Locators (GA-52Cx or equivalent passive instrument) will be used for UXO surface survey during UXO activities. The GA-52Cx detects the magnetic field of any ferromagnetic object.
- b. Schonstedt MG-220 Magnetic Gradiometer (Down-Hole Magnetometer or equivalent will be used to conduct down hole UXO checks. The MG-220 detects the magnetic field of any ferromagnetic object as it is lowered into a borehole.
- c. Marking tape, pin flags, stakes, utility spray paints, etc.

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13.5 **CWM Support Equipment**

- a. Chemical Agent Identification Kits (M18A2 Kit)
- b. ICAMs (Individual Chemical Agent Monitor)

13.6 **Decontamination Equipment**

As required by the level of protection for each site. See Site Health and Safety Plan for specifics.

13.7 **Hand Tools/ Miscellaneous Equipment**

As may be required.

14.0 ENVIRONMENTAL CONCERNS

The field operations covered by this SOP will be performed in such a manner as to minimize the effects of pollution of air, water, or land and to control noise and dust emissions within reasonable limits.

Every effort will be made to:

- a. Protect the land areas and to preserve them in their existing condition.
- b. Protect water resources, including measures for run-off or run-off controls if applicable.
- c. Implement sediment control measures, where warranted. These measures will also be implemented to control erosion.

Usually, field operations will generate solid and liquid waste (Investigative Derived Waste – IDW) requiring onsite handling and possible offsite disposal. The major types of waste to be generated, their environmental concerns, and their handling and disposition are summarized below:

- a. Personal and equipment decontamination containers disposed offsite following a thorough decontamination. Liquid waste will be included with well purging and development fluids.
- b. Personal Protective Equipment (PPE) will be double-bagged and will be the responsibility of TtNUS to dispose of according to applicable regulations. Disposal will normally be offsite.

It is not anticipated that any chemical releases will occur during the field activities.

The MSDSs for chemicals being brought onto the installation for use in field operations will be listed on a site-specific Chemical Inventory and maintained at the TtNUS Field Command Post. Copies of these documents are to be made available to client and offsite representatives who may be called upon to respond to an emergency event.

15.0 UXO/CWM PROCEDURES FOR FIELD OPERATIONS

15.1 General – field procedures for work on any installation can include any or all of the following tasks:

- a. Initial entry into suspect areas

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- b. CWM operations
- c. Surface and subsurface sampling
- d. Monitoring well installation
- e. Exploratory trenching
- f. Geophysical surveys
- g. Other miscellaneous operations

15.2 Initial Entry – initial entry into suspect areas require an UXO-qualified technician with a magnetometer (GA-52Cx) to screen a path into the area. The screened area is marked with lanes using either pin flags with plastic pins or marking tape. Suspect items on the surface and subsurface magnetic anomalies will be marked, usually with a different color tape or flag, and will be avoided by team members. The site where the work is to be conducted will be thoroughly screened for UXO/CWM contamination prior to any work commencing. All personnel will stay within the cleared areas and not venture out into areas not screened. If an area that has magnetic anomalies cannot be avoided, the UXO-qualified technician will hand excavate down to the anomaly to check to see if a hazard exists. Before excavation begins, the immediate area will be cleared of non-essential personnel outside of what could be a fragmentation zone (as determined by the UXO Technician). If the excavation reveals a hazard, the emergency notification procedures in paragraph 11.0 will apply.

15.3 CWM Operations - prior to conducting CWM operations, an Emergency Response Plan as required by 29CFR1910.120 and DA Pam 50-6 will be developed and implemented. Most of the information required to develop this plan should be obtained from the installation safety office; however, as a minimum, the following elements will be addressed:

- a. Pre-emergency planning and procedures for reporting incidents to appropriate government agencies for potential chemical exposure, person injuries, fire/explosions, environmental spills and releases, and discovery of radioactive materials.
- b. Personnel roles, lines of authority, communications.
- c. Posted instructions and list of emergency contacts: physicians, nearby notified medical facility, fire and police departments, ambulance service, state/local/federal environmental agencies, Certified Industrial Hygienist (CIH), and installation commander.
- d. Emergency recognition and prevention.
- e. Site topography, layout and prevailing weather conditions.
- f. Criteria and procedures for site evacuation (emergency alerting procedures/employee alarm system, emergency PPE and equipment, safe distance, place of refuge (assembly area), evacuation routes, site security and control).
- g. Specific procedures for decontamination and medical treatment of injured personnel.
- h. Route maps to nearest pre-notified medical facility.
- i. Criteria for initiating community alert program, contacts and responsibilities.
- j. Critique of emergency responses and follow-up.
- k. Material Safety Data Sheets (MSDS) for each hazardous substance anticipated to be encountered on site would be made accessible to site personnel at all times.

15.4 Sampling – sampling will be conducted in accordance with established protocols and methodologies. Site-specific sampling requirements will be presented in the project-specific Work Plans and/or in other project-specific documents such as Field Sampling and Analysis Plans and Quality Assurance Plans.

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Prior to initiating any sampling activities, an UXO-qualified technician will screen sites potentially contaminated with UXO/CWM. A magnetometer will be used to screen entry into a suspect area as in paragraph 15.2 above. Lanes will be marked and suspect items and subsurface anomalies will be identified and avoided. The immediate sampling area will be surface-screened prior to the introduction of the sampling team into the area.

Prior to any subsurface intrusive sampling, another check with a magnetometer needs to be accomplished. The GA-52Cx Magnetic Locator (magnetometer) can be used for collecting subsurface samples not greater than 0.5 feet. If excavation of a borehole or hand auguring hole is to exceed this depth, a MG-220 Magnetic Gradiometer (down hole magnetometer) shall be utilized with readings taken at two feet depth intervals.

If an anomaly is detected, the location will be marked and avoided. If appropriate and acceptable, an alternate sampling location (in a cleared area) will be designated. If the sampling location cannot be relocated then the UXO-qualified technician will hand excavate down to the anomaly to determine if it is hazardous. If it is not hazardous, the object will be set aside and the sampling event will continue. If the object has been determined to be hazardous or suspect, the sampling team will move out of the area and the emergency procedures listed in paragraph 11.0 will be implemented.

15.5 Monitoring Well Installation – the area within a 50-foot radius of the borehole and the off- road access path will be screened with the GA-52Cx magnetometer and be cleared of all metal objects. Once this is accomplished, the areas around borehole sites will be marked using colored marking tape and/or pin flags. Heavy equipment such as front-end loaders, backhoes, and bulldozers will not be used to develop or establish drill sites. The following action will be followed:

- a. The GA-52Cx magnetometer will be used directly over the borehole site to check for buried items down to 0.5 feet. After a surface check, the UXO-qualified technician will hand auger down to a depth of two feet and check down the hole using the MG-220 magnetometer.
- b. Once the hand-auguring hole has been cleared, the drill rig will be positioned over the proposed borehole. Drilling will commence to a depth of four feet, the drill auger will be removed from the borehole, the drill crew chief and UXO personnel will make observations of the soil from the core barrel and the soil removed from the hole by hand auger (if needed). The drilling log and lithologic log will be maintained in accordance with standard practices, noting any metal objects that may be found.
- c. The drilling derrick will be secured and drill rig moved to a position at least 20 feet from the borehole.
- d. The borehole will be checked again with the MG-220 magnetometer.
- e. If UXO or magnetic anomaly is present, the borehole will be abandoned and another location selected. The new borehole should be at least six feet from the original borehole. If a UXO or anomaly is not detected and the clearance is given, the drill rig shall be positioned back over the borehole, and drilling will proceed to the next depth (6 feet).
- f. Repeat above steps at intervals of 2 feet, until a depth of ten feet is reached. At the ten-foot interval, a magnetometer reading shall be taken with the MG-220 set on the maximum sensitivity. The instrument will detect larger objects (approaching 100 lbs.) that could be expected to penetrate to depths of 10 feet or more.

