

**Health and Safety Plan**  
for  
**Field Investigation**  
at the  
**Ammunition Burning Grounds**  
**Jeep Trail Area and**  
**Little Sulphur Creek**  
**Naval Surface Warfare Center**  
**Crane Division**  
Crane, Indiana



**Southern Division**  
**Naval Facilities Engineering Command**  
Contract Number N62467-94-D-0888  
Contract Task Orders 0311

March 2004

**HEALTH AND SAFETY PLAN  
FOR  
FIELD INVESTIGATION  
AT THE  
AMMUNITION BURNING GROUNDS  
JEEP TRAIL AREA AND  
LITTLE SULPHUR CREEK**

**NAVAL SURFACE WARFARE CENTER (NSWC)  
CRANE, INDIANA**

**COMPREHENSIVE LONG-TERM  
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT**

**Submitted to:  
Southern Division  
Naval Facilities Engineering Command  
2155 Eagle Drive  
North Charleston, South Carolina 29406**

**Submitted by:  
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**MARCH 2004**

**PREPARED UNDER THE  
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## 1.0 INTRODUCTION

This Health and Safety Plan (HASP) is specifically written for site activities that are to be conducted at the Naval Surface Warfare Center Crane (NSWC Crane), located in Crane, Indiana. The objective of this investigation is to identify, evaluate, and recommend one or more cost-effective corrective measures for safely reducing contamination in soils, groundwater, and surface water at the three Areas of Concern (AOC) located within the Ammunition Burning Ground (ABG): the Main Treatment Area, the Old Jeep Trail (OJT) and Little Sulphur Creek. The Jeep Trail is inactive. The Main Treatment Area is an active hazardous waste treatment facility. Propellants, explosives, pyrotechnics, PCP phosphorous, hand grenades, fuses, and primers are burned in various devices. These devices include pans, cages, and containment pads. While some samples will be taken within the ABG Treatment Unit boundaries, these samples will be used to assess the impact of surface soil washout into Little Sulphur Creek. In addition to this HASP, a copy of the Tetra Tech NUS Health and Safety Guidance Manual must be present at the site during the performance of site activities. This guidance manual provides detailed information pertaining to the HASP as well as Tetra Tech NUS standard operating procedures (SOPs). Both documents must be present at the site to comply with the requirements stipulated in the Occupational Safety and Health Administration (OSHA) standard 29 CFR 1910.120.

This HASP has been developed using the latest available information regarding known or suspected chemical contaminants and potential physical hazards associated with the proposed work and site activities. This HASP will be modified if new information becomes available. All changes to the HASP will be requested through the Tetra Tech NUS Health and Safety Manager (HSM) and the Task Order Manager (TOM). It is the responsibility of the TOM to notify all affected personnel of all changes to this HASP. A Site Safety Follow-up Report will document all changes to this HASP.

The elements of this HASP are in compliance with the requirements established by OSHA 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response" (HAZWOPER) and sections of 29 CFR 1926 "Safety and Health Regulations For Construction." The information contained in this plan, as well as policies on conducting on-site operations, have been obtained from the Tetra Tech NUS Health and Safety Program and NSWC Crane policies and procedures.

### 1.1 KEY PROJECT PERSONNEL AND ORGANIZATION

This section defines responsibility for site safety and health for Tetra Tech NUS and subcontractor employees engaged in on-site activities. Personnel assigned to these positions will exercise the primary

responsibility for on-site health and safety. These persons will be the primary points of contact for any questions regarding the safety and health procedures and the selected control measures that are to be implemented for on-site activities.

- The Tetra Tech NUS Task Order Manager (TOM) is responsible for the overall direction of health and safety for this project.
- The Project Health and Safety Officer (PHSO) is responsible for developing the HASP in accordance with applicable OSHA regulations. Specific responsibilities include:
  - i. providing information regarding site contaminants and physical hazards associated with the site
  - ii. establishing air monitoring and decontamination procedures
  - iii. assigning personal protective equipment
  - iv. determining emergency response procedures and emergency contacts
  - v. stipulating training requirements and reviewing appropriate training and medical surveillance certificates
  - vi. providing standard work practices to minimize potential injuries and exposures associated with hazardous waste work.
- The Tetra Tech NUS Field Operations Leader (FOL) is responsible for implementation of the HASP with the assistance of an appointed Site Safety Officer (SSO). The FOL manages field activities, executes the work plan, and enforces safety procedures as applicable to the work plan.
- The Site Safety Officer (SSO) supports site activities by advising the FOL on all aspects of health and safety on-site. These duties may include:
  - i. coordinates all health and safety activities with the FOL
  - ii. selects, applies, inspects, and maintains personal protective equipment
  - iii. establishes work zones and control points
  - iv. implements air monitoring program for on-site activities
  - v. verifies training and medical of on-site personnel status in relation to site activities
  - vi. implements hazard communication and respiratory protection programs
  - vii. coordinates emergency services.
  - viii. provides site specific training for all on-site personnel
- Compliance with the requirements stipulated in this HASP is monitored by the SSO and coordinated through the CLEAN Health and Safety Manager.

1.2 SITE INFORMATION AND PERSONNEL ASSIGNMENTS

Site Name: NSWC Crane

Client Contact: Mr. Thomas Brent

Address: Crane, Indiana

Phone Number: (812) 854--6160

Alternate Contact: Ms. Chris Freeman

Phone Number: (812) 854--4423

**Project Team:**

**Tetra Tech NUS Personnel:**

Ralph Basinski

Matthew M. Soltis, CIH, CSP

Clyde J. Snyder

Terry Rojahn

Wes Rogers

Terry Rojahn

**Discipline/Tasks Assigned:**

Task Order Manager (TOM)

Manager of Health and Safety (HSM)

Project Health and Safety Officer (PHSO)

Field Operations Leader (FOL)

Field Technician and UXO Specialist

Site Safety Officer (SSO)

**Non-Tetra Tech NUS Personnel**

**Affiliation/Discipline/Tasks Assigned**

TBA

Drilling Subcontractor

TBA

Surveyor

Hazard Assessments (for purposes of OSHA 29 CFR 1910.132) and HASP preparation conducted by:  
Clyde J. Snyder

## 2.0 EMERGENCY ACTION PLAN

### 2.1 INTRODUCTION

This section has been developed as part of a planning effort to direct and guide field personnel in the event of an emergency. In the event of on-site emergencies, which cannot be handled by on-site personnel, site personnel will be evacuated to a safe place of refuge and the appropriate emergency response agencies will be notified. It has been determined that a majority of potential emergency situations would be better supported by outside emergency responders. Based on this determination, Tetra Tech NUS and subcontractor personnel will not provide emergency response support beyond the capabilities of on-site response. 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. 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. This emergency action plan conforms to the requirements of OSHA Standard 29 CFR 1910.38(a), as allowed in OSHA 29 CFR 1910.120(l)(1)(ii).

Tetra Tech NUS will through necessary services include incidental response measures for incidents such as:

- Incipient stage fire fighting support and prevention
- Incipient spill control and containment measures and prevention
- Removal of personnel from emergency situations
- Provide initial medical support for injuries or illnesses requiring only first-aid level support
- Provide site control and security measures as necessary

### 2.2 EMERGENCY PLANNING

Through the initial hazard/risk assessment effort, injuries or illnesses resulting from exposure to chemical or physical hazards or fire are the most probable emergencies that could be encountered during site activities.

To minimize and eliminate these potential emergency situations, emergency planning activities associated with this project include the following. The SSO and/or the FOL are responsible for:

- Coordinating with NSWCrane Emergency Services personnel to ensure that Tetra Tech NUS emergency action activities are compatible with existing facility emergency response procedures.
- Establishing and maintaining information at the project staging area (support zone) for easy access in the event of an emergency. This information will include the following:
  - Chemical Inventory (used on-site), with Material Safety Data Sheets.
  - On-site personnel medical records (medical data sheets).
  - A logbook identifying personnel on site each day.

It will be the responsibility of the Tetra Tech NUS FOL to ensure this information is available and present at the site.

- Identifying a chain of command for emergency action.
- Educating site workers to the hazards and control measures associated with planned activities at the site, and to provide early recognition and prevention where possible.
- Drill and practice incidental response measures periodically.

It is understood that the use of two-way communication devices (cellular phones and radios) must be approved by the NSWCrane Safety Office and such equipment will only be used with official permission. However, Tetra Tech NUS is authorized to utilize two-way radio assigned to the Environmental Department. This radio is to be used only in the event of an emergency. It should only be activated if needed as the battery will only be charged periodically throughout the shift.

## **2.3 EMERGENCY RECOGNITION AND PREVENTION**

### **2.3.1 Recognition**

Foreseeable emergency situations that may be encountered during site activities will generally be recognizable by visual observation. Visual observation is primarily relevant for physical hazards that may be associated with the proposed scope of work. Visual observation will also play a role in detecting some chemical overexposures. To adequately recognize exposures to site contaminants, site personnel must have a clear knowledge of signs and symptoms of exposure associated with the site contaminants. This information is provided in Table 6-1 of this HASP. Potential site hazards, the activities unto which they have been associated with, and the recommended control methods are discussed in detail in Section 5.0 and 6.0 of this HASP. Additionally, early recognition of emergency situations will be supported by periodic

site surveys to eliminate any situation predisposed to an emergency. The FOL, and the SSO will make up the site evaluation committee responsible for these periodic surveys. Site surveys will be conducted at least once a week during the initiation of this effort.

The above actions will provide early recognition for potential emergency situations. Should an incident occur, Tetra Tech NUS will take defensive and offensive measures to control these situations. However, if the FOL and the SSO determine that an incident has progressed to a serious emergency situation, Tetra Tech NUS will withdraw, and notify the appropriate response agencies.

### **2.3.2      Prevention**

Tetra Tech NUS and subcontractor personnel will minimize the potential for emergencies by ensuring compliance with the HASP, the Health and Safety Guidance Manual and applicable OSHA regulations.

