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NSA CRANE  
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ACCIDENT PREVENTION PLAN AND SITE SAFETY AND HEALTH PLAN SOLID WASTE  
MANAGEMENT UNIT 34 (SWMU 34) OLD GUN TUB STORAGE LOT NSA CRANE IN  
6/1/2012  
TETRA TECH

**Accident Prevention Plan  
and  
Site Safety and Health Plan**

**for**

**SWMU 34  
Old Gun Tub Storage Lot**

**NAVAL SUPPORT ACTIVITY CRANE  
CRANE, INDIANA**



**Naval Facilities Engineering Command Midwest  
Great Lakes, Illinois**

**Contract Number N624670-08-D-1001  
Contract Task Order F27R**

June 2012

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

**FOR**

**SOIL CHARACTERIZATION INVESTIGATION FOR**

**OLD GUN TUB STORAGE LOT  
NAVAL SUPPORT ACTIVITY CRANE  
CRANE, INDIANA**

**SUBMITTED TO:**

**NAVAL FACILITIES ENGINEERING COMMAND MIDWEST  
201 DECATUR AVENUE, BUILDING 1A  
GREAT LAKES, ILLINOIS 60088**

**SUBMITTED BY:**

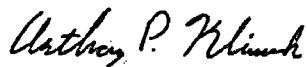
**TETRA TECH  
234 MALL BOULEVARD, SUITE 260  
KING OF PRUSSIA, PENNSYLVANIA 19406**

**CONTRACT NUMBER N62470-08-D-1001  
CONTRACT TASK ORDER F27R**

**JUNE 2012**

**PREPARED UNDER THE SUPERVISION OF:**

**APPROVED FOR SUBMISSION BY:**



**ANTHONY P. KLIMEK, P.E.  
PROJECT MANAGER  
TETRA TECH  
CINCINNATI, OHIO**



**MATTHEW M. SOLTIS, CIH, CSP  
CLEAN HEALTH AND SAFETY MANAGER  
TETRA TECH  
PITTSBURGH, PENNSYLVANIA**

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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 Equipment Inspection Checklist

III Tetra Tech Standard Operating Procedure (SOP) Utility Locating and Excavation Clearance

IV 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 or Celsius
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
COPC	Contaminant of Potential 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
F	Fahrenheit
FOL	Field Operations Leader
HAZWOPER	Hazardous Waste Operations and Emergency Response
HSM	Health and Safety Manager
IDW	Investigative Derived Waste
lbs	pounds
mg/kg	milligrams per kilogram
mg/m <sup>3</sup>	milligrams per cubic meter
mm	millimeter
NAICS	North American Industry Classification System
NAVFAC	Naval Facilities Engineering Command
NRR	Noise Reduction Rating
NSA	Naval Support Activity
OEL	Occupational Exposure Limit
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor)

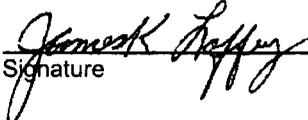
PE	Professional Engineer
PHSO	Project Health and Safety Officer
PM	Project Manager
PMP	Project Management Professional
POC	Point of Contact
PPE	Personal Protective Equipment
RAC	Risk Assessment Code
RCIR	Recordable Case Incident Rate
RPM	Remedial Project Manager
SOP	Standard Operating Procedure
SSO	Site Safety Officer
SSHPP	Site Safety and Health Plan
TSS	Technical Support Services
TP	Technical Paper
TWA	Time-Weighted Average
USCG	United States Coast Guard

# **ACCIDENT PREVENTION PLAN**

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

Prepared by:

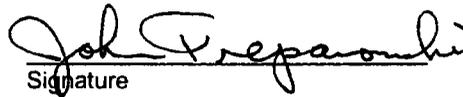
James K. Laffey  
Tetra Tech  
Project Health and Safety Officer

  
\_\_\_\_\_  
Signature

(412) 921-8678  
Phone

Approved by:

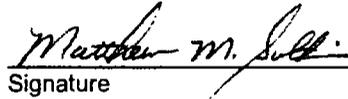
John Trepanowski, P.E.  
Tetra Tech  
Vice-President

  
\_\_\_\_\_  
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) 34, Naval Support Activity (NSA), Crane in Crane, Indiana.

### 2.1 PROJECT DESCRIPTION

Tetra Tech (Tetra Tech) has prepared this Accident Prevention Plan (APP) and Site Safety and Health Plan (SSHP), presented in Appendix A, for the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) at the Old Gun Tub Storage Lot (OGTSL) - Solid Waste Management Unit (SWMU) 34 at Naval Support Activity (NSA) Crane, Crane, Indiana.

The primary purpose of the investigation is to better define the extent of site-related chemical contamination that has previously been detected in soil at SWMU 34 and quantify any associated risks that would result from exposure of human or ecological receptors to this contamination. The activity includes the collection and analysis of surface and subsurface soil samples.

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:

- On-site personnel who may be exposed to hazardous site conditions, including Tetra Tech and subcontractor personnel participating in field activities
- 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 checked="" type="checkbox"/>	<input 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 (SOPs).

## **2.2 SITE MAPS**

A general facility location map is shown on Figure 2-1. A site location map showing the site 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, Utility Clearance
- Phase 2 – Surface and Subsurface Soil Sampling
- Phase 3 – Demobilization

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

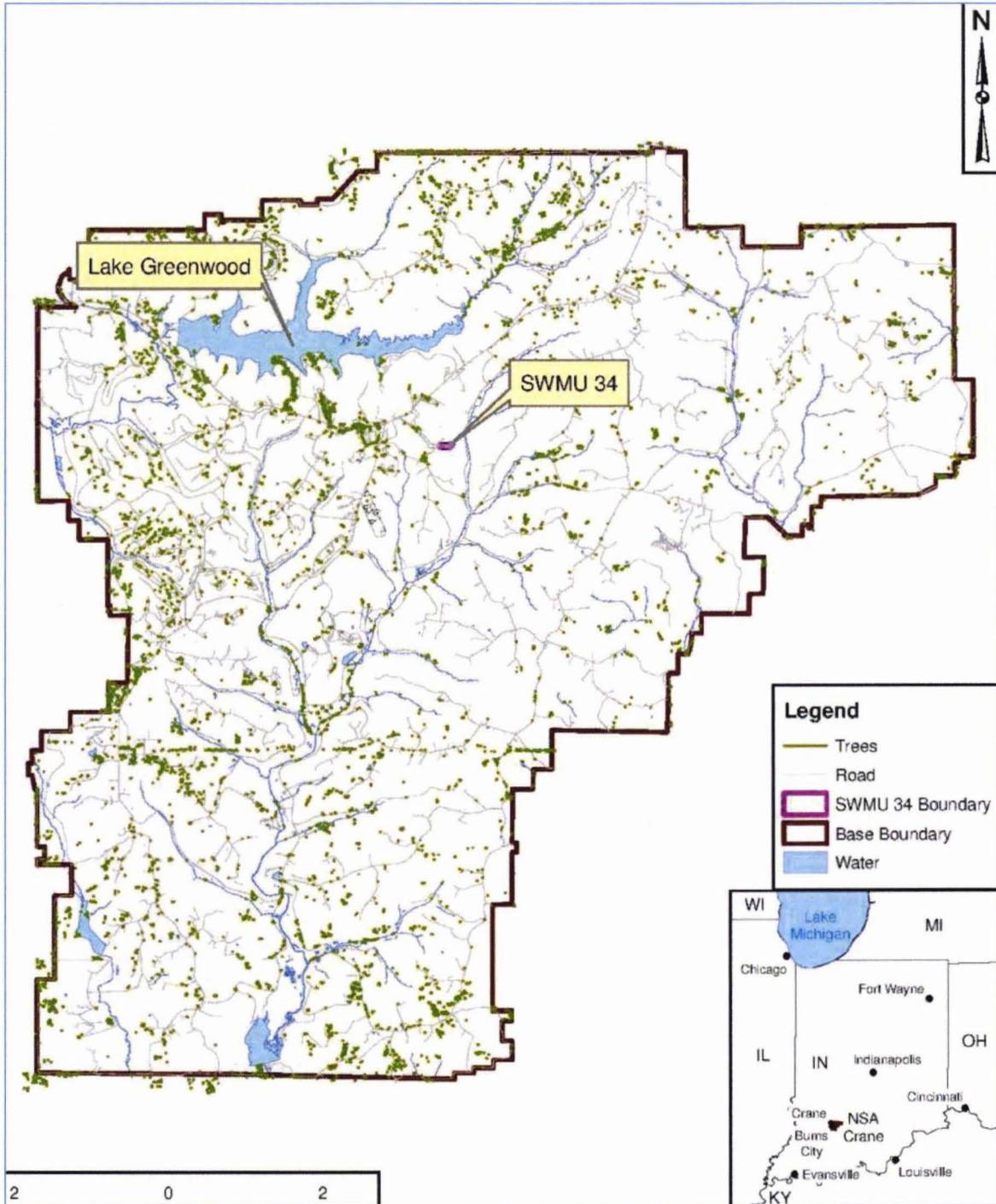
## **2.4 SPECIFIC SITE ACTIVITIES**

The detailed Scope of Work for field activities to be performed for the RI at NSA Crane is presented in the Project-Specific SAP dated April 2012. If additional tasks are determined to be necessary, the SAPs and this APP and SSHP will be amended and a hazard evaluation of the additional tasks performed.

**FIGURE 2-1  
GENERAL LOCATION MAP**



**FIGURE 2-2**  
**SITE LOCATION MAP**



### 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

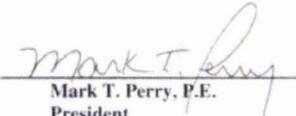
## TETRA TECH NUS, INC. HEALTH AND SAFETY POLICY



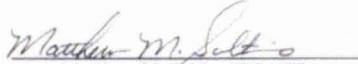
Tetra Tech NUS, Inc., is committed to providing our employees with a safe and healthful workplace. We believe that occupational injuries and illness can be prevented; and we are convinced that a strong Health and Safety Program is essential to achieve this objective.

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  
2009 OSHA 300A-100 (Rev. 01/2004)  
File approved OMS No. 1718-0174

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 enter "0".

Employees former employees, and their representatives have the right to review the OSHA Form 300 at all times. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR 1904.35 or 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	36
(K)	(L)

**Injury and Illness Types**

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

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

\*After reporting under this collection of information is estimated to average 30 minutes per response, including time to review the instruction, search and gather the data needed, and complete and review the collection of information. Penalties are not imposed for noncompliance with the collection of information unless it displays a courtesy visit OMS control number. If you have any comments about these estimates or any aspect of this data collection, contact: U.S. 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 Anderson Drive, Foster Plaza 7  
 City: Pittsburgh State: PA Zip: 15220  
 Industry description (e.g., Manufacture of motor trucks, 3361):  
Environmental Consulting  
 Standard Industrial Classification (SIC), if known (e.g., SIC 1715):  
 \_\_\_\_\_  
 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**

I certify that 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.