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- g. After reaching the depth of ten feet, the above steps will be repeated at intervals of 4 feet, until the desired depth is reached.

15.6 Exploratory Trenching and Excavation – at times, exploratory trenching may be required to determine the lateral extent of a landfill, burial pit, or subsurface geophysical anomaly. Trenching and excavation to uncover a subsurface area will be conducted using a backhoe, an excavator, or sometimes a front-end loader. **Any trenching or excavation activities (regardless of depth) must be done in accordance with OSHA 29 Subpart P requirements, which must be considered and addressed in the project-specific Health and Safety Plan.**

On project sites where excavation activities are within the scope of work and a UXO/CWM concern exists, the following additional procedures will be utilized to conduct these operations:

- a. The surface of the area to be trenched or excavated will first be swept with the GA-52Cx magnetometer. Anomalies will be hand excavated to determine if hazardous.
- b. No more than 0.5 feet of surface soil will then be gingerly removed (scraped) from the area of concern.
- c. The heavy equipment will be removed at least 20 feet away from the area, and the area will be checked with the MG-220 magnetometer. If the area is a trench, the entire length of the trench will be checked with the MG-220 and the excavation can continue two feet at a time. If the area is a wide-open area, it can once again be checked with the GA-52Cx, but only 0.5 feet of soil removal can be excavated at a time.
- d. Anomalies will continue to be uncovered by hand excavation until the desired results are obtained and the trench/area is abandoned and refilled.
- e. Excavation will continue another 2 feet if using the MG220 or 0.5 feet if using the GA-52Cx magnetometer. Once again after the proper depth of soil is excavated, the heavy equipment is removed from the area (>20 feet) and the area is rechecked with the magnetometer. If excavation depths reach 4 feet, suitable means of access/egress must be provided (e.g., ladders) and atmospheric monitoring must be performed prior to any entries.
- f. The above procedures are followed until the desired depth is reached and/or the desired results are obtained.

Once the area or trench has been cleared, excavation can continue to the proper depth before the equipment is again moved away (at least 20 feet) and the area/trench.

15.7 Geophysical Surveys – there are several instruments that can be used to conduct geophysical surveys. The GA-52Cx (Schonstedt) and the MG-220 are magnetometers and are passive instruments. The Geonics Terrain Conductivity Meter (EM-31) is an active instrument and is commonly used to measure subsurface terrain conductivity. This information can be used geophysical surveys, as well as for locating voids, discontinuities in soil structures such as boundaries of disposal pits and buried conducting objects. An Ordnance Safety Analysis of the Geonics Model EM-61 Non-Contacting Terrain Conductivity Meter was conducted by the Naval Surface Warfare Center at the request of TtNUS in April 1993. The analysis concluded, in summary, that the “Geonics EM-61 poses no ordnance safety hazard when operated in the normal survey mode, where the device is held at hip height.” However, the Geonics EM-61 should not be used with the boom on the ground if ordnance is present or suspected.

When using the magnetometer or the EM-61, a UXO-qualified technician will conduct a surface sweep of the area to be surveyed to ensure that no surface ordnance or other hazards exist. The

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magnetometer is a passive instrument; therefore, no special ordnance safety precautions are required.

Manufacture recommended procedures for the EM-61 must be followed to ensure safe operation during the geophysical survey. Standard survey protocols and quality assurance methods will also be required during survey operations.

- 15.8 Miscellaneous Operations – due to the potential of UXO/CWM materials being encountered during field activities, UXO support will be provided at all site locations. UXO support will be provided for any and all field activities that are in areas suspected to contain UXO and/or CWM. These areas also include those areas covered with water and creeks, canals, etc.

Operations that involve the inspection, hazard classification, segregation, and final disposal of UXO and UXO-related scrap will not be covered in this SOP. The demilitarization of UXO and UXO-related scrap is not authorized unless specific work plans, SOPs, health and safety plans and other established procedures are written and approved addressing these operations.

16.0 HAZARD CONTROL BRIEF

A Health and Safety Hazard Control Briefing (i.e., tailgate meetings) will be conducted daily prior to the start of onsite activities. The briefing will be detailed and will cover the information in the Safe Work Permits for the anticipated tasks for the day, as well as applicable portions of this SOP. Additional briefings will be conducted as necessary for tasks that become necessary during the course of a workday, if they were not covered in the morning briefing. These briefings are in addition to (not in place of) the site-specific health and safety training that is required for all onsite personnel prior to their participation in any onsite, intrusive activities.

The following information will be given during the daily briefings:

- a. Overview of task(s) to be performed and review of appropriate Safe Work Permits with task participants.
- b. Overview of the day's objectives, as well as general site hazards
 - Unexploded Ordnance Hazards
 - Chemical Warfare Agents and Materials
 - Physical Hazards
- c. Overview of Standard Work Practices pertinent to the day's planned activities
- d. Review of any worker incidents or near-miss events, including a review of corrective/preventive measures to prevent recurrence
- e. Overview of Emergency Response Actions, evacuation routes and assembly points

17.0 SECURITY

Field activities under various TtNUS contracts are typically unclassified and normal security measures apply in accordance with above references (paragraph 9.1 above). TtNUS personnel and their subcontractors will check in with the appropriate client/installation's security office and may be issued security badges for entry into certain work areas. This SOP will not cover special security requirements for projects involving UXO/CWM as most installations have established policies and procedures on

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reporting and securing recovered items that are UXO and/or CWM. The TtNUS Project Manager will incorporate all security procedures required by the installation into the site work plan.