## **2.4      SAFE DISTANCES AND PLACES OF REFUGE**

In the event that the site must be evacuated, all personnel will immediately stop activities and report to the telephone communications point at the support zone. Telephone communication points and safe places of refuge will be identified prior to the commencement of site activities and will be conveyed to personnel as part of the daily safety meeting conducted each morning. During an evacuation, personnel reporting to the refuge location will remain there until directed otherwise by the Tetra Tech NUS FOL. The FOL or the SSO will take a head count at this location to account for and to confirm the location of all site personnel. The site logbook will be used to take the head count. Emergency response personnel will be immediately notified of any unaccounted personnel.

## **2.5      EVACUATION ROUTES AND PROCEDURES**

An evacuation will be initiated whenever; severe weather is encountered; a fire or explosion occurs; readings on monitoring instrumentation indicate levels of contamination greater than instituted action levels; or if personnel show signs or symptoms of overexposure to potential site contaminants. In the event of an evacuation, personnel will proceed immediately to the designated place of refuge in the support zone, unless doing so would further jeopardize the welfare of workers. In such an event, personnel will proceed to a designated alternate location and remain until further notification from the Tetra Tech NUS FOL.

Evacuation procedures will be discussed prior to the initiation of any work at the site. 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.

## **2.6 DECONTAMINATION PROCEDURES / EMERGENCY MEDICAL TREATMENT**

During an evacuation, decontamination procedures will be performed only if doing so does not further jeopardize the welfare of site workers. Decontamination will not be performed if the action that initiates an evacuation would further endanger the lives of workers if workers were to perform decontamination procedures. However, it is unlikely that an evacuation would occur at this site which would require workers to evacuate the site without first performing decontamination procedures.

## **2.7 EMERGENCY ALERTING AND ACTION/RESPONSE PROCEDURES**

Since Tetra Tech NUS personnel will be working in close proximity to each other, hand signals, voice commands, and air horns, will be sufficient to alert site personnel of an emergency. If site personnel will be working in remote locations or if site activities are conducted in separate sites simultaneously, two-way radios will be used to communicate between teams of workers.

If an emergency occurs on Base, the following procedures are to be initiated:

- Tetra Tech NUS personnel will sign-out a base environmental radio for weekends at a minimum if available radios should be utilized during the entire work shift due to the remote location of most work sites. This will give field personnel a direct access to base emergency personnel 24 hours a day 7days a week. A procedure for radio use will be established by field personnel and NSWCC Crane officials.
- Initiate an evacuation by hand signals, voice commands, air horn, or two-way radios. Report to the designated refuge assembly point in the support zone.
- Describe to the FOL (who will serve as the Incident Coordinator) what has occurred and as many details as possible. Once all personnel are evacuated, incipient response procedures will be enacted to control the situation.

In the event that site personnel cannot control the incident through offensive and defensive measures, the FOL and SSO will enact the emergency notification procedures to secure additional outside assistance in the following manner:

- On base call 854-3300 or 864-1333\* or other emergency contacts (Table 2-1) and report the emergency. Give the emergency operator the location of the emergency, the type of emergency, the number of injured, and a 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.

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

- Conduct a head count of site personnel using the site logbook.

## 2.8 PPE AND EMERGENCY EQUIPMENT

A first aid kit, eye wash units, and fire extinguishers (strategically placed), will be maintained on-site and shall be immediately available for use in the event of an emergency. A stretcher and fire blanket are available at the ABG and will be available for use by field personnel.

## 2.9 EMERGENCY CONTACTS

Prior to performing work at any of the sites, all personnel will be thoroughly briefed on the emergency procedures to be followed in the event of an accident. A mobile phone may be available on site. Table 2-1 provides a list of emergency contacts and their associated telephone numbers. This table must be posted on site where it is readily available to all site personnel. Telephone numbers for the Base Safety Office, the Base Emergency Preparedness Coordinator, and the Base Environmental Office are listed in Table 2-1.

In addition, Tetra Tech NUS personnel who are injured or become ill on the job must notify appropriate company representatives. Figure 2-3 presents the procedure for reporting an injury/illness, and the form to use for this purpose. **If the emergency involves personnel exposures to chemicals, follow the steps in Figure 2-3.**

**TABLE 2-1  
EMERGENCY REFERENCE  
NSWC Crane, Crane, Indiana**

<b>AGENCY</b>	<b>TELEPHONE</b>
Base Emergency Number (Fire Department, Base Security, Ambulance)	854-3300 or 854-1333
Base Environmental Office	(812) 854-3114
Bedford Ambulance	(812) 279-6545
Bloomington Hospital (Bloomington, IN)	(812) 336-9515
Hospital, Bedford Medical Center (Bedford, IN)	(812) 275-1200
Poison Control Center	1-800-382-9097
National Response Center	1-800-424-8802
Base Contact, Thomas Brent	(812) 854-6160
Explosive Disposal Director, Walt Waggoner	(812) 854-1317
Contract Task Order Manager, Ralph Basinski	(412) 921-8308
TtNUS Crane Field Office Building 3245	(812)-854-0280
Field Operations Leader, Terry Rojahn	(412) 921-8857
Tetra Tech NUS Office, Pittsburgh	1-800-245-2730 (412) 921-7090
CLEAN Health and Safety Manager, Matthew M. Soltis, CIH, CSP	(412) 921-8912
Project Health and Safety Officer, Clyde J. Snyder	(412) 921-8904

**Note:** Most phones require the number to be preceded by 991 (i.e., 991-812-854-0280) or simply by "99" (if 812 is left off) (i.e., 99-854-0280)

**2.10 EMERGENCY ROUTE TO HOSPITAL**

Directions to the Bloomington Hospital:

Exit NSWC 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 Road). Follow Bloomfield Road North; this road turns into 2nd Street. Follow 2nd Street, hospital will be on the right (601 West 2nd Street)

Directions to Bedford Regional Medical Center:

Exit the base on H-58, through the Bedford Gate. Head West 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. (2900 16<sup>th</sup> Street)

Figure 2-1  
Hospital Route Map (Bedford Gate)

Note: The Bedford Gate is open only from 0600 - 0830 and 1500 - 1800 hours.