Paul J. Chew President  
 Company Executive

10291-10-28-9 Phone \_\_\_\_\_ 13 Jun 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.

Year **2009**  
U.S. Department of Labor  
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

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 backlines 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												
(A) Case No.	(B) Employee's Name	(C) Job Title (e.g., Welder)	(D) Date of injury or onset of illness (no 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)							
								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	XXXXXXXXXXXXXXXX	Environmental Engineer	04/2009	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: U.S. Department of Labor, OSHA Office of Statistics, Room 7-364, 301 Constitution Ave. NW, Washington, DC 20210. Do not send this completed form to the office.

Injury  
Skin Disorder  
Respiratory Condition  
Poisoning  
Hearing Loss  
All other illnesses

## 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
(G)	(H)	(I)	(J)

### Number of Days

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

### Injury and Illness Types

Total number of... (M)			
(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 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 Forster Plaza 7, 661 Anderson 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 466  
 Total hours worked by all employees last year 905,132

### 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 E. Army \_\_\_\_\_  
President  
Title  
 Company executive  
 (412) 921-7217 \_\_\_\_\_  
28-Jan-11  
Date  
 Phone

### 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



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.

Form approved OMB no. 1218-0178

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., Worker)	(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 employee touch)	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	Restricted work activity or job transfer	Job transfer or restriction	Away From Work (days)	On job transfer or restriction (days)	(G)					
						(C)	(D)	(I)	(J)	(K)	(L)	(1)	(2)	(3)	(4)	(5)	(6)
NUS-2010-10	..... (Wilmington, MA)	Environmental Scientist	3/22/2010	NAVY CLEAN LANT CTO WENS	Back injury from lifting empty cooler and hardware boxes			X		2	X						
NUS-2010-19	..... (Newark, DE)	Environmental Technician	12/3/2010	ONREC - Synthco Columbia	Cut hand with blade removing equipment from wall				X		X						
NUS-2010-20	..... (Germantown, MD)	Graphic	12/7/2010	112 Germantown, MD - 2	Sprain Ankle			X			X						
<b>Page totals</b>						0	0	1	2	0	2	2	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: U.S. Department of Labor, OSHA, Office of Statistics, Room N-1204, 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

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

Year 2011   
**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	0	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	0
(K)	(L)

### Injury and Illness Types

Total number of ... (M)	(1) Injury	(2) Skin Disorder	(3) Respiratory Condition	(4) Poisoning	(5) Hearing Loss	(6) All Other Illnesses
0	0	0	0	0	0	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: U.S. 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 NJ, Inc.  
 Street 691 Anderson Drive, Foster Plaza 7  
 City Pittsburgh State Pennsylvania Zip 15230  
 Industry description (e.g., Manufacture of motor truck trailers)  
Environmental Consulting  
 Standard Industrial Classification (SIC), if known (e.g., SIC 3718)  
 OR North American Industrial Classification (NAICS), if known (e.g., 336212)  
5 4 1 6 2 0

### Employment information

Annual average number of employees 436  
 Total hours worked by all employees last year 872631

### 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. Fahy  
 Company representative

President  
 Title  
1/23/12  
 Date

(412) 821-7217  
 Phone



#### 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 Activity Hazard Analysis (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 Figure A-2-1.

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.

This APP and SSHP (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 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 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 NSA Crane.
- 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.

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.

### 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 includes the training of chemicals brought onsite in accordance with the OSHA Hazard Communication 29 CFR 1910.1200(f) Standard. In addition 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 SSO, 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, first aid, etc.)
- 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
- 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, conducted by a board certified occupational medicine physician 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.

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## 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 onsite 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. The HSM 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 (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 Base Point of Contact (POC) as soon as possible, but not later than 24 hours from the time of the event. Incidents that must be reported to the Base 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 Base POC.

## **8.2 INCIDENT REPORTING PROCEDURES**

Following the prescribed 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

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 guides users 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, TOTAL can be found under the "Health and Safety" tab, by clicking on "Incident Reporting." Select "Report an Incident (TOTAL)" then, near the bottom of the screen, click on "Launch TOTAL Application." This connects the user 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 user 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 onsite, 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
<b>INSTRUCTIONS:</b>		
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
<b>INFORMATION ABOUT THE INCIDENT</b>		
<b>Description of Incident</b>		
<hr/> <hr/> <hr/>		
<b>Date of Incident</b>		<b>Time of Incident</b>
		_____ AM <input type="checkbox"/> PM <input type="checkbox"/> OR Cannot be determined <input type="checkbox"/>
<b>Weather conditions at the time of the incident</b>		<b>Was there adequate lighting?</b>
		_____ Yes <input type="checkbox"/> No <input type="checkbox"/>
<b>Location of Incident</b>		
_____ Was location of incident within the employer's work environment? Yes <input type="checkbox"/> No <input type="checkbox"/>		
<b>Street Address</b>		<b>City, State, Zip Code and Country</b>
<b>Project Name/Number</b>		<b>Client:</b>
<b>Tt Supervisor or Project Manager</b>		<b>Was supervisor on the scene?</b>
		Yes <input type="checkbox"/> No <input type="checkbox"/>
<b>WITNESS INFORMATION (attach additional sheets if necessary)</b>		
<b>Name</b>		<b>Company</b>
<b>Street Address</b>		<b>City, State and Zip Code</b>
<b>Telephone Number(s)</b>		

CORRECTIVE ACTIONS				
<b>Corrective action(s) immediately taken by unit reporting the incident:</b>				
<hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/>				
<b>Corrective action(s) still to be taken (by whom and when):</b>				
<hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/> <hr style="border: 0; border-top: 1px solid black; margin-bottom: 5px;"/>				
ROOT CAUSE ANALYSIS LEVEL REQUIRED				
Root Cause Analysis Level Required: Level - 1 <input type="checkbox"/> Level - 2 <input type="checkbox"/> None <input type="checkbox"/>				
<b>Root Cause Analysis Level Definitions</b>				
<b>Level - 1</b>	<p><b>Definition:</b> 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"> <li>▪ Work related fatality</li> <li>▪ Hospitalization of one or more employee where injuries result in total or partial permanent disability</li> <li>▪ Property damage in excess of \$75,000</li> <li>▪ When requested by senior management</li> </ul>			
<b>Level - 2</b>	<p><b>Definition:</b> 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"> <li>▪ OSHA recordable lost time incident</li> <li>▪ Near miss incident that could have triggered a Level 1 RCA</li> <li>▪ When requested by senior management</li> </ul>			
<b>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.</b>				
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"/> TetraTech 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"

Blank lines for describing the activity before the incident.

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"

Blank lines for describing how the injury occurred.

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".

Blank lines for describing the object or substance that harmed the individual.

MEDICAL CARE PROVIDED

Was first aid provided at the site: Yes [ ] No [ ] If yes, describe the type of first aid administered and by whom?

Blank line for describing first aid provided at the site.

Was treatment provided away from the site: Yes [ ] No [ ] If yes, provide the information below.

Table with 2 columns: Name of physician or health care professional, Facility Name, Street Address, City State and Zip Code, Telephone Number, and Type of Care? (with sub-questions about emergency room, hospitalization, death, and compensation).

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

Table with 4 columns: Affected individual (print), Affected individual (signature), Telephone Number, Date

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.

<u>INSTRUCTIONS:</u>			
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 <input type="checkbox"/>	Equipment Damage <input type="checkbox"/>	Fire or Explosion <input type="checkbox"/>	Spill or Release <input type="checkbox"/>
INCIDENT DETAILS			
<b>Results of Incident:</b> Fully describe damages, losses, etc.			
<b>Response Actions Taken:</b>			
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 <input type="checkbox"/> No <input type="checkbox"/> 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 <input type="checkbox"/> Client <input type="checkbox"/> Other <input type="checkbox"/> Name: _____			
Was an additional written report on this incident generated? Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, place in project file.			

<b>INSTRUCTIONS:</b>			
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.			
Incident Report Number: (From the IR Form)			
<b>INCIDENT DETAILS</b>			
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.			
<b>VEHICLE INFORMATION</b>			
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 Belt Used?	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 Belt Used?	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		



TETRA TECH, INC.

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INCIDENT FORM IR-C

COMPLETE AND SUBMIT DIAGRAM DEPICTING WHAT HAPPENED

A large, empty rectangular area with a thin black border, intended for drawing a diagram depicting an incident. The area is currently blank.

**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 type="checkbox"/> <input checked="" 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 type="checkbox"/> <input checked="" type="checkbox"/>	Lead Abatement Plan	<input type="checkbox"/> <input checked="" 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 type="checkbox"/> <input checked="" type="checkbox"/>	Other _____ Plan
<input type="checkbox"/> <input checked="" type="checkbox"/>	Diving Slab Plan	<input type="checkbox"/> <input checked="" type="checkbox"/>	Other _____ Plan

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 9.3 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 HAZARD COMMUNICATION PROGRAM**

See Section 10.4 of the SSHP

**9.6 SSHP FOR HTRW WORK**

See Appendix A

## 10.0 RISK MANAGEMENT PROCESSES

The AHA defines the activities being performed, the hazards posed, and the control measures required to perform the work safely. Site workers are briefed on each AHA before conducting the task and their input is solicited before, during, and after the performance of work to further identify the hazards posed and control measures required. Figure A-2-1 in the SSHP contains the AHA for each activity being provided in support of the field activities during this CTO.

# **APPENDIX A**

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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 Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) at the Old Gun Tub Storage Lot (OGTSL) - Solid Waste Management Unit (SWMU) 34 at Naval Support Activity (NSA) Crane, Crane, Indiana.

The primary purpose of the RFI is to better define the extent of site-related chemical contamination that has previously been detected in soil at SWMU 34 and quantify any associated risks that would result from exposure of human or ecological receptors to this contamination. This SSHP covers the collection and analysis of surface and subsurface soil samples and related activities.

This SSHP was developed using historical site background information regarding known or suspected chemical contaminants, information obtained on previous site visits, and knowledge of 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 FACILITY LOCATION

NSA Crane is located in the southern portion of Indiana, approximately 75 miles southwest of Indianapolis, 60 miles northwest of Louisville, Kentucky, and immediately east of Burns City and Crane Village, Indiana. NSA Crane encompasses approximately 62,463 acres or approximately 98 square miles of the northern portion of Martin County and smaller portions of Greene, Daviess, and Lawrence Counties.