**TABLE 4-1 OF THE DEPARTMENT OF DEFENSE
EXPLOSIVES SAFETY BOARD TECHNICAL PAPER #18**

Table 4-1. Minimum Qualification Standards

Position Description	Training Required (Notes 1, 2, & 3)	Minimum Years of EOD/UXO Experience (Note 4)	Special Requirements (Note 5)
Senior UXO Supervisor	1, 2, or 3	10 years	Significant experience in all aspects of munitions response actions or range clearance activities, as appropriate for the contracted operation. Five years experience in supervisory positions.
UXO Safety Officer	1, 2, or 3	8 years	Experience in all phases of munitions response actions or range clearance activities, as appropriate for the contracted operation, and applicable safety standards.
UXO Quality Control Specialist	1, 2,3	8 years	Experience in all phases of munitions response actions or range clearance activities, as appropriate for the contracted operation, and the transportation, handling and storage of munitions and commercial explosives.
UXO Technician III	1, 2 or 3	8 years	Prior military EOD and or commercial UXO experience in munitions response actions or range clearance activities, as appropriate for the contracted operation.
UXO Technician II	1 or 2 -----or----- 3	N A -----or----- 3 years	Prior military EOD experience -----or----- Experience in response munitions response actions or range clearance activities, as appropriate for the contracted operation, plus specific project explosives safety training.
UXO Technician I	3	0	Successfully completed formal course of instruction appropriate to this skill level
UXO-Sweep Personnel	Equipment and site specific training	N A	Safety Equipment and site specific training. (Experience at this position is not required for UXO Technician I certification.)

ATTACHMENT III

EQUIPMENT INSPECTION CHECKLISTS

Equipment Inspection Checklist for Drill Rigs

Company: _____

Unit/Serial No#: _____

Inspection Date: ____ / ____ / ____ Time: ____ :

Equipment Type: _____

(e.g., Drill Rigs Hollow Stem, Mud Rotary, Direct Push, HDD)

Project Name: _____

Project No#: _____

Yes	No	NA	Requirement	Comments
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Emergency Stop Devices	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Emergency Stop Devices (At points of operation) 	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Have all emergency shut offs identified been communicated to the field crew? 	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Has a person been designated as the Emergency Stop Device Operator? 	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Highway Use	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Cab, mirrors, safety glass? 	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Turn signals, lights, brake lights, etc. (front/rear) for equipment approved for highway use? 	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Seat Belts? 	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Is the equipment equipped with audible back-up alarms and back-up lights? 	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Horn and gauges 	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Brake condition (dynamic, park, etc.) 	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Tires (Tread) or tracks 	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Windshield wipers 	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Exhaust system 	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Steering (standard and emergency) 	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Wheel Chocks? 	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Are tools and material secured to prevent movement during transport? Especially those within the cab? 	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Are there flammables or solvents or other prohibited substances stored within the cab? 	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> • Are tools or debris in the cab that may adversely influence operation of the vehicle (in and around brakes, clutch, gas pedals) 	

Yes	No	NA	Requirement	Comments
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>Fluid Levels:</p> <ul style="list-style-type: none"> • Engine oil • Transmission fluid • Brake fluid • Cooling system fluid • Hoses and belts • Hydraulic oil 	
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>High Pressure Hydraulic Lines</p> <ul style="list-style-type: none"> • Obvious damage • Operator protected from accidental release • Coupling devices, connectors, retention cables/pins are in good condition and in place 	
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>Mast Condition</p> <ul style="list-style-type: none"> • Structural components/tubing • Connection points • Pins • Welds • Outriggers • Operational • Plumb (when raised) 	
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>Hooks</p> <ul style="list-style-type: none"> • Are the hooks equipped with Safety Latches? • Does it appear that the hook is showing signs of wear in excess of 10% original dimension? • Is there a bend or twist exceeding 10% from the plane of an unbent hook? • Increase in throat opening exceeding 15% from new condition • Excessive nicks and/or gouges • Clips • Number of U-Type (Crosby) Clips (cable size 5/16 – 5/8 = 3 clips minimum) (cable size 3/4 – 1 inch = 4 clips minimum) (cable size 1 1/8 – 1 3/8 inch = 5 clips minimum) 	

Yes	No	NA	Requirement	Comments
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>PPE Required for Drill Rig Exclusion Zone</p> <ul style="list-style-type: none"> • Hardhat • Safety glasses • Work gloves • Chemical resistant gloves _____ • _____ • Steel toed Work Boots • Chemical resistant Boot Covers • Apron • Coveralls Tyvek, Saranex, cotton) 	
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>Other Hazards</p> <ul style="list-style-type: none"> • Excessive Noise Levels? _____ dBA • Chemical hazards (Drilling supplies - Sand, bentonite, grout, fuel, etc.) <ul style="list-style-type: none"> - MSDSs available? • Will On-site fueling occur <ul style="list-style-type: none"> - Safety cans available? - Fire extinguisher (Type/Rating - _____) 	

Approved for Use Yes No See Comments

Site Health and Safety Officer

Operator

**TETRA TECH
SAFE BOATING CHECKLIST**

Owner/Operator Name: _____

Registration Number _____

Location _____ County: _____ State: _____ HIN: _____

Length of Boat: <16 16-25 26-39 40-65 > 65
 Area of Operations: Inland Coastal
 Powered by: Gas Diesel Sail Other
 Type: PWC Open Cabin Other

VESSEL SAFETY CHECK REQUIREMENTS				RECOMMENDED AND DISCUSSION ITEMS			
<i>Item</i>	Yes	No	NA	Item	Yes	No	NA
1. Display of Numbers				(While encouraged, items below are not requirements)			
2. Registration / Documentation				I. Marine Radio			
3. Personal Flotation Devices (PFD)				II. Dewatering Device & Backup			
4. Visual Distress Signals (VDS)				III. Mounted Fire Extinguishers			
5. Fire Extinguishers				IV. Anchor & Line for Area			
6. Ventilation				V. First Aid and PIW Kits (**over)			
7. Backfire Flame Control				VI. Inland Visual Distress Signals			
8. Sound Producing Devices / Bell				VII. Capacity / Cert. of Compliance			
9. Navigation Lights				VIII. Discussion Items: (as applies)			
10. Pollution Placard				a. Accident reporting/owner responsibility			
11. MARPOL Trash Placard				b. Offshore operations			
12. Marine Sanitation Devices				c. Nautical charts / navigation aids			
13. Navigation Rules				d. Survival tips / first Aid			
14. State and/ or Local Requirements				e. Fueling / fuel management			
15. Overall Vessel Condition:				f. Float plan / weather & sea conditions			
a. Deck free of hazards / clean bilge				g. Insurance considerations			
b. Electrical / fuel systems				h. Boating check list			
c. Galley / heating systems				i. Safe boating classes			

This checklist has been modified for use from the United States Coast Guard Auxiliary Vessel Safety Check (VSC) Program. USCG AUX. Form 204 (7-2000)

Explanation of Required Items

- ❑ **1. NUMBERING:** The boat's registration number must be permanently attached to each side of the forward half of the boat. Characters must be plain, vertical, block style, not less than three (3) inches high, and in a color contrasting with the background. A space or hyphen must separate the letters from the numbers.

- ❑ **2. REGISTRATION / DOCUMENTATION:** Registration or Documentation papers must be on board and available. Documentation numbers must be permanently marked on a visible part of the interior structure. The documented boat's name and hailing port must be displayed on the exterior hull in letters not less than 4 inches in height.

- ❑ **3. PERSONAL FLOTATION DEVICES (PFDs):** Acceptable PFDs (also known as Life Jackets) must be U.S. Coast Guard approved and in good, serviceable condition. A wearable PFD of suitable size is required for the each person on the boat. Wearable PFDs shall be "*readily accessible.*" Boats 16 Feet or longer, must also have one Type IV (throwable) device, which shall be "*immediately available.*" PFDs shall NOT be stored in unopened plastic packaging.