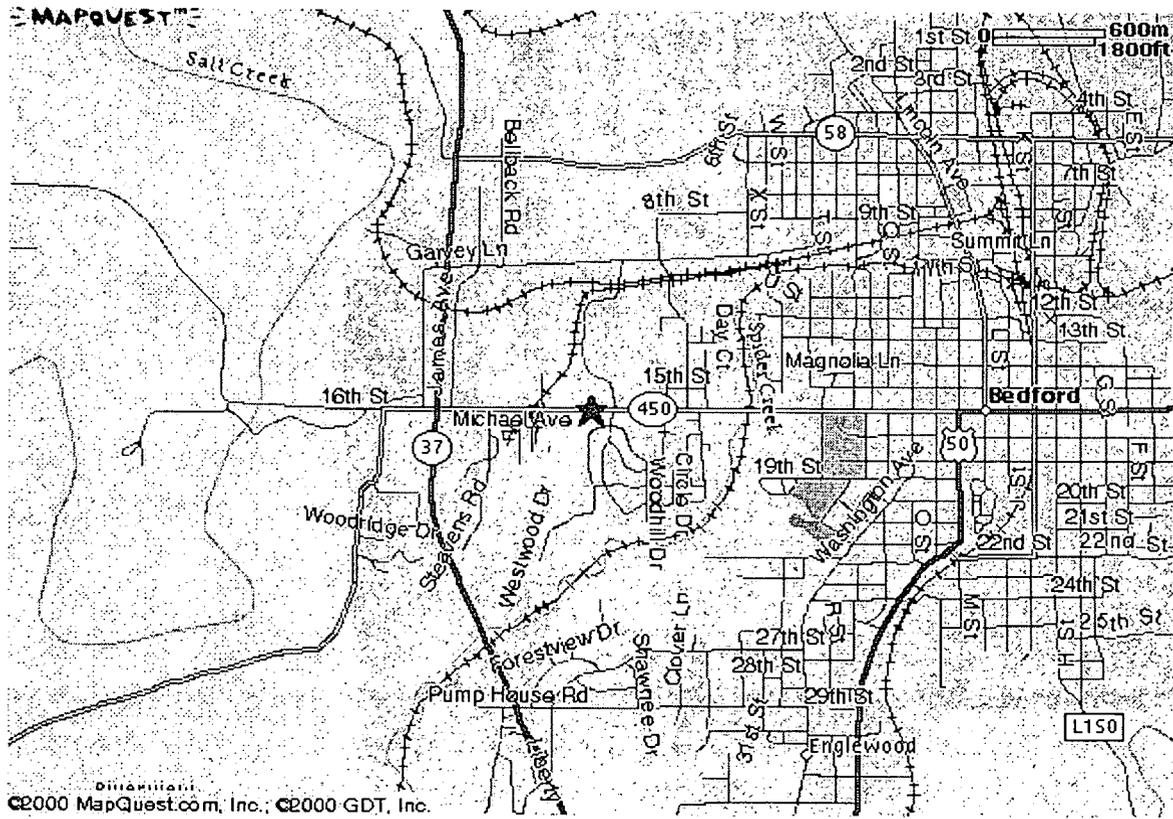
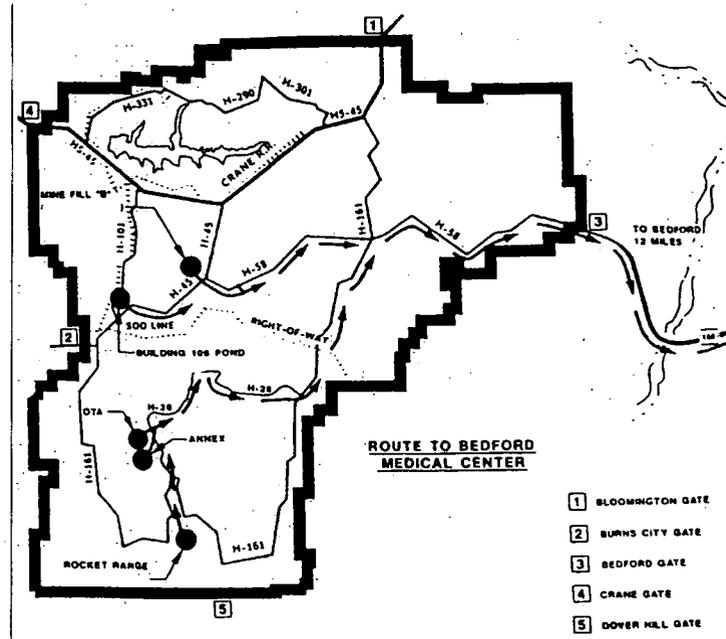
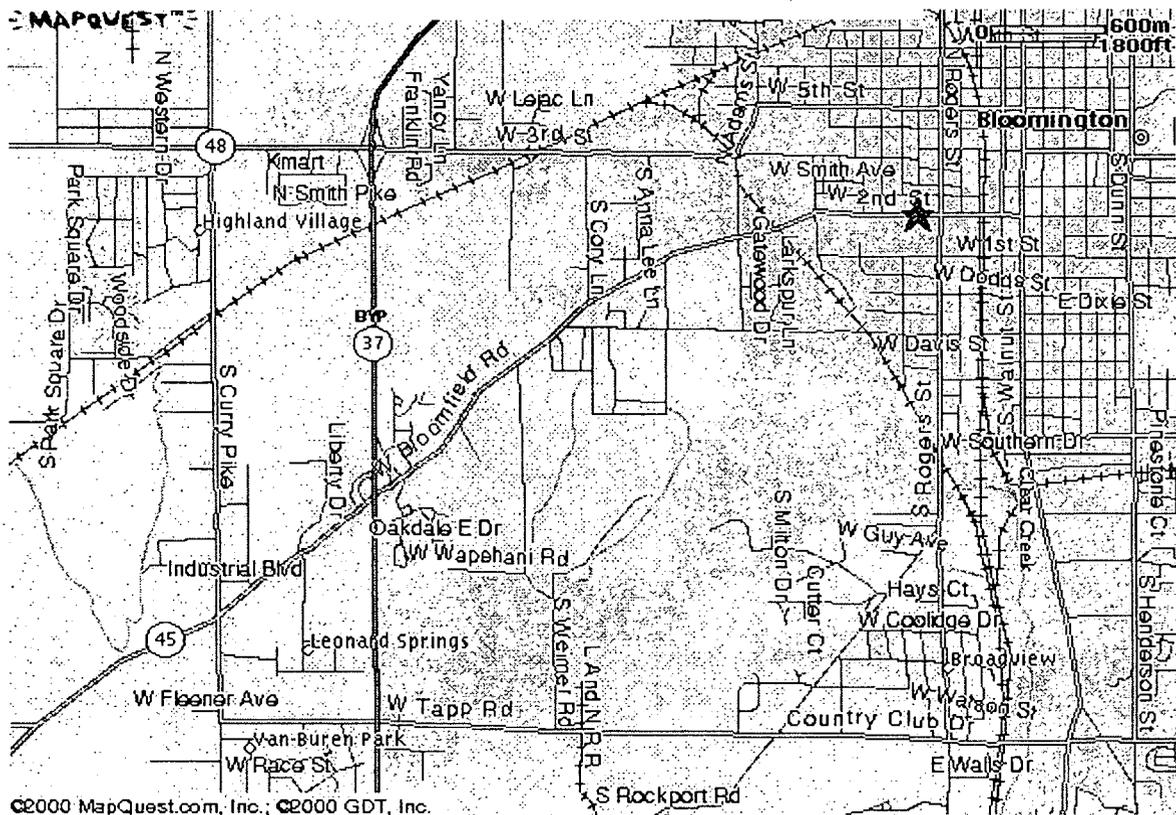
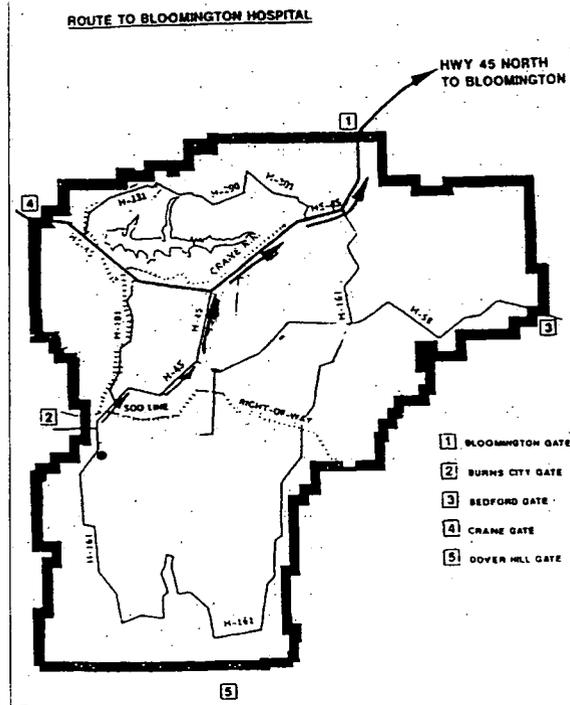


Figure 2-2  
Hospital Route Map (Bloomington Gate)

Note: The Bloomington Gate is open 24 hours.



## 2.11 INJURY/ILLNESS REPORTING

If any Tetra Tech NUS personnel are injured or develop an illness as a result of working on site, the Tetra Tech NUS "Injury/Illness Procedure" (Attachment I) must be followed. Following this procedure is necessary for documenting all of the information obtained at the time of the incident.

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 (Attachment II) filed onsite. If an exposure to hazardous materials has occurred, provide information on the chemical, physical, and toxicological properties of the subject chemical(s) to medical service personnel.

### FIGURE 2-3 EMERGENCY RESPONSE PROTOCOL

The purpose of this protocol is to provide guidance for the medical management of injury situations.

In the event of a personnel injury or accident:

- Rescue, when necessary, employing proper equipment and methods.
- Give attention to emergency health problems -- breathing, cardiac function, bleeding, and shock.
- Transfer the victim to the medical facility designated in this HASP by suitable and appropriate conveyance (i.e. ambulance for serious events)
- Obtain as much exposure history as possible (a Potential Exposure report is attached).
- If the injured person is a Tetra Tech NUS employee, call the medical facility and advise them that the patient(s) is/are being sent and that they can anticipate a call from the WorkCare physician. WorkCare will contact the medical facility and request specific testing which may be appropriate. WorkCare physicians will monitor the care of the victim. Site officers and personnel should not attempt to get this information, as this activity leads to confusion and misunderstanding.
- Call WorkCare at 1-800-455-6155 and enter Extension 109, or follow the voice prompt for after hours and weekend notification and be prepared to provide:
  - Any known information about the nature of the injury.
  - As much of the exposure history as was feasible to determine in the time allowed.
  - Name and phone number of the medical facility to which the victim(s) has/have been taken.
  - Name(s) of the involved Tetra Tech NUS, Inc. employee(s).
  - Name and phone number of an informed site officer who will be responsible for further investigations.
  - Fax appropriate information to WorkCare at (714) 456-2154.
- Contact Corporate Health and Safety Department (Matt Soltis) and Corporate Human Resources Manager Marilyn Duffy at 1-800-245-2730.
- As data is gathered and the scenario becomes more clearly defined, this information should be forwarded to WorkCare.

WorkCare will compile the results of all data and provide a summary report of the incident. A copy of this report will be placed in each victim's medical file in addition to being distributed to appropriately designated company officials.

Each involved worker will receive a letter describing the incident but deleting any personal or individual comments. A personalized letter describing the individual findings/results will accompany this generalized summary. A copy of the personal letter will be filed in the continuing medical file maintained by WorkCare.

**FIGURE 2-3 (continued)**  
**WORKCARE**  
**POTENTIAL EXPOSURE REPORT**

Name: \_\_\_\_\_ Date of Exposure: \_\_\_\_\_  
Social Security No.: \_\_\_\_\_ Age: \_\_\_\_\_ Sex: \_\_\_\_\_  
Client Contact: \_\_\_\_\_ Phone No.: \_\_\_\_\_  
Company Name: \_\_\_\_\_

**I. Exposing Agent**

Name of Product or Chemicals (if known): \_\_\_\_\_

Characteristics (if the name is not known)

Solid            Liquid            Gas            Fume            Mist            Vapor

**II. Dose Determinants**

What was individual doing? \_\_\_\_\_

How long did individual work in area before signs/symptoms developed? \_\_\_\_\_

Was protective gear being used? If yes, what was the PPE? \_\_\_\_\_

Was their skin contact? \_\_\_\_\_

Was the exposing agent inhaled? \_\_\_\_\_

Were other persons exposed? If yes, did they experience symptoms? \_\_\_\_\_

**III. Signs and Symptoms (check off appropriate symptoms)**

**Immediately With Exposure:**

Burning of eyes, nose, or throat	Chest Tightness / Pressure
Tearing	Nausea / Vomiting
Headache	Dizziness
Cough	Weakness
Shortness of Breath	

**Delayed Symptoms:**

Weakness	Loss of Appetite
Nausea / Vomiting	Abdominal Pain
Shortness of Breath	Headache
Cough	Numbness / Tingling

**IV. Present Status of Symptoms (check off appropriate symptoms)**

Burning of eyes, nose, or throat	Nausea / Vomiting
Tearing	Dizziness
Headache	Weakness
Cough	Loss of Appetite
Shortness of Breath	Abdominal Pain
Chest Tightness / Pressure	Numbness / Tingling
Cyanosis	

Have symptoms: (please check off appropriate response and give duration of symptoms)

Improved: \_\_\_\_\_ Worsened: \_\_\_\_\_ Remained Unchanged: \_\_\_\_\_

**V. Treatment of Symptoms (check off appropriate response)**

None: \_\_\_\_\_ Self-Medicating: \_\_\_\_\_ Physician Treated: \_\_\_\_\_

### **3.0 SITE BACKGROUND**

This section provides information pertaining to NSWC Crane and the sites that are to be investigated. This information will be revised if additional information becomes available or if additional sites are going to be investigated.