#### 1.1.1 SWMU 34 Description

SWMU 34 is an open area in the north-central portion of NSA Crane. As shown on Figure A-1-1, the site is roughly L-shaped. The east-west leg is approximately 900 feet long and 200 feet wide, and the north-south leg is approximately 700 feet long and 150 feet wide. The site is approximately six acres and is covered by gravel and grassed areas. The site is located on a topographic ridge and slopes down from the center in all directions. The hillsides located below the site are wooded and steep; runoff from SWMU 34 drains into the valleys adjacent to the site. Access is from two gravel roads that extend to the site from the west and southwest. There are no permanent structures located on the site. The closest man-made

structures are Buildings 3032 and 3226. Building 3032 is an active dog kennel located just west of the site. Building 3226 is located approximately 200 feet southwest of the site.

#### **1.1.2 SWMU 34 History**

SWMU 34 was primarily used for the outdoor storage of containers and equipment, including gun which were used to house large caliber guns on Navy ships. Some of the containers and equipment stored for long periods of time and were thus exposed to the elements and subject to weathering. Storage during the 1950s and early 1960s consisted of combat ready materials (e.g., vehicles, bomb trailers, weatherproof containers of various hardware, light and heavy gun mounts, etc.). Gun tub storage began during the Vietnam era of the late 1960s. Gun tub storage ceased in 2001, when the gun tubs were dismantled and sold for scrap metal.

The site was, and continues to be, used as an outside storage facility. There were trailers, empty dumpsters, and other containers stored throughout the east-west leg of the site. There are also separate piles of material in the woods just outside the cleared area used for storage – Pile A and Pile B. Pile A is located on the northeast corner of the site; it consists of a small pile of gravel (less than 10 feet in diameter and 18 inches high) and an adjacent area covered with gravel, the gravel appears to have been pushed or dumped in its current locations. Pile B is approximately 8 feet wide, 25 feet long and 2 feet high; it is a row of four adjacent piles of soil and gravel material that appears to have been dumped in their current locations.

FIGURE A-1-1  
SWMU 34



## 1.2 PREVIOUS ENVIRONMENTAL SAMPLING STUDIES

Some limited surface soil sampling and analysis has been performed on the east-west leg of the OGTSL. No surface soil samples were collected from the north-south leg. No groundwater samples have been collected from the site. Because of the ridge top topography, there are no streams or water bodies in the vicinity, therefore, no sediment or surface water samples have been collected from the site.

## 1.3 CHEMICAL HAZARDS

Historical data indicate that the OGTSL site is contaminated with the metals (including arsenic, cadmium, chromium, and lead) and polychlorinated biphenyls (PCBs). Sporadic detections of SVOCs (including benzo(a)pyrene, a polycyclic aromatic hydrocarbon (PAH)) were detected at trace levels.

Table A-1-1 shows the contaminants of concern (COCs) and the current occupational exposure limits (OELs) from the American Conference of Governmental and Industrial Hygienists (ACGIH) threshold limit values (TLVs) and 8-hour time weighted average ( $TWA_8$ ), and OSHA personal exposure limit (PELs)  $TWA_8$  or short term exposure limits (STELs).

**TABLE A-1-1  
SAMPLE RESULTS AND CURRENT OCCUPATIONAL EXPOSURE LIMITS**

Contaminant of Concern	Highest Concentration Previously Detected (mg/kg)	Amount of Dust-in-Air that would have to be generated to reach the OEL (mg/m <sup>3</sup> )	Current OELs
Arsenic	9.9	252.53	0.01 ppm $TWA_8$
Cadimum	12	102.46	0.01 ppm $TWA_8$
Chromium	573	218.15	0.5 ppm $TWA_8$
Lead	543	23.02	0.5 ppm $TWA_8$ 2.5 ppm STEL
PCBs	390	320.51	None
Benzo(a)pyrene	0.14	NA	500

**Table Notes:**

- $TWA_8$ : Average air concentration over an 8-hour work period that is not to be exceeded
- ACGIH STEL: Concentration in air that is not be exceeded for more than 15 minutes 4 times per day
- NA: not available

Based on current site information and these calculations, the amount of dust-in-air that would have to be generated to reach the current OELs is 15.417 mg/m<sup>3</sup>, which is greater than the amount of dust visible to the naked eye (2.5 mg/m<sup>3</sup>). Therefore, a dust monitor will not be necessary to use at this site, however area wetting methods will be used to control dust, if visible dust generation is observed.

### 1.3.1 Metals

Heavy metals are chemical elements with a specific gravity that is at least 5 times the specific gravity of water. Heavy metals become toxic when they are not metabolized by the body and accumulate in the soft tissues. Metal toxicity usually occurs from a sudden or unexpected exposure to a high level of the heavy metal (e.g., from careless handling, inadequate safety precautions, or an accidental spill or release of toxic material). Symptoms of metal toxicity include damaged or reduced mental and central nervous function, lower energy levels, and damage to blood composition, lungs, kidneys, liver, and other vital organs. Long-term exposure may result in slowly progressing physical, muscular, and neurological degenerative processes that mimic Alzheimer's disease, Parkinson's disease, muscular dystrophy, and multiple sclerosis.

### 1.3.2 PCBs

The most commonly observed health effects in people exposed to large amounts of PCBs are skin conditions such as acne and rashes. Studies in exposed workers have shown changes in blood and urine that may indicate liver damage. PCB exposures in the general population are not likely to result in skin and liver effects. Most of the studies of health effects of PCBs in the general population examined children of mothers who were exposed to PCBs.

Polychlorinated biphenyls are mixtures of up to 209 individual chlorinated compounds (known as congeners). PCBs are either oily liquids or solids that are colorless to light yellow. Some PCBs can exist as a vapor in air. PCBs have no known smell or taste. Many commercial PCB mixtures are known in the U.S. by the trade name Aroclor. PCBs have been used as coolants and lubricants in transformers, capacitors, and other electrical equipment because they don't burn easily and are good insulators.

### 1.3.3 PAHs

PAHs are a group of chemicals that are formed during the incomplete burning of coal, oil, gas, wood, garbage, or other organic substances, such as tobacco and charbroiled meat. There are more than 100 different PAHs. PAHs generally occur as complex mixtures (for example, as part of combustion products such as soot), not as single compounds. PAHs usually occur naturally, but they can be manufactured as individual compounds for research purposes; however, not as the mixtures found in combustion products. As pure chemicals, PAHs generally exist as colorless, white, or pale yellow-green solids. They can have a faint, pleasant odor. A few PAHs are used in medicines and to make dyes, plastics, and pesticides. Others are contained in asphalt used in road construction. They can also be found in substances such as crude oil, coal, coal tar pitch, creosote, and roofing tar. They are found throughout the environment in the

air, water, and soil. They can occur in the air, either attached to dust particles or as solids in soil or sediment.

#### **1.3.4 Potential Routes of Exposure**

**Ingestion and Skin Contact:** Potential exposure concerns to these PCP 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 is also 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 HASP. 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.

**Inhalation:** 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 and the work being conducted is non-intrusive.

As a result of this, although possible, it is very unlikely that workers participating in these activities will encounter any airborne concentrations of the above PCP that would represent an occupational exposure concern. Examples of onsite practices that are to be observed that will protect workers from exposure via inhalation include wearing the proper PPE and practicing good hygiene.

## 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.

### 2.1 SUMMARY OF SITE SPECIFIC TASKS

The specific tasks anticipated to be involved with this effort are summarized into two classifications. The first are the RFI site activities and the second are the sampling site activities.

- Mobilization/Demobilization
- Surface and subsurface soil samples will be collected with a hand auger, backhoe, or direct push technology (DPT), depending on site conditions.
- Geographic Positioning System (GPS) Surveying
- Investigation-Derived Waste (IDW) Management

**FIGURE A-2-1  
ACTIVITY HAZARD ANALYSIS (AHA)**

Activity/Work Task: Site Mobilization/Demobilization and GPS Surveying		Overall Risk Assessment Code (RAC) (Use highest code)				<b>M</b>	
Project Location: SWMU 34		<b>Risk Assessment Code (RAC) Matrix</b>					
Contract Number: F27R		<b>Severity</b>	<b>Probability</b>				
Date Prepared: June 6, 2012			Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by: J.K. Laffey		Catastrophic	E	E	H	H	M
Reviewed by: Clyde Snyder		Critical	E	H	H	M	L
		Marginal	H	M	M	L	L
		Negligible	M	L	L	L	L
<b>Notes: (Field Notes, Review Comments, etc.)</b>		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.				<b>RAC Chart</b>	
		"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			
<b>JOB STEPS</b>	<b>HAZARDS</b>	<b>CONTROLS</b>				<b>RAC</b>	
<ul style="list-style-type: none"> <li>• Assembling equipment and supplies</li> <li>• Performing initial/exit inspections of the intended work areas</li> <li>• Arranging for utilities, site access, notifying appropriate client contacts</li> <li>• Performing equipment inspections of vehicles and equipment</li> </ul>	1. General	1. Most accidents are caused by failure to observe basic safety rules or precautions. 2. Accidents often can be avoided by recognizing potentially hazardous situations before an accident occurs. 3. Be alert to potential hazards. 4. Site personnel must have the necessary training, skills and tools to perform the site tasks/functions properly. 5. Report unusual or out of the ordinary situations to the FPL/SSO				L	
	2. Heavy Equipment	1. Conduct heavy initial site acceptance inspection prior to performing any work at this site. 2. Use the equipment inspection checklist for drill rigs in Attachment III. <ul style="list-style-type: none"> <li>• Once the equipment passes inspection the AHA for Soil Boring with DPT or Heavy Equipment will be followed.</li> </ul>				L	
	3. Minor cuts, abrasions or contusions	1. Wear cut-resistant gloves when handling items with sharp or rough edges.				M	
	4. Heavy lifting (muscle)	1. Practice safe lifting techniques. Use mechanical lifting devices such as				M	

**FIGURE A-2-1  
ACTIVITY HAZARD ANALYSIS**

JOB STEPS	HAZARDS	CONTROLS	RAC
arriving/preparing to depart the site  • Conducting site geographic surveys	strains and pulls)	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).	
	5. Vehicle traffic movement patterns	1. Designate and mark vehicle and equipment staging areas. 2. Be aware of the heavy equipment areas 3. Stay clear of moving vehicles 4. In high traffic areas, wear a high-visibility vest, shirt or jacket.	M
	6. 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
	7. 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 (approximately 2 feet) 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
	8. Inclement weather	1. The FOL and/or the SSO 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
	9. Implement Site Specific Hazard Communication Program	1. Complete the chemical inventory for the project. 2. Procure Material Safety Data Sheets (MSDSs) for chemicals used exclusively on this project. 3. Label containers used onsite for hazardous materials. 4. Identification of any additional hazard communication training requirements.	L