- ❑ **4. VISUAL DISTRESS SIGNALS:** Boats 16 feet and over are required to carry a minimum of either:
 - 1) three day and three night pyrotechnic devices
 - 2) one day non-pyrotechnic device (flag) and one night non-pyrotechnic device (auto SOS light)
 - 3) a combination of 1) and 2).

Boats less than 16 feet need only carry night visual distress signals when operating from sunset to sunrise. It is recommended, but not required, that boats operating on inland waters should have some means of making a suitable day and night distress signal. The number and type of signals is best judged by considering conditions under which the boat will be operating.

- ❑ **5. FIRE EXTINGUISHERS:** Fire extinguishers are required if one of the following conditions exists:
 - 1) Inboard engine(s)
 - 2) Double bottom hulls not completely sealed or not completely filled with flotation materials
 - 3) Closed living space
 - 4) Closed stowage compartments that contain flammable materials or
 - 5) Permanently installed fuel tanks. Boats less than 26 feet, and propelled by outboard motors are NOT required to have fire extinguishers unless one or more of the conditions (2-5) listed above applies.

Coast Guard Classification of Fire Extinguishers		
Classification (type size)	B-I	B-II
Foam (minimum gallons)	1.25	2.5
Carbon Dioxide (minimum lbs.)	4	15
Dry Chemical (minimum lbs.)	2	10
Halon (minimum lbs.)	2.5	10

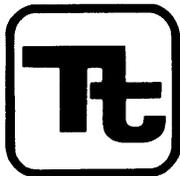
NOTE: Fire extinguishers must be readily accessible and verified as serviceable.

MINIMUM NUMBER OF EXTINGUISHERS REQUIRED		
<i>Boat Length</i>	<i>No Fixed System</i>	<i>With Fixed System</i>
Less than 26'	one B-1	0
26' to less than 40'	two B-1 or one B-2	one B-1
40' to 65'	three B-1 or one B-1 & one B-2	two B-1 or one B-2

- ❑ **6. VENTILATION:** Boats with gasoline engines in closed compartments, built after 1 August 1980 must have a powered ventilation system. Those built prior to that date must have natural or powered ventilation. Boats with closed fuel tank compartments built after 1 August 1978 must meet requirements by displaying a “certificate of compliance.” Boats built before that date must have either natural or powered ventilation in the fuel tank compartment.
- ❑ **7. BACKFIRE FLAME ARRESTER:** All gasoline powered inboard/outboard or inboard motor boats must be equipped with an approved backfire flame control device.
- ❑ **8. SOUND PRODUCING DEVICES:** To comply with Navigation Rules and for distress signaling purposes all boats must carry a sound producing device (whistle, horn, siren, etc.) capable of a 4-second blast audible for ½ mile. Boats larger than 39.4 ft. are also required to have a bell (see Navigation Rules.)
- ❑ **9. NAVIGATION LIGHTS:** All boats must be able to display navigation lights between sunset and sunrise and in conditions of reduced visibility. Boats 16 feet or more in length must have properly installed, working navigation lights and an all-around anchor light capable of being lit independently from the red/green/white “running” lights.
- ❑ **10. POLLUTION PLACARD:** Boats 26 feet and over with a machinery compartment must display an oily waste “pollution” placard.
- ❑ **11. MARPOL TRASH PLACARD:** Boats 26 feet and over in length, operating in U.S. navigable waters, must display a “MARPOL” trash placard. Oceangoing boats 40 feet and over must also have a written trash disposal plan available onboard.
- ❑ **12. MARINE SANITATION DEVICE:** Any installed toilet must be a Coast Guard approved device. Overboard discharge outlets must be capable of being sealed.
- ❑ **13. NAVIGATION RULES:** Boats 39.4 feet and over must have on board a current copy of the Navigation Rules.
- ❑ **14. STATE AND LOCAL REQUIREMENTS:** A boat must meet the requirements of the state in which it is being examined.
- ❑ **15. OVERALL BOAT CONDITION: As it applies to this Vessel. Including, but not limited to:**
 - a. Deck free of hazards and clean bilge** - The boat must be free from fire hazards, in good overall condition, with bilges reasonably clean and visible hull structure generally sound. The use of automobile parts on boat engines is not acceptable. The engine horsepower must not exceed that shown on the capacity plate.
 - b. Electrical and Fuel Systems:** The electrical system must be protected by fuses or manual reset circuit breakers. Switches and fuse panels must be protected from rain or water spray. Wiring must be in good condition, properly installed and with no exposed areas or deteriorated insulation. Batteries must be secured and terminals covered to prevent accidental arcing. If installed, self-circling or kill switch mechanism must be in proper working order.
 - Fuel Systems - Portable fuel tanks** (normally 7 gallon capacity or less) must be constructed of non-breakable material and free of corrosion and leaks. All vents must be capable of being closed. The tank must be secured and have a vapor-tight, leak-proof cap. Each permanent fuel tank must be properly ventilated.
 - c. Galley and Heating Systems** - System and fuel tanks must be properly secured with no flammable materials nearby.

ATTACHMENT IV

TETRA TECH STANDARD OPERATING PROCEDURE UTILITY LOCATING AND EXCAVATION CLEARANCE



TETRA TECH

STANDARD OPERATING PROCEDURES

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Effective Date	01/2012	Revision	3
Applicability	Tetra Tech, Inc.		
Prepared	Health & Safety		
Approved	J. Zimmerly		

Subject
UTILITY LOCATING AND EXCAVATION CLEARANCE

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1.0 PURPOSE

Utilities such as electric service lines, natural or propane gas lines, water and sewage lines, telecommunications, and steam lines are very often in the immediate vicinity of work locations. Contact with underground or overhead utilities can have serious consequences including employee injury/fatality, property and equipment damage, substantial financial impacts, and loss of utility service to users.

The purpose of this procedure is to provide minimum requirements and technical guidelines regarding the appropriate procedures to be followed when performing subsurface and overhead utility locating services. It is the policy of Tetra Tech NUS, Inc. (TtNUS) to provide a safe and healthful work environment for the protection of our employees. The purpose of this Standard Operating Procedure (SOP) is to aid in achieving the objectives of this policy, to present the acceptable procedures pertaining to utility locating and excavation clearance activities, and to present requirements and restrictions relevant to these types of activities. This SOP must be reviewed by any employee potentially involved with underground or overhead utility locating and avoidance activities.

2.0 SCOPE

This procedure applies to all TtNUS field activities where there may be potential contact with underground or overhead utilities. This procedure provides a description of the principles of operation, instrumentation, applicability, and implementability of typical methods used to determine the presence and avoidance of contact with utility services. This procedure is intended to assist with work planning and scheduling, resource planning, field implementation, and subcontractor procurement. Utility locating and excavation clearance requires site-specific information prior to the initiation of any such activities on a specific project. This SOP is not intended to provide a detailed description of methodology and instrument operation. Specialized expertise during both planning and execution of several of the methods presented may also be required.