#### **3.1 SITE HISTORY**

The Naval Surface Warfare Center Crane (NSWC Crane) is located in Crane, Indiana approximately 75 miles southwest of Indianapolis and 71 miles northwest of Louisville, Kentucky. The facility encompasses more than 100 square miles (64,463 acres) in Daviess, Greene, Lawrence, and Martin Counties. It is located in a rural, sparsely populated area. The acreage surrounding the base is either wooded or farmed land. The facility, originally called Naval Ammunition Depot (NAD), Burns City, was opened in 1941 to serve as an inland ammunition production and storage center. The Depot's name was changed to NAD, Crane in 1943. In 1975, the name was changed to Naval Weapons Support Center, Crane and in 1992, the name was again changed to Naval Surface Warfare Center, Crane. Today NSWC Crane's mission is to "provide quality and responsive engineering, technical and material support to the Fleet for combat subsystems, equipment and components, microelectronic technology, microwave components, electronic warfare, acoustic sensors tests, engineering pyrotechnics, small arms, electronic module test and system command." Under the Single Service Management Program, a segment of the Center's mission is to provide support (including environmental protection) to the Crane Army Ammunition Activity (CAAA). The Army is tasked with the production and renovation of conventional ammunition and related items, the performance of manufacturing, engineering, and product quality assurance to support production; and the storage, shipment, demilitarization, and disposal of conventional ammunition and related components. Because of the nature of the Army's operations, CAAA contributes significant financial support for the environmental program through an Inter-service Support Agreement.

#### **3.2 SPECIFIC SITES TO BE INVESTIGATED**

This HASP covers CTO 0311 RCRA surface, subsurface soil and sediment sampling, surface and groundwater sampling, monitoring well installation, along with well development at three sites within the Ammunition Burning Ground, (Main Treatment Area, Former Burn Pit Area on the Jeep Trail, and Little Sulphur Creek) at the Naval Surface Warfare Center Crane Division.

CTO 0311 includes surface, subsurface soil and sediment sampling, surface and groundwater water sampling, along with well installation, and development. These areas are part of the Ammunition Burning Grounds (ABG), and are known as: the Main Treatment Area, the Jeep Trail, and Little Sulphur Creek. This investigation is being conducted to determine the impact of past treatment of munitions/explosives by Open Burning (OB). The ABG site encompasses approximately 50 acres and is located in the eastern central portion of NSWC Crane. The main treatment area is used for the treatment of propellants/explosives, rocket motors, candles, flares, solvents, detonators, fuses, and other items. The Jeep Trail (Former Burn Pit Area) is located along Little Sulphur Creek, approximately one-fourth of a mile south of the ABG. The Jeep Trail site was used during past base operations to burn out residual explosives in bomb casings and to burn potentially explosive contaminated packaging materials, small ammunition items, and solvent contaminated rags.

Prior to any field operations it is required that the Tetra Tech NUS FOL contact the appropriate Crane Area Supervisor for work schedules and permission to enter the area. Work will only proceed when cleared by the Area Supervisor or the Explosive Disposal Director.

## 4.0 SCOPE OF WORK

This section discusses the activities that are to be performed at the site. Table 5-1 of this HASP provides information related to each of the tasks that are to be performed as part of the scope of work conducted at the site. As new phases or tasks are to be performed at the site, Table 5-1 will be modified accordingly. If tasks other than those presented below are performed at the site, this section will be modified accordingly.

The Soil and Groundwater Sampling program at the ABG, OJT and LSC will consist of the following tasks:

- Mobilization/Demobilization
- Soil Boring Activities will include Direct Push Technology (DPT), and Hand Augering.
- Monitoring Well Installation and Development, purging, and repair.
- Multi-Media Sampling including:
  - Soils (Surface and Subsurface)
  - Groundwater
  - One surface water sample (Spring A)
- Decontamination of sampling and heavy equipment
- IDW Management

## 5.0 TASKS/HAZARDS/ASSOCIATED CONTROL MEASURES SUMMARIZATION

Table 5-1 of this section serves as the primary portion of the site specific HASP which identifies the tasks that are to be performed as part of the scope of work. The anticipated hazards, recommended control measures, air monitoring recommendations, required Personal Protective Equipment (PPE), and decontamination measures for each site task are discussed in detail. This table and the associated control measures will be revised, if the scope of work, contaminants of concern, or other conditions change.

Through using the table, site personnel can determine which hazards are associated with each task and at each site, and what associated control measures are necessary to minimize potential exposure or injuries related to those hazards. The table also assists field team members in determining which PPE and decontamination procedures to use based on proper air monitoring techniques and site-specific conditions.

A Health and Safety Guidance Manual must accompany this table and the HASP. This will require the FOL to obtain and maintain a Guidance manual on site. The manual is designed to further explain supporting programs and elements for other site-specific aspects as required by 29 CFR 1910.120. The Guidance Manual should be referenced for additional information regarding air monitoring instrumentation, decontamination activities, emergency response, hazard assessments, hazard communication and hearing conservation programs, medical surveillance, PPE, respiratory protection, site control measures, standard work practices, and training requirements. Many of Tetra Tech NUS' SOPs are also provided in this Guidance Manual.

Safe Work Permits (SWP) issued for all major activities (See Section 10.11) will use elements defined in Table 5-1 as the primary reference. The FOL or the SSO completing the SWP will add additional site-specific information. In situations where the SWP is more conservative than the direction provided in Table 5-1 due to the incorporation of site-specific elements, the Safe Work Permit will be followed.

Because the ABG is an active site, Tetra Tech NUS field personnel must contact the Area Supervisor for permission prior to entering this area. The names and telephone numbers for the area supervisor, and the Explosive Disposal Director, are listed in Table 2-1 Emergency Contacts.

## 5.1 GENERAL SAFE WORK PRACTICES

In addition to the task-specific work practices identified on Table 5-1, workers must follow these safe work practices when conducting work involving known and unknown site hazards. These safe work practices establish a pattern of general precautions and measures for reducing risks associated with hazardous site operations.

- Refrain from 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.
- Wash hands and face thoroughly upon leaving a contaminated or suspected contaminated area. A thorough shower and washing must be conducted as soon as possible if excessive skin contamination occurs.
- Avoid contact with potentially contaminated substances by walking around puddles, pools, mud, or other such areas. Avoid, whenever possible, kneeling on the ground or leaning or sitting on equipment. Do not place monitoring equipment on potentially contaminated surfaces.
- Be familiar with and adhere to all instructions in the site-specific HASP.
- Be aware of the location of the nearest telephone and all emergency telephone numbers. See Section 2.0, Table 2-1.
- Attend briefings on anticipated hazards, equipment requirements, Safe Work Permits, emergency procedures, and communication methods before going on site.
- Plan and mark entrance, exit, and emergency escape routes. See Section 2.0.
- Rehearse unfamiliar operations prior to implementation.
- Use the "buddy system" whenever respiratory protection equipment is in use. Establish hand signals or other means of emergency communication in case of two-way radio failure.
- Maintain visual contact with each other and with other on-site team members by remaining in close proximity in order to assist each other in case of emergency.

- 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.
- Be familiar with all MSDSs relevant to site operations
- Immediately report all injuries, illnesses, and unsafe conditions, practices, and equipment to the SSO.
- Matches and lighters are restricted from entering in the Exclusion Zone or Contamination Reduction Zone.
- Observe coworkers for signs of toxic exposure and heat or cold stress. (TtNUS Health and Safety Guidance Manual Section 4)
- Inform co-workers of potential symptoms of illness, such as headaches, dizziness, nausea, or blurred vision.

## 5.2 DPT DRILLING SAFE WORK PRACTICES

The following safe work practices are to be followed when working on or around DPT rig operations.

### 5.2.1 Before DPT Drilling

- Identify all underground utilities and buried structures before DPT drilling. Use the Utility Locating and Excavation Clearance SOP provided in Attachment IV. Note: NSWCrane requires that a digging permit be issued before any intrusive activities take place. No intrusive activities can take place unless this permit has been issued.
- All DPT rigs will be inspected by a Competent Person (the SSO or designee) prior to the acceptance of the equipment at the site and prior to the use of the equipment. All repairs or deficiencies identified will be corrected prior to use. The inspection will be accomplished using the Equipment Inspection Checklist provided in Attachment III. Inspection frequencies will be once every shift (either 5 or 10 day) or following repairs.

- The work area around the point of operation will be graded to the extent possible to remove any trip hazards near or surrounding DPT equipment.
- The driller's helper will establish an equipment staging and lay down plan. The purpose of this is to keep the work area clear of clutter and slip, trip, and fall hazards. Mechanisms to secure heavy objects such as drill flights will be provided to avoid the collapse of stacked equipment.
- All potentially contaminated tooling will be wrapped in polyethylene sheeting for storage and transport to the centrally located decontamination unit.

### 5.2.2 During Drilling

- The DPT operator shall verbally alert employees and visually ensure employees are clear from dangerous parts of equipment before starting or engaging equipment.
- One employee shall be responsible for emergency shut-off switch operation during DPT operation, such that the machinery can be shutdown quickly if an employee is in danger.
- Secure frayed or loose clothing, hair, and jewelry when working with DPT equipment.
- Minimize contact to the greatest extent possible with contaminated tooling and environmental media.
- Support functions (sampling and screening stations) will be maintained a minimum distance from the DPT rig of the height of the mast plus five feet to remove these activities from within physical hazard boundaries.
- Only qualified operators and knowledgeable ground crew personnel will participate in the operation of the DPT rig.
- In order to minimize contact with potentially contaminated tooling and media and to minimize lifting hazards, multiple personnel should move auger flights and other heavy tooling.
- Only personnel absolutely essential to the work activity will be allowed in the exclusion zone. Site visitors will be escorted at all times.