**FIGURE A-2-1  
ACTIVITY HAZARD ANALYSIS**

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.
<b>Personal Protective Equipment</b> <b>Minimum:</b> Safety toe boots, safety glasses. Optional items: Hardhat, hearing protection. <b>HTRW:</b> None anticipated for this task.	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

**FIGURE A-2-1 (Continued)  
ACTIVITY HAZARD ANALYSIS**

Activity/Work Task: Surface and subsurface soil sampling using DPT, backhoe and hand auger		Overall Risk Assessment Code (RAC) (Use highest code)				H	
Project Location: SWMU 34		<b>Risk Assessment Code (RAC) Matrix</b>					
Contract Number: F27R		<b>Severity</b>	<b>Probability</b>				
Date Prepared: June 6, 2012			Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by: J.K. Laffey		Catastrophic	E	E	H	H	M
Reviewed by: Clyde Snyder		Critical	E	H	H	M	L
		Marginal	H	M	M	L	L
		Negligible	M	L	L	L	L
<b>Notes: (Field Notes, Review Comments, etc.)</b>		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.				<b>RAC Chart</b>	
		"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	
Heavy equipment (DPT rig/backhoe) set up and operation  • Positioning Unit (engaging outriggers, etc.)  • Assembling equipment and supplies	1. General	1. Conduct heavy initial site acceptance inspection prior to performing any work at this site. 2. Use the equipment inspection checklist for heavy equipment in Attachment III. 3. Only proceed once the equipment passes inspection. 4. Ensure that workers are thoroughly trained and competent to perform their assigned task with the equipment used in investigation. 5. Ensure that back-up alarms are functional on equipment. 6. Ensure that moving parts are guarded if such parts are exposed. 7. Check/test emergency stop controls.				L	
	2. Utility Strike	1. Tetra Tech Standard Operating Procedure (SOP) Utility Locating and Excavation Clearance (Attachment IV) will be followed. 2. Know the maximum height and reach of the machine. <ul style="list-style-type: none"> <li>• Serious injury or death by electrocution can occur if machine or attachments are not kept a safe distance from electrical power lines.</li> <li>• Keep distance at least 10 ft plus additional 1/2 inch for each 1,000 volts over 50,000 volts.</li> </ul>				M	
	3. Tip Over	1. Heavy equipment must have a rollover protective structure (ROPS) meeting OSHA requirements designed to protect the operator if the machine tips over.				M	

**FIGURE A-2-1 (Continued)  
ACTIVITY HAZARD ANALYSIS**

JOB STEPS	HAZARDS	CONTROLS	RAC
		<ol style="list-style-type: none"> <li>A seat belt must be worn so that the operator will not be thrown out of the seat during a rollover or upset situation.</li> <li>When working on slopes, avoid moving across the face of the slope.</li> <li>Operate up and down the slope face if possible.</li> <li>Use extreme caution when operating near open excavations.</li> <li>Do not permit heavy equipment to attempt to traverse severely sloping terrain.</li> <li>Use a ground guide along with a functioning back-up alarm during equipment backing.</li> <li>Once rig is sited, deploy outriggers to properly block and level the rig and secure parking brake.</li> </ol>	
	4. Falling off heavy equipment	<ol style="list-style-type: none"> <li>Mount and dismount the machine only where steps and/or handholds are provided.</li> <li>Use both hands and face the machine, when mounting and dismounting.</li> <li>Maintain a three point hand and/or feet contact on mounting hardware.</li> <li>Never get on or off a moving machine.</li> <li>Never jump off of a machine.</li> <li>Do not try to climb on or off the machine when carrying tools or supplies.</li> </ol>	<b>M</b>
Refueling or jump starting heavy equipment	1. Fire	<ol style="list-style-type: none"> <li>All fuels, most lubricants and some coolant mixtures are flammable.</li> <li>Do not smoke while refueling or in a refueling area.</li> <li>Do not smoke in areas where batteries are charged, or where flammable materials are stored.</li> <li>Keep fuels and lubricants stored and secured in properly marked containers away from all unauthorized personnel.</li> <li>Store oily rags or other flammable material in protective containers, in a safe place.</li> <li>Do not expose the heavy equipment to flames, burning brush, etc.</li> </ol>	<b>L</b>
	2. Electric arc shock or battery explode	<ol style="list-style-type: none"> <li>When using jumper cables always connect positive (+) cable to positive (+) terminal of battery connected to starter solenoid and negative (—) cable from external source to starter negative (—) terminal.</li> <li>If not equipped with starter negative terminal, connect to engine block or ground bolt on frame.</li> </ol>	<b>L</b>
Operations	1. Struck By	<ol style="list-style-type: none"> <li>Perform pre-work area walk around inspection.</li> <li>The operator will preview terrain in work area, place pin flags around boundary of</li> </ol>	<b>M</b>

**FIGURE A-2-1 (Continued)**  
**ACTIVITY HAZARD ANALYSIS**

JOB STEPS	HAZARDS	CONTROLS	RAC
		<p>equipment travel area or roadway boundaries.</p> <ol style="list-style-type: none"> <li>3. Use a spotter to observe equipment movement and to alert operator to dangerous situations.</li> <li>4. Hard hats and high visibility vests for personnel in work area.</li> <li>5. Control work area (use flaggers, signage, barricades, and/or other means) and restrict non-essential personnel from the area.</li> <li>6. Inspect rig and ensure that the equipment, augers, rods and tools will be properly secured during transport.</li> <li>7. Establish safety zone around the swing radius of the hydraulic bucket.</li> <li>8. A standardized set of hand signals will be used by the operator and signal person.</li> <li>9. Operators will always know exactly where all ground based workers are located.</li> <li>10. Back-up warning alarms must be functional so that it can be heard by all nearby workers.</li> <li>11. Two-way radios are also valuable communication tools.</li> </ol>	
	2. Intermittent high noise levels	<ol style="list-style-type: none"> <li>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.</li> <li>2. SSO is responsible for determining and designating when hearing protection is required.</li> <li>3. Hearing protection is to consist of either ear muffs or plugs that have a noise reduction rating (NRR) of at least 25 dB.</li> </ol>	<b>M</b>
	3. Slips, Trips, Falls	<ol style="list-style-type: none"> <li>1. Clear trees, roots, weeds, limbs and other ground hazards from the drill location.</li> <li>2. Practice good housekeeping to keep the ground around the drill site clear of obstructions, equipment and other tripping hazards.</li> <li>3. Wear appropriate foot protection to prevent slips and trips.</li> <li>4. Use caution when working on uneven and wet ground surfaces.</li> </ol>	<b>M</b>
	4. Minor cuts, or abrasions	<ol style="list-style-type: none"> <li>1. When handling equipment and tools wear cut-resistant gloves when handling items with sharp or rough edges.</li> </ol>	<b>M</b>
	5. Heavy lifting (muscle strains and pulls)	<ol style="list-style-type: none"> <li>1. Practice safe lifting techniques</li> <li>2. Use mechanical lifting devices such as a dolly or a two wheel cart, when possible.</li> <li>3. Ensure clear path of travel</li> <li>4. Have a good grasp on the object</li> <li>5. Perform a "test lift" to gauge ability to safely make the lift</li> </ol>	<b>L</b>

**FIGURE A-2-1 (Continued)  
ACTIVITY HAZARD ANALYSIS**

JOB STEPS	HAZARDS	CONTROLS	RAC
		6. Lift with your legs not your back 7. Obtain help to lift large, bulky, or heavy items	
	6. Insect bites	1. Shake out boots before donning. 2. Use insect repellants <ul style="list-style-type: none"> <li>• Apply products with DEET to exposed skin</li> <li>• Apply products with Permethrin to clothing only</li> <li>• Follow manufacturer's recommendations for application</li> </ul> 3. Tape up pants leg to work boot joints with duct tape. 4. Wear light-colored clothing to better see and remove any insects. 5. Perform close body inspections at least daily upon leaving the site.	L
	7. Inclement weather	1. If electrical storms or inclement weather are in the area, as determined through local forecasting or weather alerts issued, the SSO 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 is noted within this 30 minutes, work may resume at the SSO's 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 NSA Crane existing systems.	M
Surface soil sampling using a trowel or hand auger	1. Muscle strains, tendon or ligament sprains, back or other soft-tissue injuries	1. Operating a hand auger can be physically demanding depending on the conditions of the soil, the auger tools, and the physical capabilities of the operator. 2. Only personnel who are confident that they can physically perform this activity without injury should operate a hand auger.	M
	2. Bruises, abrasions, cuts, foot or eye injuries	1. Ensure that the hand auger tool is properly maintained. 2. Avoid injury by stopping if strong resistance is encountered (such as if impassable rocky conditions are encountered). 3. Secure assistance when needed. 4. Wear appropriate PPE (work gloves, safety toe shoes, and safety impact eye protection)	L
	3. Contact with	1. Inspect for buried and overhead utilities in the vicinity of the augering location.	M

**FIGURE A-2-1 (Continued)  
ACTIVITY HAZARD ANALYSIS**

JOB STEPS	HAZARDS	CONTROLS	RAC
	utilities	2. Verify the location of utility lines in accordance with Tetra Tech SOP Utility Locating and Excavation Clearance in Attachment IV.	
EQUIPMENT TO BE USED		INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<p>HSA Drill Rig, bore rods, auger flights, sharp knives, hand tools (dollies, hand carts, etc.), ventilation fan</p> <p><b>Safety Equipment:</b></p> <ul style="list-style-type: none"> <li>• A 20-pound dry chemical ABC fire extinguisher readily available.</li> <li>• Spill-control kit available at drilling location.</li> <li>• First-aid kit, eyewash, and an emergency air horn nearby.</li> <li>• Portable eye wash bottle.</li> </ul> <p><b>Monitoring Instruments:</b> none</p>		<p>Visual inspection prior to use by user.</p>	<ol style="list-style-type: none"> <li>1. Review of AHA during pre-task tailgate safety briefing with the intended task participants.</li> <li>2. Personnel must be trained in use of drilling equipment.</li> <li>3. The drill operator must have current certifications to operate the equipment.</li> <li>4. Review operating manuals of monitoring instruments.</li> </ol>
<p><b>Personal Protective Equipment:</b> <b>Minimum:</b> Safety toe boots, safety glasses, work gloves. <b>Optional items:</b> Hardhat, hearing protection. Nitrile surgeon's style gloves and Tyvek if there is a change to soil clothing. <b>HTRW:</b> metals and, possibly, MC</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