3.0 GLOSSARY

Electromagnetic Induction (EMI) Survey - A geophysical exploration method whereby electromagnetic fields are induced in the ground and the resultant secondary electromagnetic fields are detected as a measure of ground conductivity.

Magnetometer – A device used for precise and sensitive measurements of magnetic fields.

Magnetic Survey – A geophysical survey method that depends on detection of magnetic anomalies caused by the presence of buried ferromagnetic objects.

Metal Detection – A geophysical survey method that is based on electromagnetic coupling caused by underground conductive objects.

Vertical Gradiometer – A magnetometer equipped with two sensors that are vertically separated by a fixed distance. It is best suited to map near surface features and is less susceptible to deep geologic features.

Ground Penetrating Radar – Ground Penetrating Radar (GPR) involves specialized radar equipment whereby a signal is sent into the ground via a transmitter. Some portion of the signal will be reflected from the subsurface material, which is then recorded with a receiver and electronically converted into a graphic picture.

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4.0 RESPONSIBILITIES

Project Manager (PM)/Task Order Manager (TOM) - Responsible for ensuring that all field activities are conducted in accordance with this procedure.

Site Manager (SM)/Field Operations Leader (FOL) - Responsible for the onsite verification that all field activities are performed in compliance with approved SOPs or as otherwise directed by the approved project plan(s).

Site Health & Safety Officer (SHSO) – Responsible to provide technical assistance and verify full compliance with this SOP. The SHSO is also responsible for reporting any deficiencies to the Corporate Health and Safety Manager (HSM) and to the PM/TOM.

Health & Safety Manager (HSM) – Responsible for preparing, implementing, and modifying corporate health and safety policy and this SOP.

Site Personnel – Responsible for performing their work activities in accordance with this SOP and the TtNUS Health and Safety Policy.

5.0 PROCEDURES

This procedure addresses the requirements and technical procedures that must be performed to minimize the potential for contact with underground and overhead utility services. These procedures are addressed individually from a buried and overhead standpoint.

5.1 Buried Utilities

Buried utilities present a heightened concern because their location is not typically obvious by visual observation, and it is common that their presence and/or location is unknown or incorrectly known on client properties. This procedure must be followed prior to beginning any subsurface probing or excavation that might potentially be in the vicinity of underground utility services. In addition, the Utility Clearance Form (Attachment 3) must be completed for every location or cluster of locations where intrusive activities will occur.

Where the positive identification and de-energizing of underground utilities cannot be obtained and confirmed using the following steps, the PM/TOM is responsible for arranging for the procurement of a qualified, experienced, utility locating subcontractor who will accomplish the utility location and demarcation duties specified herein.

1. A comprehensive review must be made of any available property maps, blue lines, or as-builts prior to site activities. Interviews with local personnel familiar with the area should be performed to provide additional information concerning the location of potential underground utilities. Information regarding utility locations shall be added to project maps upon completion of this exercise.
- 2., A visual site inspection must be performed to compare the site plan information to actual field conditions. Any findings must be documented and the site plan/maps revised. The area(s) of proposed excavation or other subsurface activities must be marked at the site in white paint or pin flags to identify those locations of the proposed intrusive activities. The site inspection should focus on locating surface indications of potential underground utilities. Items of interest include the presence of nearby area lights, telephone service, drainage grates, fire hydrants, electrical service vaults/panels, asphalt/concrete scares and patches, and topographical depressions. Note the location of any emergency shut off switches. Any additional information regarding utility

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locations shall be added to project maps upon completion of this exercise and returned to the PM/TOM.

3. If the planned work is to be conducted on private property (e.g., military installations, manufacturing facilities, etc.) the FOL must identify and contact appropriate facility personnel (e.g., public works or facility engineering) before any intrusive work begins to inquire about (and comply with) property owner requirements. It is important to note that private property owners may require several days to several weeks advance notice prior to locating utilities.
4. If the work location is on public property, the state agency that performs utility clearances must be notified (see Attachment 1). State "one-call" services must be notified prior to commencing fieldwork per their requirements. Most one-call services require, by law, 48- to 72-hour advance notice prior to beginning any excavation. Such services typically assign a "ticket" number to the particular site. This ticket number must be recorded for future reference and is valid for a specific period of time, but may be extended by contacting the service again. The utility service will notify utility representatives who then mark their respective lines within the specified time frame. It should be noted that most military installations own their own utilities but may lease service and maintenance from area providers. Given this situation, "one call" systems may still be required to provide location services on military installations.
5. Utilities must be identified and their locations plainly marked using pin flags, spray paint, or other accepted means. The location of all utilities must be noted on a field sketch for future inclusion on project maps. Utility locations are to be identified using the following industry-standard color code scheme, unless the property owner or utility locator service uses a different color code:

white	excavation/subsurface investigation location
red	electrical
yellow	gas, oil, steam
orange	telephone, communications
blue	water, irrigation, slurry
green	sewer, drain
6. Where utility locations are not confirmed with a high degree of confidence through drawings, schematics, location services, etc., the work area must be thoroughly investigated prior to beginning the excavation. In these situations, utilities must be identified using safe and effective methods such as passive and intrusive surveys, or the use of non-conductive hand tools. Also, in situations where such hand tools are used, they should always be used in conjunction with suitable detection equipment, such as the items described in Section 6.0 of this SOP. Each method has advantages and disadvantages including complexity, applicability, and price. It also should be noted that in some states, initial excavation is required by hand to a specified depth.
7. At each location where trenching or excavating will occur using a backhoe or other heavy equipment, and where utility identifications and locations cannot be confirmed prior to groundbreaking, the soil must be probed using a device such as a tile probe which is made of non-conductive material such as fiberglass. If these efforts are not successful in clearing the excavation area of suspect utilities, hand shoveling must be performed for the perimeter of the intended excavation.
8. All utilities uncovered or undermined during excavation must be structurally supported to prevent potential damage. Unless necessary as an emergency corrective measure, TtNUS shall not make any repairs or modifications to existing utility lines without prior permission of the utility owner, property owner, and Corporate HSM. All repairs require that the line be locked-out/tagged-out prior to work.

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5.2 Overhead Power Lines

If it is necessary to work within the minimum clearance distance of an overhead power line, the overhead line must be de-energized and grounded, or re-routed by the utility company or a registered electrician. If protective measures such as guarding, isolating, or insulating are provided, these precautions must be adequate to prevent employees from contacting such lines directly with any part of their body or indirectly through conductive materials, tools, or equipment.

The following table provides the required minimum clearances for working in proximity to overhead power lines.

<u>Nominal Voltage</u>	<u>Minimum Clearance</u>
0 -50 kV	10 feet, or one mast length; whichever is greater
50+ kV	10 feet plus 4 inches for every 10 kV over 50 kV or 1.5 mast lengths; whichever is greater

6.0 UNDERGROUND LOCATING TECHNIQUES

A variety of supplemental utility locating approaches are available and can be applied when additional assurance is needed. The selection of the appropriate method(s) to employ is site-specific and should be tailored to the anticipated conditions, site and project constraints, and personnel capabilities.