### 5.2.3 After DPT Drilling

- All equipment used within the exclusion zone will undergo a complete decontamination and evaluation by the SSO to determined cleanliness prior to moving to the next location, exiting the site, or prior to down time for maintenance.
- All motorized equipment will be fueled prior to the commencement of the day's activities. During fueling operations all equipment will be shutdown and grounded to the fuel provider.
- When not in use all DPT rigs will be shut down, emergency brakes set, and wheels chocked.
- All areas subjected to subsurface investigative methods will be restored to equal or better condition than original to remove any contamination brought to the surface and to remove any physical hazards. In situations where these hazards cannot be removed these areas will be barricaded to minimize the impact on field crews working in the area.

### 5.3 **DRUM HANDLING SAFE WORK PRACTICES**

The following safe work practices are to be followed when working with 55-gallon drums containing solids (e.g., cuttings) or liquids (e.g. groundwater ).

- Check the work area and manage any slip, trip, and/or fall hazards.
- Visually inspect each drum for potential handling hazards, such as a loose lid, swelling, or rust-through.
- Always wear hand protection (e.g. leather or leather palmed gloves) when handling drums.
- Always use equipment, manual or powered, to move or lift drums. NEVER attempt to lift a drum containing any amount of material without the appropriate equipment (i.e. lift gate, fork lift, etc.).
- Always use multiple workers to right a drum on its side, particularly when full. If possible, use equipment, such as a fork lift, to right the drum.
- When staging, leave open space around each drum to avoid creating pinch points.

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**TABLE 5-1  
TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM  
NSWC CRANE, INDIANA  
OBD, OJT AND LSC SITES**

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring - Type and Action Levels	Personal Protective Equipment <i>(Items in italics are deemed optional as conditions or the FOL or SSO dictate.)</i>	Decontamination Procedures
<p>Soil borings and Monitoring Well Installation</p> <p>These tasks will be accomplished using the following methods:</p> <p><b>Soil boring:</b></p> <ul style="list-style-type: none"> <li>- Direct-Push Technology [Geoprobe®]</li> <li>- Hand Augering</li> </ul> <p><b>Monitoring Well Installation</b></p> <ul style="list-style-type: none"> <li>- DPT Rig</li> </ul>	<p><b>Chemical hazards:</b></p> <p>1) Previous analytical data identified the low concentrations of the following compounds as contaminants of concern in the soil or groundwater: Arsenic, Barium, Chromium, Cyanides, Lead, RDX, HMX, Manganese, 1,2-Dichloroethylene, 1,1,2,2-Tetrachloroethane, and 1,1,1-Trichloroethane (Methyl Chloroform), Trichloroethylene. Elevated airborne concentrations of site contaminants are not expected but if sustained readings are observed in the breathing zone site activities will be suspended.</p> <p>2) Transfer of contamination into clean areas or onto persons</p> <p><b>Physical hazards:</b></p> <p>3) Heavy equipment hazards (pinch/compressions points, rotating equipment, hydraulic lines, etc.)</p> <p>4) Noise in excess of 85 dBA</p> <p>5) Energized systems (contact with underground or overhead utilities)</p> <p>6) Lifting (strain/muscle pulls)</p> <p>7) Slips, trips, and falls</p> <p>8) Vehicular and foot traffic</p> <p>9) Ambient temperature extremes (heat/cold stress)</p> <p>10) Flying projectiles</p> <p>11) Contact with UXO</p> <p>12) Exposure to open burning treatment operations</p> <p><b>Natural hazards:</b></p> <p>13) Insect/animal bites and stings, poisonous plants, etc.</p> <p>14) Inclement weather</p>	<p>1) Use real-time monitoring instrumentation, action levels, and identified PPE to control exposures to potentially contaminated media (air, water, soils, etc.). Generation of dusts should be minimized. If airborne dusts are observed, area wetting methods may be used. If area wetting methods are not feasible, activities must be suspended until dust levels subside, or until an acceptable alternative control method can be selected.</p> <p>-Verify monitoring well construction materials (grout, bentonite, sand, and decontamination solutions) MSDS are included in Hazard Communication Program. Ensure personnel constructing wells have reviewed the MSDS and understand potential health effects.</p> <p>2) Decontaminate all equipment and supplies between boreholes and prior to leaving the site. Wrap all portable equipment to be transported across clean areas of the site to the central decontamination pad.</p> <p>3) All equipment will be:</p> <ul style="list-style-type: none"> <li>- Inspected in accordance with Federal safety and transportation guidelines, OSHA (1926.600.601.602), and manufacturer's design. All inspections will be documented using the Equipment Inspection Checklist found in Attachment III of this HASP.</li> <li>- Operated and supported by knowledgeable operators, and ground crew.</li> <li>- Used within safe work zones, with routes of approach clearly demarcated. All personnel not directly supporting this operation will remain at least 25 feet from the point of operation. This will be the area identified as the exclusion zone.</li> </ul> <p>In addition to equipment considerations, the following safe operating procedures will be incorporated:</p> <ul style="list-style-type: none"> <li>- Hydraulic masts or other projecting devices shall be at least 20 feet from overhead power sources and a minimum of 3 feet from underground utilities.</li> <li>- Hand signals will be established prior to the commencement of the operation.</li> <li>- A remote sampling device must be used to sample drill cuttings near rotating tools</li> <li>- Only manufacturer-approved equipment may be used in conjunction with equipment repair procedures (e.g., flight connectors).</li> <li>- Work areas will be kept clear of clutter.</li> <li>- Secure all loose articles to avoid possible entanglement during coring activities.</li> <li>- All self-propelled equipment shall be equipped with movement warning systems.</li> <li>- All personnel will be instructed in the location and operations of the emergency shut-off device(s). This device will be tested initially (and then periodically) to ensure its operational status.</li> <li>- Areas will be inspected prior to the movement of the drill rig and support vehicles to eliminate any physical hazards. This will be the responsibility of the FOL and/or SSO.</li> <li>- The drill rig and support vehicles will be moved no closer than 3 feet to unsupported side-walls of excavations and embankments.</li> </ul> <p>4) Hearing protection will be used during all subsurface activities using the DPT when noise levels are between 87 and 92 dBA. (during operation). Boundaries will be established to limit noise hazard. Height of the mast + 5 feet or a minimum of 25 feet is normal. Excessive noise levels are being approached when you have to raise your voice to talk to someone within 2 feet of your location.</p> <p>5) All drilling activities will proceed only when a clearance permit is obtained from NSWC Crane. If the field crew questions the validity of the permit, operations will cease and the TOM and PHSO will be notified. A decision will then be made on how to proceed. If operations are to proceed it will be in accordance with the Utility Locating and Excavation Clearance SOP in Attachment IV of this HASP. All utility clearances will be obtained, in writing, and locations identified and marked prior to activities. Overhead utilities will also be identified. <b>The Utility Clearance Form found in Attachment IV of this HASP must be filled out for all intrusive activities.</b></p> <p>6) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques.</p> <p>7) Preview work locations for unstable/uneven terrain.</p> <p>8) Use traffic-warning signs, flag persons, and high visibility vests as determined by the SSO when working in or along traffic thoroughfares.</p> <p>9) Wear appropriate clothing for weather conditions. Acceptable shelter and liquids for field crews.</p> <p>10) Wear eye protection and hard hat when the drill rig or DPT rig is operating. Restrict all others from the area.</p> <p>11) Screen work area to ensure that it is clear of UXO. Area must be cleared by the UXO/EOD Specialist prior to beginning work. Suspicious items will be marked and personnel will leave the area and notify appropriate site contacts. See Attachment V I and Section 6 of this HASP.</p> <p>12) Contact the ABG Area Supervisor prior to entering onto the site and obtain permission to enter. Do not approach any active OB or treatment operation.</p> <p>13) Avoid nesting areas, use repellents. Report potential hazards to the SSO. Relative to the time of the year this operation is conducted, certain natural hazards may have little bearing.</p> <p>14) Suspend or terminate operations until directed otherwise by SSO. (See Section 6.3.4 of this HASP)</p>	<p>A direct reading Photoionization Detector (PID) with a 11.7 eV lamp (Primary), or a Flameionization Detector (FID) (Secondary/Back-up), will be used to screen samples and to detect the presence of any potential volatile organics. Source monitoring of the sample collection area will be conducted at regular intervals to be determined by the SSO. Positive sustained results at a source or downwind location(s) which may impact operations crew will require the following actions:</p> <ul style="list-style-type: none"> <li>- Monitor the breathing zone of at-risk and downwind employees. Any sustained readings (greater than 1 minute in duration) above background in the breathing zone of the at-risk employees requires site activities to be suspended and site personnel to retreat to an unaffected area.</li> <li>- Work may only resume if airborne readings in worker breathing zone return to background. If elevated readings in worker breathing zone persist, the PHSO and HSM will be contacted to determine necessary actions and levels of protection.</li> </ul> <p>Site contaminants may adhere to or be part of airborne dusts or particulates generated during site activities. Generation of dusts should be minimized to avoid inhalation of contaminated dusts or particulates. Evaluation of dust concentrations will be performed by observing work conditions for visible dust clouds. Potential exposure to contaminated dust will be controlled using water suppression, by avoiding dust plumes, or evacuating the operation area until dust subsides.</p>	<p>Level D - (Minimum Requirements)</p> <p><b>Subsurface Soils - Borings and well advancement</b></p> <p><b>Screening and Sampling Staff</b></p> <ul style="list-style-type: none"> <li>- Standard field attire including sleeved shirt and long pants</li> <li>- Safety shoes (Steel toe/shank)</li> <li>- Safety glasses</li> <li>- Surgical style gloves (<i>double-layered if necessary</i>)</li> <li>- Hard hat (when overhead hazard exists)</li> <li>- Tyvek® coveralls; Impermeable garments if the potential exists for soiling or saturating.</li> <li>- Hearing protection for high noise areas</li> <li>- <i>Reflective vest for traffic areas</i></li> </ul> <p><b>Driller and Driller Helper</b></p> <ul style="list-style-type: none"> <li>- Standard field attire including sleeved shirt and long pants</li> <li>- Safety shoes (Steel toe/shank)</li> <li>- Safety glasses</li> <li>- Nitrile inner gloves; Butyl outer gloves</li> <li>- Hard hat (when overhead hazard exists)</li> <li>- Tyvek® coveralls; Impermeable garments if the potential exists for soiling or saturating.</li> <li>- Hearing protection for high noise areas</li> <li>- <i>Reflective vest for traffic areas</i></li> </ul> <p><b>Monitoring Well Construction</b></p> <p><b>Driller, Driller Helper, and Oversight</b></p> <p>Level D - (Minimum Requirements)</p> <ul style="list-style-type: none"> <li>- Standard field attire (Sleeved shirt, long pants)</li> <li>- Safety shoes (steel toe/shank)</li> <li>- Safety glasses</li> <li>- Surgical style gloves (<i>double-layered or a heavy neoprene or nitrile glove for protection against the sharpedge ampoules</i>).</li> <li>- <i>Reflective vest for high traffic areas</i></li> <li>- <i>Hardhat (when overhead hazards exists, or identified as a operation requirement)</i></li> <li>- <i>Tyvek coveralls and disposable boot covers if surface contamination is present or if the potential for soiling work attire exists.</i></li> <li>- <i>Hearing protection for high noise areas, or as directed on an operation by operation scenario.</i></li> </ul> <p><b>Note:</b> The Safe Work Permit(s) for this task (see Attachment V of this HASP) will be issued at the beginning of each day to address the tasks planned for that day. As part of this task, additional PPE may be assigned to reflect site-specific conditions or special considerations or conditions associated with any identified task. Protective levels may require modification should this activity be required to be conducted within a controlled zone due to an on-going operation.</p>	<p><b>Personnel Decontamination</b> will consist of a soap/water wash and rinse for reusable and non-reusable outer protective equipment (boots, gloves, PVC splash suits, as applicable)</p> <p>The sequential procedure is as follows:</p> <p>Stage 1: Equipment drop, remove outer protective wrapping; Decon personnel will wipe down the outer shell and pass hand equipment through as necessary.</p> <p>Stage 2: Soap/water wash and rinse of outer boots and gloves</p> <p>Stage 3: Soap/water wash and rinse of the outer splash suit, as applicable</p> <p>Stage 4: Disposable PPE will be removed and bagged.</p> <p>Stage 5: Wash face and hands</p> <p>Stage 6: Depending on ambient conditions, you may be required to report for medical evaluation. This evaluation consists of pulse, breathing rate, oral temperature, and body weight. This medical screening will be performed when ambient conditions dictate and during periods of acclimatization.</p> <p><b>Equipment Decontamination</b> - All heavy equipment decontamination will take place at a centralized decontamination pad utilizing a steam cleaner. Heavy equipment will have the wheels and tires cleaned along with any loose debris removed, prior to transporting to the central decontamination area. All site vehicles will have restricted access to exclusion zones, and 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.</p> <p><b>Sampling Equipment Decontamination</b></p> <p>Sampling equipment will be decontaminated as per the requirements in the Sampling and Analysis Plan and/or Work Plan.</p> <p>All equipment used in the exclusion zone will require a complete decontamination between locations and prior to removal from the site.</p> <p>The FOL or the SSO will be responsible for evaluating equipment arriving on-site, leaving the site, and between locations. No equipment will be authorized access, exit, or movement to another location without this evaluation.</p>
<p>Surveying</p>	<p><b>Physical hazards:</b></p> <p>1) Slip, trips, and falls</p> <p>2) Biological hazards (Insect/animal bites and stings)</p> <p>3) Vehicular and foot traffic</p> <p>4) Ambient temperature extremes</p> <p>5) Severe weather conditions (lightning, high winds, and thunder storms)</p>	<p>1) Preview work locations for unstable/uneven terrain. Barricade all excavations from access closer than two feet from the edge.</p> <p>2) All equipment will be</p> <ul style="list-style-type: none"> <li>- Inspected in accordance with OSHA, and manufacturers design.</li> <li>- Operated by Certified operators, and knowledgeable ground crew.</li> </ul> <p>3) Avoid nesting areas, use repellents (Do NOT use repellents during sampling activities). Report potential hazards to the SSO.</p>	<p>Not required</p>	<p>Level D - (Minimum Requirements)</p> <ul style="list-style-type: none"> <li>- Standard field attire (Long sleeve shirt, long pants)</li> <li>- Safety shoes (Steel toe/shank)</li> <li>- Safety glasses</li> <li>- <i>Hard hat (when overhead hazards exists, or identified as a operation requirement)</i></li> <li>- <i>Reflective vest for high traffic areas</i></li> <li>- <i>Hearing protection for high noise areas, or as directed on an operation by operation scenario.</i></li> </ul>	<p>Decontamination not required for this task.</p>