FIGURE A-2-1 (Continued)  
ACTIVITY HAZARD ANALYSIS

<b>Activity/Work Task:</b> Decontamination		Overall Risk Assessment Code (RAC) (Use highest code)				L	
<b>Project Location:</b> SWMU 34		<b>Risk Assessment Code (RAC) Matrix</b>					
<b>Contract Number:</b> F27R		<b>Severity</b>	<b>Probability</b>				
<b>Date Prepared:</b> June 6, 2012			Frequent	Likely	Occasional	Seldom	Unlikely
<b>Prepared by:</b> J.K. Laffey		Catastrophic	E	E	H	H	M
<b>Reviewed by:</b> Clyde Snyder		Critical	E	H	H	M	L
		Marginal	H	M	M	L	L
		Negligible	M	L	L	L	L
<b>Notes: (Field Notes, Review Comments, etc.)</b>		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.				<b>RAC Chart</b>	
		"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	
Personal Decontamination  <ul style="list-style-type: none"> <li>• Equipment drop</li> <li>• Segregated removal of PPE (wash and rinse reusable items, dispose of non-reusable items)</li> </ul>	1. Slips, Trips, Falls	1. Clear intended decon area location of ground hazards. 2. Practice good housekeeping to keep the site clear of obstructions, materials, equipment and other tripping hazards. 3. Wear appropriate foot protection to prevent slips and trips. 4. Use caution when working on uneven and wet surfaces				L	
	2. Exposure to contaminated media	1. Follow good decontamination practices (work from top down and outside in). 2. Nitrile gloves are to be the last item of PPE removed. 3. Wash hands and face following personal decontamination and prior to performing any hand-to-mouth activity.				L	
Decontamination of boating equipment and large tools (e.g., vehicles, etc.) using pressure washer	1. Noise	1. Pressure washer operator must wear hearing protection (muffs or plugs with NRR of at least 25 dB)				L	
	2. Flying projectiles	1. Restrict other personnel from decon pad during pressure washing operations. 2. Pressure washer operator must exercise care when directing the wand so that it is not pointing at himself/herself or at any other worker. 3. Pressure washer operator must wear full face shield over safety glasses with side shields and brow protection.				L	

**FIGURE A-2-1 (Continued)**  
**ACTIVITY HAZARD ANALYSIS**

JOB STEPS	HAZARDS	CONTROLS	RAC
		4. At SSO discretion, additional PPE consisting of hardhat, rainsuit, apron, and or boot covers may be required during decon operations - depending on observations indicating that significant contact with decon overspray and/or windy conditions during washing activities.	
	3.. Falling objects	1. Place items to be decontaminated on ground or on washing/drying racks in a manner that they are secure and will not fall. 2. Wear safety toe safety footwear.	L
	4. Strains/sprains from heavy lifting	1. Practice safe lifting techniques 2. Use mechanical lifting devices such as a dolly whenever possible 3. Ensure clear path of travel 4. Have a good grasp on object 5. Perform "test lift" to gauge ability to safely make the lift, 6. Lift with your legs not your back 7. Obtain help when needed to lift large, bulky, or heavy items	L
	5. Slips/trips/falls	1. Keep decon areas orderly, maintain good housekeeping, spread light coating of sand on decon pad liner to increase traction.	L
	6. Exposure to contaminated media	1. Follow good decontamination practices (work from top down and outside in). Surgeon's gloves are to be the last item of PPE removed. 2. Wash hands and face following personal decontamination and prior to performing any hand-to-mouth activity.	L
EQUIPMENT	INSPECTION	TRAINING	
Hand tools (hand brushes, garden sprayers, etc.)	Visual inspection prior to use by user. Check wooden handles for cracks or splinters.	None required.	
Pressure washer	Inspect pressure washer prior to putting into service to ensure that it is in good working order, and ensure that fittings are secure.	Review manufacturer's instructions and safety guidelines prior to use.	
<b>Personal Protective Equipment:</b> <b>Minimum:</b> Safety toe boots, safety	Initial PPE inspection performed by SSO. Ongoing (prior to each use)	Initial site specific H&S training to cover review of the APP and SSHP. Daily tail-gate and pre-task briefings to review	

**FIGURE A-2-1 (Continued)  
ACTIVITY HAZARD ANALYSIS**

EQUIPMENT	INSPECTION	TRAINING
<p>glasses  <u>Optional items:</u> Hardhat, hearing protection. Decontamination pad            pressure washer operators are to wear full face shield over safety glasses with side shields and brow protection, hearing protection, and nitrile gloves. If contact with overspray cannot be avoided, rain suit or moisture-repellant disposable coveralls may be specified by the SSO.  <u>HTRW:</u> metals and, possibly, MC</p>	<p>inspections responsibilities of PPE users.</p>	<p>appropriate AHAs and other relevant topics. OSHA 40 hour HAZWOPER training, plus appropriate 8-hour annual refresher training for the task participants. Supervisors must have completed additional 8 hours of HAZWOPER training. Also Review of AHA during tailgate safety briefing with the intended task participants.</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 site activities, and will be confirmed by visual observations of worker activities.</p>

I have read and understand this AHA:

Name (Printed)	Signature	Date

FIGURE A-2-1 (Continued)  
ACTIVITY HAZARD ANALYSIS

Activity/Work Task: Investigative Derived Waste (IDW) Management		Overall Risk Assessment Code (RAC) (Use highest code)				L	
Project Location: SWMU 34		<b>Risk Assessment Code (RAC) Matrix</b>					
Contract Number: F27R		<b>Severity</b>	<b>Probability</b>				
Date Prepared: June6, 2012			Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by: J.K. Laffey		Catastrophic	E	E	H	H	M
		Critical	E	H	H	M	L
Reviewed by: Clyde Snyder		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.				<b>RAC Chart</b>	
		"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	
<b>JOB STEPS</b>	<b>HAZARDS</b>	<b>CONTROLS</b>				<b>RAC</b>	
Filling, moving 55-gallon drums of IDW	1. Heavy lifting	<ol style="list-style-type: none"> <li>Practice safe lifting techniques</li> <li>Use mechanical lifting devices such as a dolly whenever possible</li> <li>Ensure clear path of travel</li> <li>Have a good grasp on object</li> <li>Perform "test lift" to gauge ability to safely make the lift</li> <li>Lift with your legs not your back</li> <li>Obtain help when needed to lift large, bulky, or heavy items.</li> </ol>				L	
	2. Struck by/pinches compressions	<ol style="list-style-type: none"> <li>Exercise caution when handling drums.</li> <li>Position drums so that there is adequate room between them for placement and repositioning.</li> </ol>				L	
	3. Falling objects (drums)	<ol style="list-style-type: none"> <li>Do not stack drums on top of each other.</li> <li>Do not place more than 4 drums to a pallet.</li> <li>Leave at least 4 feet of clearance between pallets for clear access.</li> </ol>				L	
	4. Slips, Trips, Falls	<ol style="list-style-type: none"> <li>Maintain good housekeeping in IDW storage areas</li> <li>Keep the area clear of loose debris and other potential tripping hazards.</li> <li>Wear appropriate foot protection to prevent slips and trips.</li> <li>Use caution when working on uneven and wet ground surfaces.</li> </ol>				L	

**FIGURE A-2-1 (Continued)  
ACTIVITY HAZARD ANALYSIS**

JOB STEPS	HAZARDS	CONTROLS	RAC
	5. Foot hazards	1. Safety toe foot protection will be required for IDW container handling activities.	L
	6. Minor contusions, abrasions, cuts	1. Wear cut-resistant gloves when handling items with sharp or rough edges.	L
EQUIPMENT		INSPECTION	TRAINING
Hand tools (drum dollies, wrenches, etc.)		Visual inspection prior to use by user. Check wooden handles for cracks or splinters.	All personnel participating in this activity must be current with HAZWOPER training requirements.
<p><b>Personal Protective Equipment:</b>  <b>Minimum:</b> Safety toe boots, safety glasses <b>Optional items:</b> Hardhat, cotton or leather work gloves.</p> <p><b>HTRW:</b> If contact with IDW is likely, wear chemical-resistant coveralls (e.g., surgeon's nitrile gloves under leather/cotton work gloves.</p>		Initial PPE inspection performed by SSO. Ongoing (prior to each use) inspections responsibilities of PPE users.	Initial site specific H&S training to cover review of the APP and SSHP. Daily tail-gate and pre-task briefings to review appropriate AHAs and other relevant topics. 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 site activities, and will be confirmed by visual observations of worker activities.

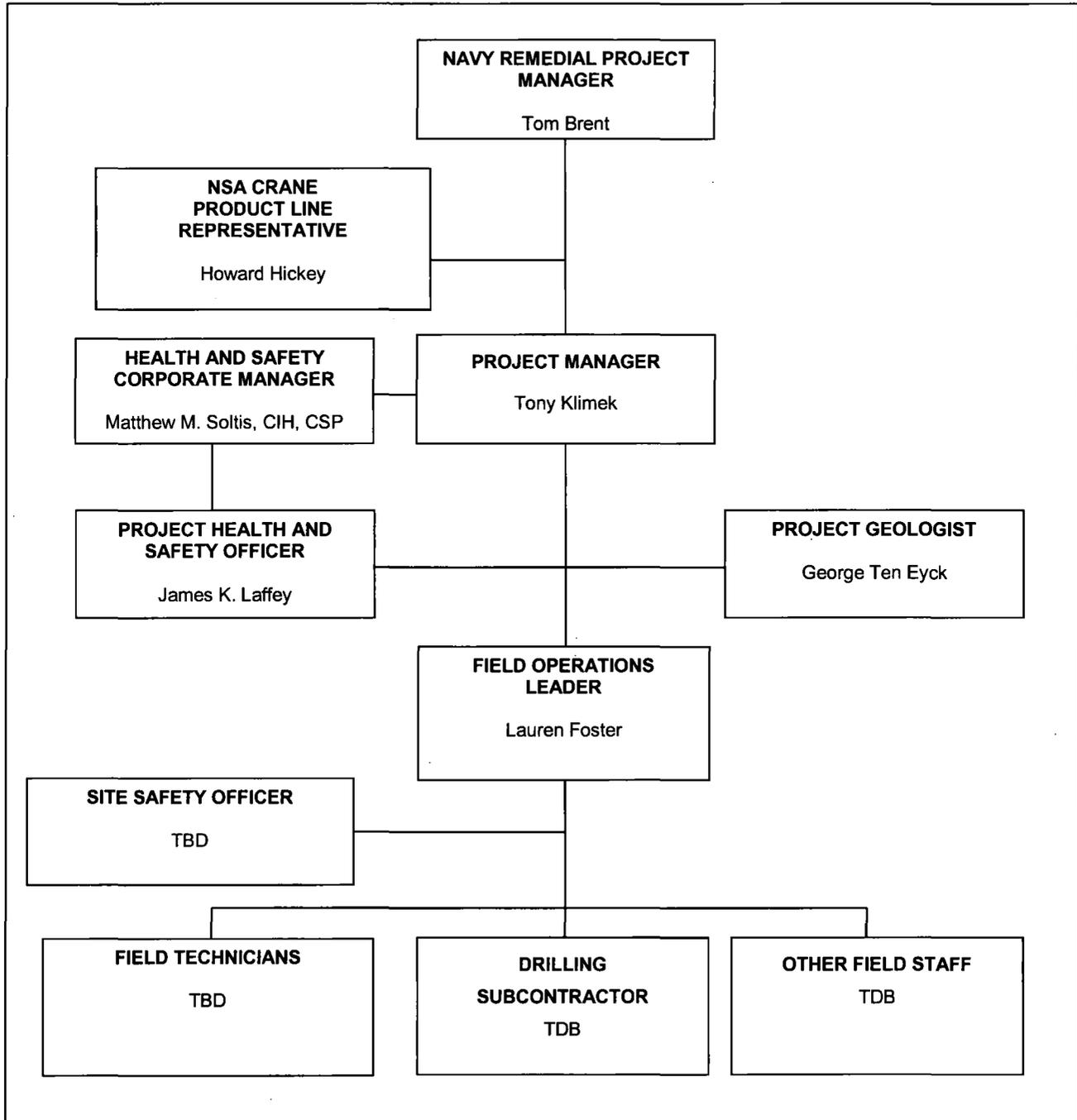
I have read and understand this AHA:

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 NSA CRANE**



### **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 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 Site Safety Officer (SSO)**

The SSO supports site activities by advising the FOL on the aspects of health and safety onsite. 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 onsite 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.

### **3.1.5 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

### **3.1.6 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:** NSA Crane **Address:** Crane, Indiana  
**Navy RPM:** Tom Brent **Phone Number:** (812)-854-6160  
**Navy PLR:** Howard Hickey **Phone Number:** (847) 688-2600 X 243

<b>Tetra Tech Personnel:</b>	<b>Discipline/Tasks Assigned:</b>	<b>Phone:</b>
<u>Tony Klimek</u>	<u>PM</u>	<u>(513) 333-4815</u>
<u>Lauren Foster</u>	<u>FOL/SSO</u>	<u>(513) 333-4813</u>
<u>George Ten Eyck</u>	<u>Technical Lead</u>	<u>(513) 333-4822</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>

<b>Non-Tetra Tech Personnel:</b>	<b>Affiliation/Task Assigned:</b>	<b>Phone:</b>
<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 has many years of field supervision in excavation, soil sampling, and safety and meets 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, and heavy equipment supervision safety.

The SSO 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. No excavation, heavy equipment operation, or soil sampling activities will be conducted unless 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.

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## **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 NSA Crane. 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 onsite must be trained in Basic First Aid, CPR, and bloodborne 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 NSA Crane 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 onsite; 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. If site conditions or the results of air monitoring performed during site activities warrant a higher level of protection, the field personnel will withdraw from the site, immediately notify the Tetra Tech PHSO, and obtain further instructions.

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 minimum is as follows:

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

- Water resistant shoe/boots with slip-resistant soles; and
- Tyvek® coverall type suits if a chance of soiling clothing

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

## 7.0 EXPOSURE MONITORING/AIR SAMPLING PROGRAM

None of the chemical contaminants are expected to be present in significant concentrations to present an inhalation hazard during planned site activities. Contaminants of concern are non-volatile and were previously detected at low concentrations that are unlikely to pose a significant exposure threat to site personnel via inhalation, negating the need to monitor contaminant-specific airborne concentration. Additionally, several site activities will involve collecting samples that will be wet and/or saturated with water, which will further minimize the exposure potential.

## 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) or 10 degrees Celsius (°C) 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 onsite.

#### 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		
	Light	Moderate	Heavy
Continuous	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 when:**

- 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 NSA Crane Emergency Dispatch Center 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)	<b>LITTLE DANGER</b> In < hr with dry skin. Maximum danger of false sense of security			<b>INCREASING DANGER</b> Danger from freezing of exposed flesh within one minute.				<b>GREAT DANGER</b> 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/m<sup>2</sup>; (2) all non-emergency work should have ceased at or before a wind chill of 2250 W/m<sup>2</sup>. 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  $-7^{\circ}\text{C}$  ( $19.4^{\circ}\text{F}$ ), 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 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 onsite 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.
- 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.
- 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 exclusion zones.

- Minimize the number of personnel and equipment in contaminated areas (such as the exclusion zone). 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 NSA Crane 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 exclusion zone, 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 exclusion zone 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 exclusion zone will be considered those areas of active operations plus an established safety zone depending on the task. The following represent the exclusion zone 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

Exclusion zones 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 exclusion zone and any area of the site where contamination is not suspected. This area will also serve as a focal point in supporting

exclusion zone 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 base by coordinating with the Tetra Tech FOL or designee and following established base access procedures. Site visitors will be escorted and restricted from approaching any work areas where they could potentially be exposed to hazardous chemicals. If a visitor has authorization from the client and from the Tetra Tech PM to approach our work areas, the FOL must ensure 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 that they have been physically cleared to work on hazardous waste sites.

## **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 base boundaries restricting the general public. The second line of security will take place at the work site referring interested parties to the Base Contact. The Base

Contact will serve as a focal point for base personnel, interested parties, and serve as the final line of security and the primary enforcement contact.

#### **10.4 HAZARD COMMUNICATION PROGRAM**

Site operations will be compliant with the provisions of the OSHA Hazard Communication 29 CFR 1910.1200(f) Standard.

##### **10.4.1 MSDS**

Tetra Tech and subcontractor personnel will provide MSDSs for chemicals brought onsite. 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 onsite. The MSDSs will then be maintained in a central location (i.e., temporary office) and will be available for anyone to review upon request.

##### **10.4.2 Chemical Inventory**

The SSO is responsible to develop and maintain an accurate chemical inventory list for the chemicals that will be used and stored at that workplace,

##### **10.4.3 Container Labeling**

When a chemical is brought onsite, the SSO is responsible for its receipt will verify that the container is properly labeled with the following information:

- Name of the chemical substance
- Appropriate hazard warning
- Name and address of the chemical manufacturer

##### **10.4.4 Training**

Any new chemicals brought onsite that may present new hazards may require additional training. The SSO will ensure that the appropriate training is conducted for the site personnel required to use the chemical.

## **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 MAN OVERBOARD/ABANDON SHIP**

It is not anticipated, under the proposed scope of work, that offshore activities will require site personnel to work from boats in bodies of water.

## **10.8 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 exclusion zone. 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: (1) the extent and type of hazard expected, (2) meteorological conditions, (4) topography, (5) levels of protection selected, and (6) 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 non-contaminated 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 onsite, or removed to an approved off-site disposal facility. Decontamination and rinse solutions may be discarded onsite 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 decontamination solutions (such as Alconox<sup>®</sup>, 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 decontamination will take place at a centralized decontamination pad utilizing steam or pressure washers. Heavy equipment, such as drill rigs, will have the wheels and tires cleaned along with any loose debris removed, prior to transporting to the central decontamination area. The site vehicles will be restricted access to exclusion zones, or also have their wheels/tires sprayed off as not to track mud onto the roadways servicing this installation. Roadways shall be cleared of any debris resulting from the onsite activity.

The equipment used in the exclusion zone 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 onsite and that which is to leave the site. Equipment will only be authorized access or exit with 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 Beaufort Memorial 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.

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. At least two Tetra Tech site personnel will be trained to this level while working onsite.

## 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, assemble at an area unaffected by the emergency, and notify the client and site contacts. 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 NSA Crane 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 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.
- Establishing and maintaining information at the project staging area (support zone) for easy access in the event of an emergency.

**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

- 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 NSA Crane Emergency Dispatch Center will be notified. It has been determined that the majority of potential emergency situations would be better supported by NSA Crane 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 NSA Crane 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. 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. A safe place of refuge is identified in Figure A-14-2. If required because of other circumstances prevent the use of the identified location, alternate safe places of refuge will be identified prior to the commencement of site activities by the SSO and will be conveyed to personnel as part of the pre-activities training session. This information will be reiterated during daily safety meetings. 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

FIGURE A-14-2  
SAFE PLACE OF REFUGE



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.

#### **14.3.3 Emergency Alarm Systems**

Tetra Tech personnel will be working in close proximity to each other at NSA Crane. 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:

<b>HELP</b>	three short blasts	(. . .)
<b>EVACUATION</b>	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 (FOL will serve as the Incident Coordinator) 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  
NSA CRANE**

CONTACT	TELEPHONE
Base Emergency Numbers* (Fire Department, Base Security, Ambulance) <ul style="list-style-type: none"> <li>• If dialing from an on-base phone:</li> <li>• If dialing from cell or off-base phone:</li> </ul>	9-1-1 (812) 854-1333
Base Environmental Office	(812) 854-3114
Bedford Ambulance	(812) 279-6545
Bloomington Hospital (Bloomington, Indiana)	(812) 336-9515
Bedford Medical Center (Bedford, Indiana)	(812) 275-1200
Indiana Utility One Call	811
Poison Control Center	(800) 222-1222
National Response Center	(800) 424-8802
Navy RPM, Howard Hickey	(847) 688-2600 x 243
Base Contact, Thomas Brent	(812) 854-6160
Tetra Tech PM, Tony Klimek	(513) 333-4815-office (513) 464-2967-cell
Tetra Tech Project Geologist, George Ten Eyck	(513) 333-4822-office
Tetra Tech FOL, Lauren Foster	(513) 333-4813-office (937) 238-6743-cell
Tetra Tech SSO, TBD	TBD
Tetra Tech Office, Pittsburgh	(412) 921-7090
CLEAN Health and Safety Manager, Matthew M. Soltis, CIH, CSP	(412) 921-8912-office (412) 260-6681-cell
Tetra Tech Project Safety Officer, James K. Laffey	(412) 921-8678-office (412) 370-6668-cell

**\*NOTE:** On-base extensions 3300 and 1333 are the primary emergency phone numbers. From an NSA Crane phone, on Base extensions must be preceded by "854". Off-base numbers can only be reached by dialing "991" first. Furthermore, the emergencies involving site activities should subsequently be reported to the Environmental Protection Department (x -3114/1132/6160).