6.1 Geophysical Methods

Geophysical methods include electromagnetic induction, magnetics, and ground penetrating radar. Additional details concerning the design and implementation of electromagnetic induction, magnetics, and ground penetrating radar surveys can be found in one or more of the TtNUS SOPs included in the References (Section 8.0).

Electromagnetic Induction

Electromagnetic Induction (EMI) line locators operate either by locating a background signal or by locating a signal introduced into the utility line using a transmitter. A utility line acts like a radio antenna, producing electrons, which can be picked up with a radiofrequency receiver. Electrical current carrying conductors have a 60HZ signal associated with them. This signal occurs in all power lines regardless of voltage. Utilities in close proximity to power lines or used as grounds may also have a 60HZ signal, which can be picked up with an EM receiver. A typical example of this type of geophysical equipment is an EM-61.

EMI locators specifically designed for utility locating use a special signal that is either indirectly induced onto a utility line by placing the transmitter above the line or directly induced using an induction clamp. The clamp induces a signal on the specific utility and is the preferred method of tracing since there is little chance of the resulting signals being interfered with. A good example of this type of equipment is the Schonstedt® MAC-51B locator. The MAC-51B performs inductively traced surveys, simple magnetic locating, and traced nonmetallic surveys.

When access can be gained inside a conduit to be traced, a flexible insulated trace wire can be used. This is very useful for non-metallic conduits but is limited by the availability of gaining access inside the pipe.

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Magnetics

Magnetic locators operate by detecting the relative amounts of buried ferrous metal. They are incapable of locating or identifying nonferrous utility lines but can be very useful for locating underground storage tanks (UST's), steel utility lines, and buried electrical lines. A typical example of this type of equipment is the Schonstedt® GA-52Cx locator. The GA-52Cx is capable of locating 4-inch steel pipe up to 8 feet deep.

Non-ferrous lines are often located by using a typical plumbing tool (snake) fed through the line. A signal is then introduced to the snake that is then traced.

Ground Penetrating Radar

Ground Penetrating Radar (GPR) involves specialized radar equipment whereby a signal is sent into the ground via a transmitter. Some portion of the signal will be reflected from the subsurface material, which is then recorded with a receiver and electronically converted into a graphic picture. In general, an object which is harder than the surrounding soil will reflect a stronger signal. Utilities, tunnels, UST's, and footings will reflect a stronger signal than the surrounding soil. Although this surface detection method may determine the location of a utility, this method does not specifically identify utilities (i.e., water vs. gas, electrical vs. telephone); hence, verification may be necessary using other methods. This method is somewhat limited when used in areas with clay soil types or with a high water table.

6.2 Passive Detection Surveys

Acoustic Surveys

Acoustic location methods are generally most applicable to waterlines or gas lines. A highly sensitive Acoustic Receiver listens for background sounds of water flowing (at joints, leaks, etc.) or to sounds introduced into the water main using a transducer. Acoustics may also be applicable to determine the location of plastic gas lines.

Thermal Imaging

Thermal (i.e., infrared) imaging is a passive method for detecting the heat emitted by an object. Electronics in the infrared camera convert subtle heat differentials into a visual image on the viewfinder or a monitor. The operator does not look for an exact temperature; rather they look for heat anomalies (either elevated or suppressed temperatures) characteristic of a potential utility line.

The thermal fingerprint of underground utilities results from differences in temperature between the atmosphere and the fluid present in a pipe or the heat generated by electrical resistance. In addition, infrared scanners may be capable of detecting differences in the compaction, temperature and moisture content of underground utility trenches. High-performance thermal imagery can detect temperature differences to hundredths of a degree.

6.3 Intrusive Detection Surveys

Vacuum Excavation

Vacuum excavation is used to physically expose utility services. The process involves removing the surface material over approximately a 1' x 1' area at the site location. The air-vacuum process proceeds with the simultaneous action of compressed air-jets to loosen soil and vacuum extraction of the resulting

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debris. This process ensures the integrity of the utility line during the excavation process, as no hammers, blades, or heavy mechanical equipment comes into contact with the utility line, eliminating the risk of damage to utilities. The process continues until the utility is uncovered. Vacuum excavation can be used at the proposed site location to excavate below the "utility window" which is usually 8 feet.

Hand Excavation

When the identification and location of underground utilities cannot be positively confirmed through document reviews and/or other methods, borings and excavations may be cleared via the use of non-conductive hand tools. This should always be done in conjunction with the use of detection equipment. This would be required for all locations where there is a potential to impact buried utilities. The minimum hand-excavation depth that must be reached is to be determined considering the geographical location of the work site. This approach recognizes that the placement of buried utilities is influenced by frost line depths that vary by geographical region. Attachment 2 presents frost line depths for the regions of the contiguous United States. At a minimum, hand excavation depths must be at least to the frost line depth (see Attachment 2) plus two (2) feet, but never less than 4 feet below ground surface (bgs). For hand excavation, the hole created must be reamed large enough to be at least the diameter of the drill rig auger or bit prior to drilling. For soil gas surveys, the survey probe shall be placed as close as possible to the cleared hand excavation. It is important to note that a post-hole digger must not be used in this type of hand excavation activity.

Tile Probe Surveys

For some soil types, site conditions, and excavation requirements, non-conductive tile probes may be used. A tile probe is a "T"-handled rod of varying lengths that can be pushed into the soil to determine if any obstructions exist at that location. Tile probes constructed of fiberglass or other nonconductive material are readily-available from numerous vendors. Tile probes must be performed to the same depth requirements as previously specified. As with other types of hand excavating activities, the use of a non-conductive tile probe, should always be in conjunction with suitable utility locating detection equipment.

7.0 INTRUSIVE ACTIVITIES SUMMARY

The following list summarizes the activities that must be performed prior to beginning subsurface activities:

1. Map and mark all subsurface locations and excavation boundaries using white paint or markers specified by the client or property owner.
2. Notify the property owner and/or client that the locations are marked. At this point, drawings of locations or excavation boundaries shall be provided to the property owner and/or client so they may initiate (if applicable) utility clearance.

Note: Drawings with confirmed locations should be provided to the property owner and/or client as soon as possible to reduce potential time delays.

3. Notify "One Call" service. If possible, arrange for an appointment to show the One Call representative the surface locations or excavation boundaries in person. This will provide a better location designation to the utilities they represent. You should have additional drawings should you need to provide plot plans to the One Call service.
4. Implement supplemental utility detection techniques as necessary and appropriate to conform utility locations or the absence thereof.

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5. Complete Attachment 3, Utility Clearance Form. This form should be completed for each excavation location. In situations where multiple subsurface locations exist within the close proximity of one another, one form may be used for multiple locations provided those locations are noted on the Utility Clearance Form. Upon completion, the Utility Clearance Form and revised/annotated utility location map becomes part of the project file.