**TABLE 5-1  
TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM  
NSWC CRANE, INDIANA  
OBD, OJT AND LSC SITES**

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring, Type and Action Levels	Personal Protective Equipment <i>(Items in italics are deemed optional as conditions or the FOL or SSO dictate.)</i>	Decontamination Procedures
Mobilization/ Demobilization	<p><b>Physical hazards:</b></p> <ol style="list-style-type: none"> <li>1) Lifting (muscle strains and pulls)</li> <li>2) Pinches and compressions</li> <li>3) Slip, trips, and falls</li> <li>4) Moving machinery</li> <li>5) Vehicular and foot traffic</li> </ol>	<ol style="list-style-type: none"> <li>1) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques.</li> <li>2) Use pinch bars or other equipment to keep hands from point of operation or other associated pinch points.</li> <li>3) Preview work locations for unstable/uneven terrain. Barricade all ground openings from access closer than two feet from the edge.</li> <li>4) All equipment will be <ul style="list-style-type: none"> <li>- Inspected in accordance with OSHA, and manufacturers design.</li> <li>- Operated by knowledgeable operators, and knowledgeable ground crew.</li> </ul> </li> <li>5) Establish safe zones of approach and movement</li> </ol>	<p>Not required</p> <p><b>Excessive chemical contaminant concentrations impacting field crews during this task is not anticipated.</b></p>	<p>Level D - (Minimum Requirements)</p> <ul style="list-style-type: none"> <li>- Standard field attire (sleeved shirt; long pants)</li> <li>- Safety shoes (Steel toe/shank)</li> <li>- Safety glasses</li> <li>- <i>Hardhat (when overhead hazards exists, or identified as a operation requirement)</i></li> <li>- <i>Reflective vest for high traffic areas</i></li> <li>- <i>Hearing protection for high noise areas, or as directed by the Site Safety Officer.</i></li> </ul>	<p>Not required</p>
<p>Multi-media sampling, including soils (surface and subsurface); surface water, ground water.</p> <p>This task also includes well development of existing and newly installed ground water monitoring wells, purging and repair.</p>	<p><b>Chemical hazards:</b></p> <ol style="list-style-type: none"> <li>1) Previous analytical data identified the low concentrations of the following compounds as contaminants of concern in the soil or groundwater: Arsenic, Barium, Chromium, Cyanides, Lead, RDX, HMX, Manganese, 1,2-Dichloroethylene, 1,1,2,2-Tetrachloroethane, and 1,1,1-Trichloroethane (Methyl Chloroform), Trichloroethylene. Elevated airborne concentrations of site contaminants are not expected but if sustained readings are observed in the breathing zone site activities will be suspended.</li> <li>2) Transfer of contamination into clean areas</li> </ol> <p><b>Physical hazards:</b></p> <ol style="list-style-type: none"> <li>3) Noise in excess of 85 dBA</li> <li>4) Lifting (strain/muscle pulls)</li> <li>5) Pinches and compressions</li> <li>6) Slips, trips, and falls</li> <li>7) Ambient temperature extremes (heat/cold stress)</li> <li>8) Vehicular and foot traffic</li> <li>9) Contact with UXO</li> <li>10) Exposure to open burning treatment operations.</li> </ol> <p><b>Natural hazards:</b></p> <ol style="list-style-type: none"> <li>11) Insect/animal bites and stings, poisonous plants, etc.</li> <li>12) Inclement weather</li> </ol>	<ol style="list-style-type: none"> <li>1) Use real-time monitoring instrumentation, action levels, and identified PPE to control exposures to potentially contaminated media (air, water, soils, etc.). Generation of dusts should be minimized. If airborne dusts are observed, area wetting methods may be used. If area wetting methods are not feasible, activities must be suspended until dust levels subside, or until an acceptable alternative control method can be selected.</li> <li>2) Decontaminate all equipment and supplies between sampling locations and prior to leaving the site. See decontamination of heavy and sampling equipment for direction in this task.</li> <li>3) When sampling at an operating DPT, Hollow Stem Auger, Rotasonic or other type of drill rig use hearing protection. The use of hearing protection outside of 25 feet from the DPT rig should be incorporated under the following condition: <ul style="list-style-type: none"> <li>- If you have to raise your voice to talk to someone who is within 2 feet of your location, you may be approaching excessive noise levels (80-85dBA) and hearing protection should be worn until the noise source may be positively quantified.</li> </ul> </li> <li>4) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques (See Lifting Mobilization/Demobilization, Page 1 of 6, Table 5-1).</li> <li>5) Avoid moving parts, do not remove any machine guarding. <ul style="list-style-type: none"> <li>- Use tools or equipment where necessary to avoid contacting pinch points.</li> <li>- A remote sampling device must be used to sample drill cuttings near rotating tools. The equipment operator shall shutdown machinery if the sampler is near moving machinery parts.</li> <li>- Remove any snag points</li> <li>- Follow SWP and Safe Work Practices for drilling procedures when working in and around the drill rigs.</li> </ul> </li> <li>6) Preview work locations for unstable/uneven terrain. <ul style="list-style-type: none"> <li>- Ruts, roots, and other tripping hazards should be eliminated from around the rotating apparatus to minimize trips and falls when approaching the rotating tooling.</li> <li>- Use multiple persons and small loads to pack sampling resources to remote locations.</li> <li>- Construct rope ladders and other engineered assistance for traversing hills and inclines &gt; 45°.</li> </ul> </li> <li>7) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews.</li> <li>8) Traffic and equipment considerations are to include the following: <ul style="list-style-type: none"> <li>- Establish safe zones of approach (i.e. Mast or Boom + 5 feet). See Section 9 of the HASP for specific safety zones and established clearance recommendations.</li> <li>- All self-propelled equipment shall be equipped with movement warning systems.</li> <li>- When sampling along roadways, use signs to indicate men working as well flag persons, as necessary. Personnel working in and around any established traffic patterns should wear high visibility vests to increase visual recognition.</li> </ul> </li> <li>9) Work areas will be screened to ensure no UXO items are present. Site activities will not be performed until the area is cleared by an UXO or EOD Specialist. If any suspicious items are uncovered or encountered, the area will be marked, personnel will leave the area, and appropriate site contacts will be notified. The UXO SOP included as Attachment VI of this HASP.</li> <li>10) Contact the ABG Area Supervisor prior to entering onto the site and obtain permission to enter. Do not approach any active OB or treatment operation.</li> <li>11) Avoid nesting areas, use repellents approved by the FOL. Report potential hazards to the SSO.</li> <li>12) Suspend or terminate operations until directed otherwise by the SSO. (See Section 6.3.4 of this HASP)</li> </ol>	<p>A direct reading Photoionization Detector (PID) with a 11.7 eV lamp (Primary), or a Flameionization Detector (FID) (Secondary/Back-up), will be used to screen samples and to detect the presence of any potential volatile organics. Source monitoring of the sample collection area will be conducted at regular intervals to be determined by the SSO. Positive sustained results at a source or downwind location(s) which may impact operations crew will require the following actions:</p> <ul style="list-style-type: none"> <li>- Monitor the breathing zone of at-risk and downwind employees. Any sustained readings (greater than 1 minute in duration) above background in the breathing zone of the at-risk employees requires site activities to be suspended and site personnel to retreat to an unaffected area.</li> <li>- Work may only resume if airborne readings in worker breathing zone return to background. If elevated readings in worker breathing zone persist, the PHSO and HSM will be contacted to determine necessary actions and levels of protection.</li> </ul> <p>Site contaminants may adhere to or be part of airborne dusts or particulates generated during site activities. Generation of dusts should be minimized to avoid inhalation of contaminated dusts or particulates. Evaluation of dust concentrations will be performed by observing work conditions for visible dust clouds. Potential exposure to contaminated dust will be controlled using water suppression, by avoiding dust plumes, or evacuating the operation area until dust subsides. All soil and sediment samples will be screened prior to sending to the analytical laboratories</p>	<p>Level D protection will be utilized for the following sampling activities.</p> <p>Surface, subsurface soils, surface water, groundwater and sediments.</p> <p>Level D - (Minimum Requirements)</p> <ul style="list-style-type: none"> <li>- Standard field attire (Sleeved shirt; long pants)</li> <li>- Safety shoes (steel toe/shank)</li> <li>- Safety glasses</li> <li>- Surgical style gloves (<i>double-layered if necessary</i>)</li> <li>- <i>Reflective vest for high traffic areas</i></li> <li>- <i>Hardhat (when overhead hazards exists, or identified as a operation requirement)</i></li> <li>- <i>Tyvek coveralls and disposable boot covers if surface contamination is present or if the potential for soiling work attire exists.</i></li> <li>- <i>Hearing protection for high noise areas, or as directed on an operation by operation scenario.</i></li> </ul> <p><b>Note:</b> The Safe Work Permit(s) for this task (See Attachment V) will be issued at the beginning of each day to address the tasks planned for that day. As part of this task, additional PPE may be assigned to reflect site-specific conditions or special considerations or conditions associated with any identified task.</p>	<p><b>Personnel Decontamination</b></p> <p>Personal decontamination will vary based on the type of sampling conducted. These are as follows:</p> <p>Supporting subsurface investigations at the drill rig.</p> <ul style="list-style-type: none"> <li>- Decontamination will be the same as prescribed for the drilling activity</li> </ul> <p>Sampling surface water, groundwater, soils and sediments, the following provisions will apply</p> <ul style="list-style-type: none"> <li>- Upon completion of the sampling dedicated trowels, tubing, etc. will be bagged for transport back to the central decontamination area.</li> <li>- PPE (gloves) will be removed and also bagged for disposal.</li> <li>- Handi-Wipes or similar product will be used to clean hands prior to moving to the next location.</li> </ul> <p><b>Equipment Decontamination</b></p> <p>All equipment used in remote sampling locations will be brought back to the central decontamination area for decontamination and re-use or decontamination and gross removal of contamination prior to disposal.</p> <p><b>Note:</b> Field screening instruments will be wrapped to minimize the necessary decontamination except for wiping down parts which are necessary to expose to the external environment. The equipment reference above is largely directed at hand tools.</p> <p>Decontamination of equipment (sampling and hand tools) will proceed as indicated in the Sampling and Analysis Plan and/or Work Plan.</p>