## 14.6 EMERGENCY ROUTE TO HOSPITAL

### Bloomington Hospital

601 W. 2nd St.  
P.O. Box 1149  
Bloomington, Indiana 47402

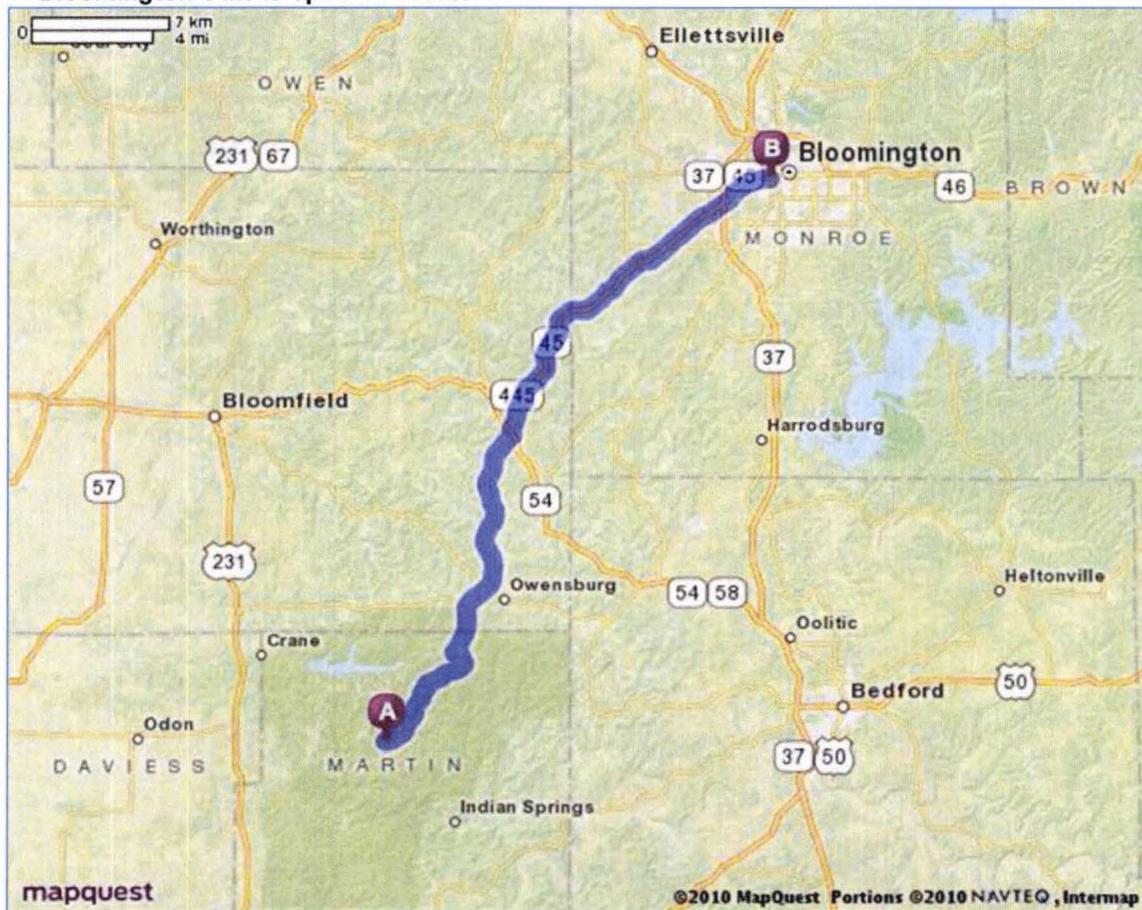
30.63 miles - about 54 minutes

- Exit NSA Crane on H-45 through the Bloomington Gate.
- Follow Highway 45 North to Bloomington at Highway 45 and Highway 37.
- Continue going straight over the overpass (Bloomfield Rd).
- Follow Bloomfield Road North; this road turns into 2nd St
- Follow 2nd Street, hospital will be on the right

FIGURE A-14-3

### BLOOMINGTON HOSPITAL ROUTE MAP VIA BLOOMINGTON GATE

Bloomington Gate is open 24 hours.



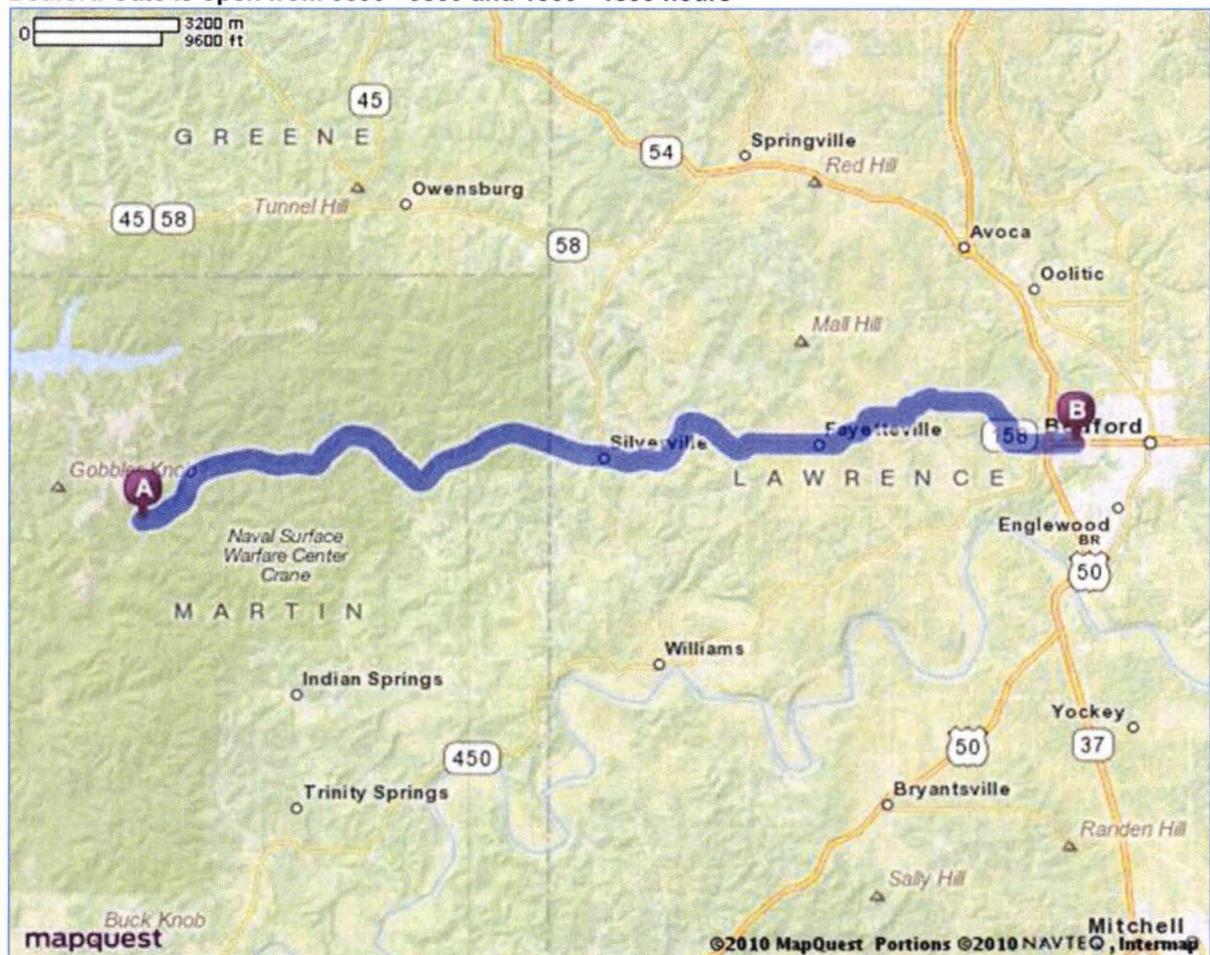
**Bedford Medical Center**  
2900 16th Street  
Bedford, Indiana 47421

19.2 miles - about 40 minutes

- Exit the base on H-58, through the Bedford Gate.
- Head East on State Highway 158.
- State Highway 158 becomes 16th Street upon entering the City of Bedford.
- The medical center is on the right shortly after Plaza Drive.

**FIGURE A-14-4**  
**BEDFORD MEDICAL CENTER**  
**ROUTE MAP VIA BEDFORD GATE**

**Bedford Gate is open from 0600 - 0830 and 1500 - 1800 hours**



#### 14.7 CRITERIA FOR ALERTING LOCAL COMMUNITY RESPONDERS

Tetra Tech personnel will be working in close proximity to each other at NSA Crane. As a result, hand signals, 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 on Base warranting evacuation occurs, the following procedures are to be initiated:

- Initiate the evacuation via hand signals, voice commands, or line of site communication
- Report to the designated refuge point where the FOL will account for site personnel
- Once non-essential personnel are evacuated, appropriate response procedures will be enacted to control the situation.
- Describe to the FOL (FOL will serve as the Incident Coordinator) pertinent incident details.

In the event that site personnel cannot mitigate the hazardous situation, the FOL and SSO will enact emergency notification procedures to secure additional assistance in the following manner:

Call the emergency contacts listed in A-14-1 and report the incident. Give the emergency operator the location of the emergency, the type of emergency, the number of injured, and 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.

- Call the appropriate emergency contacts (Table A-14-1) and report the emergency.
- Give the emergency operator the:
  - Location of the emergency
  - Type of emergency
  - Number of injured
  - Brief description of what occurred
- 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>

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.