8.0 REFERENCES

OSHA Letter of Interpretation, Mr. Joseph Caldwell, Attachment 4
 OSHA 29 CFR 1926(b)(2)
 OSHA 29 CFR 1926(b)(3)
 Tt Utility Locating and Clearance Policy
 Tt SOP GH-3.1; Resistivity and Electromagnetic Induction
 Tt SOP GH-3.2; Magnetic and Metal Detection Surveys
 Tt SOP GH-3.4; Ground-penetrating Radar Surveys

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**ATTACHMENT 1
LISTING OF UNDERGROUND UTILITY CLEARANCE RESOURCES**



American Public Works Association
2345 Grand Boulevard, Suite 500, Kansas City, MO 64108-2625
Phone (816) 472-6100 • Fax (816) 472-1610
Web www.apwa.net • E-mail apwa@apwa.net

**ONE-CALL SYSTEMS INTERNATIONAL
CONDENSED DIRECTORY**

Alabama Alabama One-Call 1-800-292-8525	Iowa Iowa One-Call 1-800-292-8989	New Jersey New Jersey One Call 1-800-272-1000
Alaska Locate Call Center of Alaska, Inc. 1-800-478-3121	Kansas Kansas One-Call System, Inc. 1-800-344-7233	New Mexico New Mexico One Call System, Inc. 1-800-321-2537 Las Cruces- Dona Ana Blue Stakes 1-888-526-0400
Arizona Arizona Blue Stake 1-800-782-5348	Kentucky Kentucky Underground Protection Inc. 1-800-752-6007	New York Dig Safely New York 1-800-962-7962 New York City- Long Island One Call Center 1-800-272-4480
Arkansas Arkansas One Call System, Inc. 1-800-482-8998	Louisiana Louisiana One Call System, Inc. 1-800-272-3020	North Carolina The North Carolina One-Call Center, Inc. 1-800-632-4949
California Underground Service Alert North 1-800-227-2600 Underground Service Alert of Southern California 1-800-227-2600	Maine Dig Safe System, Inc. 1-888-344-7233	North Dakota North Dakota One-Call 1-800-795-0555
Colorado Utility Notification Center of Colorado 1-800-922-1987	Maryland Miss Utility 1-800-257-7777 Miss Utility of Delmarva 1-800-282-8555	Ohio Ohio Utilities Protection Service 1-800-362-2764 Oil & Gas Producers Underground Protect'n Svc 1-800-925-0988
Connecticut Call Before You Dig 1-800-922-4455	Massachusetts Dig Safe System, Inc. 1-888-344-7233	Oklahoma Call Okie 1-800-522-6543
Delaware Miss Utility of Delmarva 1-800-282-8555	Michigan Miss Dig System, Inc. 1-800-482-7171	Oregon Oregon Utility Notification Center/One Call Concepts 1-800-332-2344
Florida Sunshine State One-Call of Florida, Inc. 1-800-432-4770	Minnesota Gopher State One Call 1-800-252-1166	Pennsylvania Pennsylvania One Call System, Inc. 1-800-242-1776
Georgia Underground Protection Center, Inc. 1-800-282-7411	Mississippi Mississippi One-Call System, Inc 1-800-227-6477	Rhode Island Dig Safe System, Inc. 1-888-344-7233
Hawaii Underground Service Alert North 1-800-227-2600	Missouri Missouri One-Call System, Inc. 1-800-344-7483	South Carolina Palmetto Utility Protection Service Inc. 1-888-721-7877
Idaho Dig Line Inc. 1-800-342-1585 Kootenai County One-Call 1-800-428-4950 Shoshone - Benewah One-Call 1-800-398-3285	Montana Utilities Underground Protection Center 1-800-424-5555 Montana One Call Center 1-800-551-8344	South Dakota South Dakota One Call 1-800-781-7474
Illinois JULIE, Inc. 1-800-892-0123 Digger (Chicago Utility Alert Network) 312-744-7000	Nebraska Diggers Hotline of Nebraska 1-800-331-5666	Tennessee Tennessee One-Call System, Inc. 1-800-351-1111
Indiana Indiana Underground Plant Protection Service 1-800-382-5544	Nevada Underground Service Alert North 1-800-227-2600	
	New Hampshire Dig Safe System, Inc. 1-888-344-7233	

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ATTACHMENT 1 (Continued)

Texas

Texas One Call System
1-800-245-4545
Texas Excavation Safety System, Inc.
1-800-344-8377
Lone Star Notification Center
1-800-669-8344

Utah

Blue Stakes of Utah
1-800-662-4111

Vermont

Dig Safe System, Inc.
1-888-344-7233

Virginia

Miss Utility of Virginia
1-800-552-7001
Miss Utility (Northern Virginia)
1-800-257-7777

Washington

Utilities Underground Location Center
1-800-424-5555
Northwest Utility Notification Center
1-800-553-4344
Inland Empire Utility Coordinating
Council
509-456-8000

West Virginia

Miss Utility of West Virginia, Inc.
1-800-245-4848

Wisconsin

Diggers Hotline, Inc.
1-800-242-8511

Wyoming

Wyoming One-Call System, Inc.
1-800-348-1030
Call Before You Dig of Wyoming
1-800-849-2476

District of Columbia

Miss Utility
1-800-257-7777

Alberta

Alberta One-Call Corporation
1-800-242-3447

British Columbia

BC One Call
1-800-474-6886

Ontario

Ontario One-Call System
1-800-400-2255

Quebec

Info-Excavation
1-800-663-9228

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**ATTACHMENT 3
UTILITY CLEARANCE FORM**

Client: _____ Project Name: _____
Project No.: _____ Completed By: _____
Location Name: _____ Work Date: _____
Excavation Method/Overhead Equipment: _____

1. **Underground Utilities** Circle One
- a) Review of existing maps? yes no N/A
 - b) Interview local personnel? yes no N/A
 - c) Site visit and inspection? yes no N/A
 - d) Excavation areas marked in the field? yes no N/A
 - e) Utilities located in the field? yes no N/A
 - f) Located utilities marked/added to site maps? yes no N/A
 - g) Client contact notified yes no N/A
Name _____ Telephone: _____ Date: _____
 - g) State One-Call agency called? yes no N/A
Caller: _____
Ticket Number: _____ Date: _____
 - h) Geophysical survey performed? yes no N/A
Survey performed by: _____
Method: _____ Date: _____
 - i) Hand excavation performed (with concurrent use of utility
detection device)? yes no N/A
Completed by: _____
Total depth: _____ feet Date: _____
 - j) Trench/excavation probed? yes no N/A
Probing completed by: _____
Depth/frequency: _____ Date: _____

2. **Overhead Utilities** Present Absent
- a) Determination of nominal voltage yes no N/A
 - b) Marked on site maps yes no N/A
 - c) Necessary to lockout/insulate/re-route yes no N/A
 - d) Document procedures used to lockout/insulate/re-route yes no N/A
 - e) Minimum acceptable clearance (SOP Section 5.2): _____

3. **Notes:**

Approval:

Site Manager/Field Operations Leader Date

c: PM/Project File
Program File

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**ATTACHMENT 4
OSHA LETTER OF INTERPRETATION**

Mr. Joseph Caldwell
Consultant
Governmental Liaison
Pipeline Safety Regulations
211 Wilson Boulevard
Suite 700
Arlington, Virginia 22201

Re: Use of hydro-vacuum or non-conductive hand tools to locate underground utilities.