**TABLE 5-1  
TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM  
NSWC CRANE, INDIANA  
OBD, OJT AND LSC SITES**

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring - Type and Action Levels	Personal Protective Equipment <i>(Items in italics are deemed optional as conditions or the FOL or SSO dictate.)</i>	Decontamination Procedures
<p>IDW management and moving IDW drums to storage areas</p>	<p><b>Chemical hazards:</b></p> <p>1) Previous analytical data identified the low concentrations of the following compounds as contaminants of concern in the soil or groundwater: Arsenic, Barium, Chromium, Cyanides, Lead, RDX, HMX, Manganese, 1,2-Dichloroethylene, 1,1,2,2-Tetrachloroethane, and 1,1,1-Trichloroethane (Methyl Chloroform), Trichloroethylene. Elevated airborne concentrations of site contaminants are not expected but if sustained readings are observed in the breathing zone site activities will be suspended. Further information on these contaminants and other potential contaminants is presented in Table 6-1.</p> <p>2) Transfer of contamination into clean areas</p> <p><b>Physical hazards</b></p> <p>3) Noise 4) Lifting (muscle strains and pulls) 5) Pinches and compressions 6) Slip, trips, and falls 7) Natural hazards (Insect/animal bites and stings) 8) Vehicular (highway) traffic 9) Ambient temperature extremes (heat stress)</p>	<p>1) Employ real-time monitoring instrumentation, action levels, and identify PPE to control exposures to potentially contaminated media (e.g. air, water, soils).</p> <p>2) Decontaminate all equipment and supplies, if they become contaminated, between locations and prior to leaving the site.</p> <p>3) When working near heavy equipment, use hearing protection.</p> <p>4) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques.</p> <p>5) Use pinch bars or other equipment to keep hands from the point of operation.</p> <p>6) Preview work locations for unstable/uneven terrain.</p> <p>7) Avoid nesting areas, employ repellents. Report potential hazards to the SSO.</p> <p>8) Traffic and equipment considerations are to include the following: - Establish safe zones of approach (i.e. Boom + 3 feet). - Secure all loose articles to avoid possible entanglement. - All equipment shall be equipped with movement warning systems. - All activities are to be conducted consistent with the FDOT permit requirements.</p> <p>9) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding cold/heat stress concerns is provided in section 4 of the Tetra Tech NUS Health and Safety Guidance Manual.</p>	<p><b>It is anticipated that potential contaminant concentrations at outdoor sample locations will not present an inhalation hazard.</b></p> <p>A Photoionization Detector w/ 11.1 eV UV lamp source, or a Flame Ionization Detector, will be used to monitor for applicable site contaminants.</p> <p>Source monitoring will be conducted at regular intervals as determined by the SSO. Volatile organic vapor concentrations will be measured using a PID or FID. Work shall be stopped and all workers evacuated from the area if any sustained breathing zone readings (above established background levels) are measured. Workers shall remain in an unaffected area until readings subside or until further determinations are made by the SSO.</p>	<p>Level D protection will be utilized for the initiation of all sampling activities.</p> <p>Level D - (Minimum Requirements)</p> <ul style="list-style-type: none"> <li>- Standard field attire (long sleeve shirt; long pants)</li> <li>- Tyvek coveralls and disposable boot covers if surface contamination is present or if the potential for soiling work attire exists.</li> <li>- Cotton/leather work gloves with surgical style inner gloves</li> <li>- Safety shoes (steel toe/shank)</li> <li>- Safety glasses</li> <li>- Hardhat (when overhead hazards exists, or identified as a operation requirement)</li> <li>- Reflective vest for high traffic areas</li> <li>- Hearing protection for high noise areas, or as directed on an operation by operation scenario.</li> </ul>	<p><b>Personnel Decontamination</b> will consist of a soap/water wash and rinse for reusable outer protective equipment (boots, gloves, PVC splash suits, as applicable). The decon function will take place at an area adjacent to the site activities. This procedure will consist of:</p> <ul style="list-style-type: none"> <li>- Equipment drop</li> <li>- Soap/water wash and rinse of outer boots and gloves, as applicable</li> <li>- Soap/water wash and rinse of the outer splash suit, as applicable</li> <li>- Disposable PPE will be removed and bagged.</li> </ul>