**Project-Specific Sampling and Analysis Plan (SAP)** - dated April 2012.

**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 Trailer.

**Material Safety Data Sheets (MSDSs) (maintained)** - The MSDSs will be maintained in the Tetra Tech Work trailer. 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. 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 onsite 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 Trailer. 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 given to personnel to carry at times. 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**

**EQUIPMENT INSPECTION CHECKLISTS**

### Equipment Inspection Checklist for Drill Rigs and heavy equipment

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"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<b>Emergency Stop Devices</b> <ul style="list-style-type: none"> <li>Emergency Stop Devices (At points of operation)</li> <li>Have all emergency shut offs identified been communicated to the field crew?</li> <li>Has a person been designated as the Emergency Stop Device Operator?</li> </ul>	
<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<b>Highway Use</b> <ul style="list-style-type: none"> <li>Cab, mirrors, safety glass?</li> <li>Turn signals, lights, brake lights, etc. (front/rear) for equipment approved for highway use?</li> <li>Seat Belts?</li> <li>Is the equipment equipped with audible back-up alarms and back-up lights?</li> <li>Horn and gauges</li> <li>Brake condition (dynamic, park, etc.)</li> <li>Tires (Tread) or tracks</li> <li>Windshield wipers</li> <li>Exhaust system</li> <li>Steering (standard and emergency)</li> <li>Wheel Chocks?</li> <li>Are tools and material secured to prevent movement during transport? Especially those within the cab?</li> <li>Are there flammables or solvents or other prohibited substances stored within the cab?</li> <li>Are tools or debris in the cab that may adversely influence operation of the vehicle (in and around brakes, clutch, gas pedals)</li> </ul>	

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"/>	<b>Fluid Levels:</b> <ul style="list-style-type: none"> <li>• Engine oil</li> <li>• Transmission fluid</li> <li>• Brake fluid</li> <li>• Cooling system fluid</li> <li>• Hoses and belts</li> <li>• Hydraulic oil</li> </ul>	
<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"/>	<b>High Pressure Hydraulic Lines</b> <ul style="list-style-type: none"> <li>• Obvious damage</li> <li>• Operator protected from accidental release</li> <li>• Coupling devices, connectors, retention cables/pins are in good condition and in place</li> </ul>	
<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"/>	<b>Mast Condition</b> <ul style="list-style-type: none"> <li>• Structural components/tubing</li> <li>• Connection points</li> <li>• Pins</li> <li>• Welds</li> <li>• Outriggers</li> <li>• Operational</li> <li>• Plumb (when raised)</li> </ul>	
<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"/>	<b>Hooks</b> <ul style="list-style-type: none"> <li>• Are the hooks equipped with Safety Latches?</li> <li>• Does it appear that the hook is showing signs of wear in excess of 10% original dimension?</li> <li>• Is there a bend or twist exceeding 10% from the plane of an unbent hook?</li> <li>• Increase in throat opening exceeding 15% from new condition</li> <li>• Excessive nicks and/or gouges</li> <li>• Clips</li> <li>• 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)</li> </ul>	



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"/>	<p>PPE Required for Drill Rig Exclusion Zone</p> <ul style="list-style-type: none"> <li>• Hardhat</li> <li>• Safety glasses</li> <li>• Work gloves</li> <li>• Chemical resistant gloves _____</li> </ul> <hr/> <ul style="list-style-type: none"> <li>• Steel toed Work Boots</li> <li>• Chemical resistant Boot Covers</li> <li>• Apron</li> <li>• Coveralls Tyvek, Saranex, cotton)</li> </ul>	
<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"> <li>• Excessive Noise Levels? _____ dBA</li> <li>• Chemical hazards (Drilling supplies - Sand, bentonite, grout, fuel, etc.) <ul style="list-style-type: none"> <li>- MSDSs available?</li> </ul> </li> <li>• Will On-site fueling occur <ul style="list-style-type: none"> <li>- Safety cans available?</li> <li>- Fire extinguisher (Type/Rating - _____ )</li> </ul> </li> </ul>	

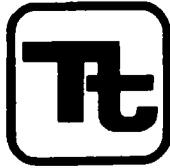
Approved for Use     Yes     No     See Comments

\_\_\_\_\_  
Site Health and Safety Officer

\_\_\_\_\_  
Operator

## **ATTACHMENT III**

# **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 scapes 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, TNUS 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**

<b>Alabama</b> Alabama One-Call 1-800-292-8525	<b>Iowa</b> Iowa One-Call 1-800-292-8989	<b>New Jersey</b> New Jersey One Call 1-800-272-1000
<b>Alaska</b> Locate Call Center of Alaska, Inc. 1-800-478-3121	<b>Kansas</b> Kansas One-Call System, Inc. 1-800-344-7233	<b>New Mexico</b> New Mexico One Call System, Inc. 1-800-321-2537 Las Cruces- Dona Ana Blue Stakes 1-888-526-0400
<b>Arizona</b> Arizona Blue Stake 1-800-782-5348	<b>Kentucky</b> Kentucky Underground Protection Inc. 1-800-752-6007	<b>New York</b> Dig Safely New York 1-800-962-7962 New York City- Long Island One Call Center 1-800-272-4480
<b>Arkansas</b> Arkansas One Call System, Inc. 1-800-482-8998	<b>Louisiana</b> Louisiana One Call System, Inc. 1-800-272-3020	<b>North Carolina</b> The North Carolina One-Call Center, Inc. 1-800-632-4949
<b>California</b> Underground Service Alert North 1-800-227-2600 Underground Service Alert of Southern California 1-800-227-2600	<b>Maine</b> Dig Safe System, Inc. 1-888-344-7233	<b>North Dakota</b> North Dakota One-Call 1-800-795-0555
<b>Colorado</b> Utility Notification Center of Colorado 1-800-922-1987	<b>Maryland</b> Miss Utility 1-800-257-7777 Miss Utility of Delmarva 1-800-282-8555	<b>Ohio</b> Ohio Utilities Protection Service 1-800-362-2764 Oil & Gas Producers Underground Protect'n Svc 1-800-925-0988
<b>Connecticut</b> Call Before You Dig 1-800-922-4455	<b>Massachusetts</b> Dig Safe System, Inc. 1-888-344-7233	<b>Oklahoma</b> Call Okie 1-800-522-6543
<b>Delaware</b> Miss Utility of Delmarva 1-800-282-8555	<b>Michigan</b> Miss Dig System, Inc. 1-800-482-7171	<b>Oregon</b> Oregon Utility Notification Center/One Call Concepts 1-800-332-2344
<b>Florida</b> Sunshine State One-Call of Florida, Inc. 1-800-432-4770	<b>Minnesota</b> Gopher State One Call 1-800-252-1166	<b>Pennsylvania</b> Pennsylvania One Call System, Inc. 1-800-242-1776
<b>Georgia</b> Underground Protection Center, Inc. 1-800-282-7411	<b>Mississippi</b> Mississippi One-Call System, Inc. 1-800-227-6477	<b>Rhode Island</b> Dig Safe System, Inc. 1-888-344-7233
<b>Hawaii</b> Underground Service Alert North 1-800-227-2600	<b>Missouri</b> Missouri One-Call System, Inc. 1-800-344-7483	<b>South Carolina</b> Palmetto Utility Protection Service Inc. 1-888-721-7877
<b>Idaho</b> Dig Line Inc. 1-800-342-1585 Kootenai County One-Call 1-800-428-4950 Shoshone - Benewah One-Call 1-800-398-3285	<b>Montana</b> Utilities Underground Protection Center 1-800-424-5555 Montana One Call Center 1-800-551-8344	<b>South Dakota</b> South Dakota One Call 1-800-781-7474
<b>Illinois</b> JULIE, Inc. 1-800-892-0123 Digger (Chicago Utility Alert Network) 312-744-7000	<b>Nebraska</b> Diggers Hotline of Nebraska 1-800-331-5666	<b>Tennessee</b> Tennessee One-Call System, Inc. 1-800-351-1111
<b>Indiana</b> Indiana Underground Plant Protection Service 1-800-382-5544	<b>Nevada</b> Underground Service Alert North 1-800-227-2600	
	<b>New Hampshire</b> 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

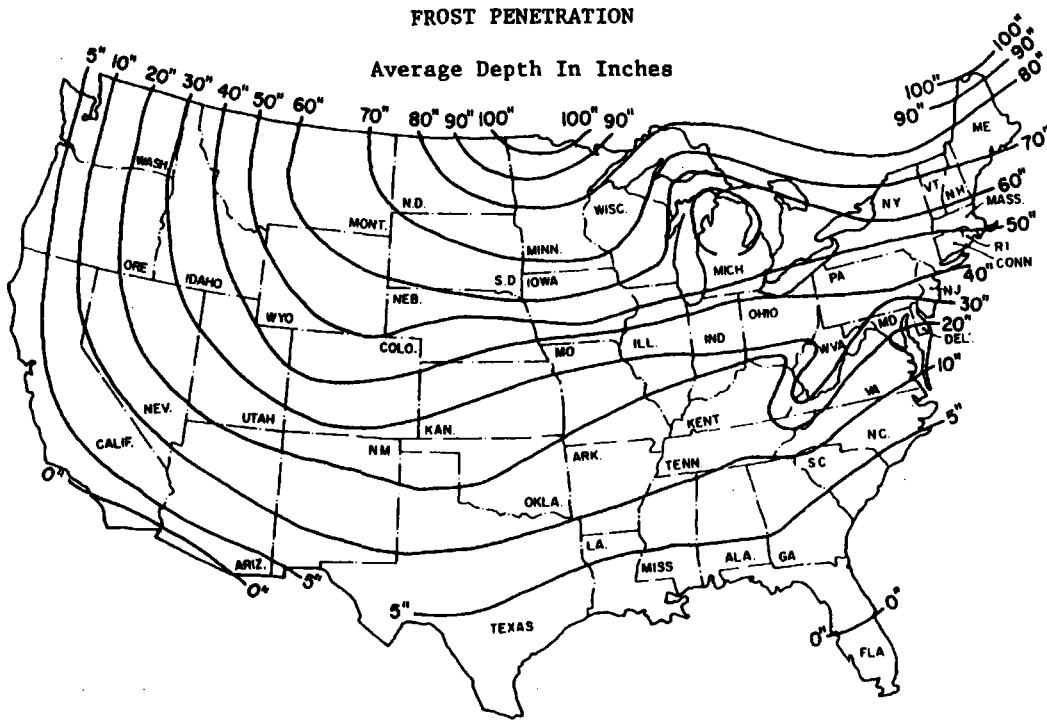
**British Columbia**  
BC One Call  
1-800-474-6886

**Ontario**  
Ontario One-Call System  
1-800-400-2255

**Quebec**  
Info-Excavation  
1-800-663-9228

**ATTACHMENT 2**

**FROST LINE PENETRATION DEPTHS BY GEOGRAPHIC LOCATION**



Courtesy U.S. Department Of Commerce

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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 yes no N/A  
detection device)?  
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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**ATTACHMENT 4 (Continued)**

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 IV**

**OSHA POSTER**

# Job Safety and Health

## It's the law!

**OSHA**  
Occupational Safety  
and Health Administration  
U.S. Department of Labor

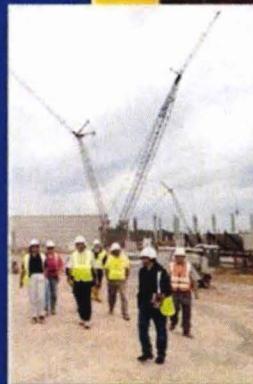
### EMPLOYEES:

- 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 –  
*The Best Resource for Safety and Health*



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.

**1-800-321-OSHA**  
[www.osha.gov](http://www.osha.gov)

OSHA 3165-12-06R