Dear Mr. Caldwell:

In a letter dated July 7, 2003, we responded to your inquiry of September 18, 2002, regarding the use of hydro-vacuum equipment to locate underground utilities by excavation. After our letter to you was posted on the OSHA website, we received numerous inquiries that make it apparent that aspects of our July 7 letter are being misunderstood. In addition, a number of industry stakeholders, including the National Utility Contractors Association (NUCA), have provided new information regarding equipment that is available for this work.

To clarify these issues, we are withdrawing our July 7 letter and issuing this replacement response to your inquiry.

***Question:** Section 1926.651 contains several requirements that relate to the safety of employees engaged in excavation work. Specifically, paragraphs (b)(2) and (b)(3) relate in part to the safety of the means used to locate underground utility installations that, if damaged during an uncovering operation, could pose serious hazards to employees.*

Under these provisions, what constitutes an acceptable method of uncovering underground utility lines, and further, would the use of hydro-vacuum excavation be acceptable under the standard?

Answer

Background

Two sections of 29 CFR 1926 Subpart P (Excavations), 1926.651(Specific excavation requirements), govern methods for uncovering underground utility installations. Specifically, paragraph (b)(2) states:

When utility companies or owners cannot respond to a request to locate underground utility installations within 24 hours * * * or cannot establish the exact location of these installations, the employer may proceed, provided the employer does so with caution, and provided detection equipment or other acceptable means to locate utility installations are used. (emphasis added).

Paragraph (b)(3) provides:

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When excavation operations approach the estimated location of underground installations, the exact location of the installations shall be determined by safe and acceptable means. (emphasis added).

Therefore, “acceptable means” must be used where the location of the underground utilities have not been identified by the utility companies and detection equipment is not used.

Subpart P does not contain a definition of either “other acceptable means” or “safe and acceptable means.” The preambles to both the proposed rule and the final rule discussed the rationale behind the wording at issue. For example, the preamble to the proposed rule, 52 Fed. Reg. 12301 (April 15, 1987), noted that a 1972 version of this standard contained language that specified “careful probing or hand digging” as the means to uncover utilities. The preamble then noted that an amendment to the 1972 standard later deleted that language “to allow other, *equally effective means* of locating such installations.” The preamble continued that in the 1987 proposed rule, OSHA again proposed using language in section (b)(3) that would provide another example of an acceptable method of uncovering utilities that could be used where the utilities have not been marked and detection equipment is not being used – “probing with hand-held tools.” This method was rejected in the final version of 29 CFR 1926. As OSHA explained in the preamble to the final rule, 54 Fed. Reg. 45916 (October 31, 1989):

OSHA received two comments * * * and input from ACCSH [OSHA’s Advisory Committee on Construction Safety and Health] * * * on this provision. All commenters recommended dropping ‘such as probing with hand-held tools’ from the proposed provision, because this could create a hazard to employees by damaging the installation or its insulation.

In other words, the commenters objected to the use of hand tools being used unless detection equipment was used in conjunction with them. OSHA then concluded its discussion relative to this provision by agreeing with the commentators and ultimately not including any examples of “acceptable means” in the final provision.

Non-conductive hand tools are permitted

This raises the question of whether the standard permits the use of hand tools alone -- without also using detection equipment. NUCA and other industry stakeholders have recently informed us that non-conductive hand tools that are appropriate to be used to locate underground utilities are now commonly available.

Such tools, such as a “shooter” (which has a non-conductive handle and a snub nose) and non-conductive or insulated probes were not discussed in the rulemaking. Since they were not considered at that time, they were not part of the class of equipment that was thought to be unsafe for this purpose. Therefore, we conclude that the use of these types of hand tools, when used with appropriate caution, is an “acceptable means” for locating underground utilities.

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Hydro-vacuum excavation

It is our understanding that some hydro-vacuum excavation equipment can be adjusted to use a minimum amount of water and suction pressure. When appropriately adjusted so that the equipment will not damage underground utilities (especially utilities that are particularly vulnerable to damage, such as electrical lines), use of such equipment would be considered a “acceptable means” of locating underground utilities. However, if the equipment cannot be sufficiently adjusted, then this method would not be acceptable under the standard.

Other technologies

We are not suggesting that these are the only devices that would be “acceptable means” under the standard. Industry stakeholders have informed us that there are other types of special excavation equipment designed for safely locating utilities as well.

We apologize for any confusion our July 7 letter may have caused. If you have further concerns or questions, please feel free to contact us again by fax at: U.S. Department of Labor, OSHA, Directorate of Construction, Office of Construction Standards and Compliance Assistance, fax # 202-693-1689. You can also contact us by mail at the above office, Room N3468, 200 Constitution Avenue, N.W., Washington, D.C. 20210, although there will be a delay in our receiving correspondence by mail.

Sincerely,

Russell B. Swanson, Director
Directorate of Construction

NOTE: OSHA requirements are set by statute, standards and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA’s interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA’s website at <http://www.osha.gov>.

ATTACHMENT V

OSHA POSTER

Job Safety and Health

It's the law!



Occupational Safety
and Health Administration
U.S. Department of Labor

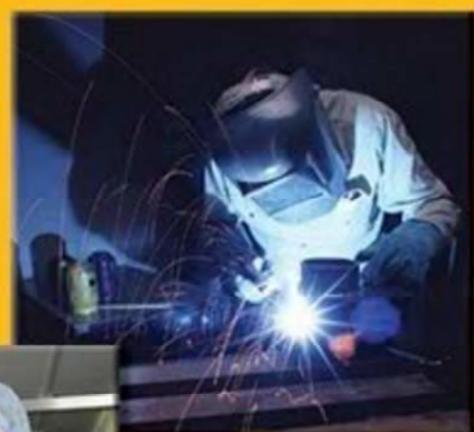
EMPLOYEES:

- You have the right to notify your employer or OSHA about workplace hazards. You may ask OSHA to keep your name confidential.
- You have the right to request an OSHA inspection if you believe that there are unsafe and unhealthful conditions in your workplace. You or your representative may participate in that inspection.
- You can file a complaint with OSHA within 30 days of retaliation or discrimination by your employer for making safety and health complaints or for exercising your rights under the *OSH Act*.
- You have the right to see OSHA citations issued to your employer. Your employer must post the citations at or near the place of the alleged violations.
- Your employer must correct workplace hazards by the date indicated on the citation and must certify that these hazards have been reduced or eliminated.
- You have the right to copies of your medical records and records of your exposures to toxic and harmful substances or conditions.
- Your employer must post this notice in your workplace.
- You must comply with all occupational safety and health standards issued under the *OSH Act* that apply to your own actions and conduct on the job.

EMPLOYERS:

- You must furnish your employees a place of employment free from recognized hazards.
- You must comply with the occupational safety and health standards issued under the *OSH Act*.

This free poster available from OSHA –
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Free assistance in identifying and correcting hazards or complying with standards is available to employers, without citation or penalty, through OSHA-supported consultation programs in each state.

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