**TABLE 5-1  
TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM  
NSWC CRANE, INDIANA  
OBD, OJT AND LSC SITES**

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring - Type and Action Levels	Personal Protective Equipment (Items in italics are deemed optional as conditions or the FOL or SSO dictate)	Decontamination Procedures
<p>Decontamination of sampling and heavy equipment</p>	<p><b>Chemical hazards:</b></p> <p>1) Previous analytical data identified the low concentrations of the following compounds as contaminants of concern in the soil or groundwater: Arsenic, Barium, Chromium, Cyanides, Lead, RDX, HMX, Manganese, 1,2-Dichloroethylene, 1,1,2,2-Tetrachloroethane, and 1,1,1-Trichloroethane (Methyl Chloroform), Trichloroethylene. Elevated airborne concentrations of site contaminants are not expected but if sustained readings are observed in the breathing zone site activities will be suspended. Further information on these contaminants and other potential contaminants is presented in Table 6-1.</p> <p>However, based on the analytical results from these previous site investigations, none of the contaminants listed above are likely to present a significant exposure potential to site workers involved in decontamination activities. However given the disposal practices and the scope of work, including investigation of anomalies, the potential exists for encountering other chemicals or contaminants that were not previously identified.</p> <p>Refer to individual Safe Work Permits contained in Attachment V for specific contaminants of concern associated with particular sites and site activities.</p> <p>--Decontamination fluids - Liquinox (detergent), isopropanol, methanol, etc.</p> <p><b>Physical hazards:</b></p> <p>2) Lifting (muscle strains and pulls)</p> <p>3) Pinches and compressions</p> <p>4) Noise</p> <p>5) Flying Projectiles</p>	<p>1) Employ protective equipment to minimize contact with site contaminants and hazardous decontamination fluids.</p> <ul style="list-style-type: none"> <li>- Have a means by which the eyes and/or skin may be flushed (i.e., portable camp shower, emergency eyewash, etc.) readily accessible.</li> <li>- Obtain manufacturer's MSDS for any decontamination solvents used on-site. Users of solvents must review the MSDS and have ready access to it on-site. Maintain a Chemical Inventory and a file of MSDSs for all hazardous chemicals brought to the site. Users must observe MSDS requirements with regard to chemical use, storage, spill response, PPE, and other aspects.</li> </ul> <p>Use of solvents will be restricted to outdoor locations (i.e., this activity is restricted from inside a building or other small or poorly-ventilated space).</p> <p>2) Use multiple persons where necessary for lifting and handling heavy pieces of equipment for decontamination purposes.</p> <p>3) Place or stack equipment securely during decontamination and air drying to prevent unstable items from falling.</p> <p>4) Steam/pressure washer operators will wear hearing protection. Other personnel will be restricted from the area (i.e., no closer than 20 feet) to minimize their potentials to exposure to noise, overspray, and flying projectiles.</p> <p>5) Wear appropriate protection (splash shield to protect pressure washer operator). Place shields around the area when this potential exists to protect others within the area.</p>	<p>1) Use visual observation and real-time monitoring instrumentation to ensure all equipment and/or areas which have been cleaned and dried are properly cleaned of potentially contaminated medias (e.g., air, water, soils).</p> <p><b>Elevated airborne concentrations impacting field crews or downwind receptors are not anticipated for this task.</b></p>	<p><b>For Drill Rig:</b> This applies to high pressure soap/water, steam cleaning wash and rinse procedures.</p> <p>Level D (Minimum requirements) -</p> <ul style="list-style-type: none"> <li>- Standard field attire (sleeved shirt; long pants)</li> <li>- Safety shoes or boots(Steel toe)</li> <li>- Nitrile outer gloves</li> <li>- Safety glasses underneath a splash shield</li> <li>- <i>PVC Rain suits or PE or PVC coated Tyvek as protection from splash as required</i></li> <li>- <i>Chemical resistant boot covers</i></li> <li>- <i>Hearing protection (plugs or muffs)</i></li> </ul> <p><b>For sampling equipment including trowels, macro samplers, bailers, etc.:</b></p> <p>Observe MSDS requirements, but not less than Level D Minimum requirements -</p> <ul style="list-style-type: none"> <li>- Standard field attire (sleeved shirt; long pants)</li> <li>- Safety shoes or boots(Steel toe)</li> <li>- Nitrile outer gloves</li> <li>- Safety glasses</li> </ul> <p>In the event of overspray of chemical decontamination fluids employ PVC rain suits or PE or PVC coated Tyvek as necessary.</p> <p>Respiratory protection is not anticipated for these activities.</p> <p><b>Note:</b> The Safe Work Permit(s) for this task (see Attachment V) will be issued at the beginning of each day to address the tasks planned for that day. As part of this task, additional PPE may be assigned to reflect site-specific conditions or special considerations or conditions associated with any identified task.</p>	<p>This decontamination procedure for <b>Level D</b> protection will consist of</p> <ul style="list-style-type: none"> <li>- Remove and dispose of any disposable PPE (Tyvek coveralls, outer gloves, etc.)</li> <li>- Soap/water wash and rinse of reusable PPE items (e.g., splash suit, boots).</li> <li>- Wash hands and face; leave contamination reduction zone</li> </ul> <p><b>Equipment Decontamination</b> - All equipment decontamination will take place at a centralized decontamination pad utilizing steam or pressure washers. Heavy equipment such as the backhoe will have the wheels and tires cleaned along with any loose debris removed, prior to transporting to the central decontamination area. All site vehicles will have restricted access to exclusion zones, and will 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 on site activity.</p> <p>All equipment used in the exclusion zone will require a complete decontamination between locations and prior to removal from the site.</p> <p>The FOL or the SSO will be responsible for evaluating equipment arriving at and leaving the site. No equipment will be authorized access or exit without this authorization.</p> <p>Evaluation will consist of</p> <ul style="list-style-type: none"> <li>- Visual inspection</li> <li>- Scanning equipment with monitoring instruments</li> </ul>

## 6.0 HAZARD ASSESSMENT

The following section provides information regarding the chemical and physical hazards associated with the NSWC Crane Site and the activities that are to be conducted as part of the scope of work. Table 6-1 provides information related to the chemical hazards that may be present at the site. Specifically, toxicological information, exposure limits, symptoms of exposure, physical properties, and air monitoring and sampling data are discussed in the table. It should be noted that the contaminants of concern might vary between tasks.

### 6.1 CHEMICAL HAZARDS

General contaminants of concern associated with these sites include: Arsenic, Chromium, Cyanides, Lead, RDX, HMX, 1,2 Dichloroethene, Tetrachloroethane, 1,1,1-Trichloroethane. In previous sampling events low levels of these contaminants were found. It is not anticipated that levels will be encountered that are of concern to field crews. It is recommended that exposure (via inhalation, ingestion, or skin contact) to these contaminants be minimized through the use of PPE and good hygiene practices. For further information on these contaminants and other potential contaminants see Table 6-1.

### 6.2 PHYSICAL HAZARDS

The following is a list of physical hazards that may be encountered at the site or may present during the performance of site activities associated with the scope of work.

- Slips, trips, and falls
- Cuts (or other injuries associated with hand tool use)
- Lifting (strain/muscle pulls)
- Ambient temperature extremes (cold and heat stress)
- Pinches and compressions
- Heavy equipment hazards (rotating equipment, hydraulic lines, etc.)
- Energized systems (contact with underground or overhead utilities)
- Vehicular and foot traffic
- Contact with Unexploded Ordnance (UXO)
- Noise in excess of 85 dBA
- Flying projectiles
- Exposure to open burning treatment operations.

### **6.2.1 Slips, Trips, and Falls**

Conditions such as steep terrain and/or heavy vegetation may create an increased potential for slip, trip, and fall hazards

- The safest approach to sample points will be identified and cleared to permit field crew access to sample locations.
- Establish anchor points and rope handrails for traversing/ascending/descending angles and slopes greater than 45% grade.
- Footwear with an adequate traction.
- Prepare work areas by removing tripping hazards (ruts, roots, debris). This is especially critical around rotating equipment, where a fall into the rotating apparatus could be life threatening.

### **6.2.2 Cuts or Other Injuries Associated with Hand Tool Use**

The clearing of brush and vegetation will be performed using hand tools that may include machetes, brush axes, chainsaws and chippers. Chainsaws and chipper operations are discussed in detail in Table 5-1. However, the use of hand tools has only been briefly discussed. The control measures presented below will help minimize the potential for physical and cutting hazards.

- Wear leather or heavy cotton work gloves when using tools to protect against blisters, cuts, or other hand injuries.
- Wear eye protection (safety glasses with side shields) to protect the eyes from twigs, sticks, or flying debris.
- Clear the immediate cutting area of all personnel (radius of the tool swing area).
- Wear long pants and long-sleeved shirts to protect against abrasions.
- Wear hard hats if work will involve areas with overhead hazards (e.g., overhanging branches).
- Wear sturdy work boots.
- Inspect all hand tools [i.e., shovel handles (cracks, splinters, etc.), brush hook handles and blade attachment points, etc.)
- Ensure all hand tools are sharp to facilitate cutting action. This will avoid persons forcing the tool to cut and increasing potential hazards.
- Use the proper tool for the intended purpose. This to will avoid potential injury possibly created through improper use.

### 6.2.3 Contact with UXO

Because of the prior uses of the areas to be investigated, there is a possibility that UXO may be encountered during operations. All activities in the Burn Pit Area on the Jeep Trail will be conducted consistent with the UXO procedures discussed in Attachment VI of this HASP with indicated variances. The UXO Specialist will conduct a surface sweep in all remaining areas of the site that are not used for regular vehicular or pedestrian traffic prior to the commencement of intrusive activities.

- In general, field personnel will practice UXO avoidance techniques.
  - Do not pick-up or kick any unknown materials.
  - Notify the EOD Specialist if you encounter unknown materials.
  - Where the potential exists for UXO materials the EOD Specialist will clear all access routes and work areas.
- To minimize the risk of a UXO encounter, a trained UXO or EOD Specialist will provide support during selected site activities. In all cases, an exclusion zone of 300 feet will be established before detection activities begin.

#### 6.2.3.1 Contact with UXO Area

Small explosives that might be encountered at the Main Treatment Area would most likely have resulted from inefficient burning of explosive-contaminated materials (sludges, trash, etc.). The TtNUS standard UXO clearance technique is based on using magnetometers to detect metal casings based on the assumption that explosives are contained in an item which has a metal casing. At the ABG, any explosives are not likely to be contained within a casing. Therefore, standard UXO clearance using a magnetometer is of no use at the Main Treatment Area. Experienced, trained eyes to visually observe drill cuttings and cores are most appropriate in this case.

1. Open Burning [OB] is not a method used to dispose of heavy cased, energetically filled munitions. It's used to dispose of propellant [loose or contained within rocket/missile motors], propelling charges [such as used on artillery rounds] and bulk explosives.
2. Items [such as motors] may contain subcomponents, which can contain small quantities explosives, which do represent a hazard.
3. OB does result in the ejection of items, however because the subcomponents tend to be small, they generally don't scatter a great distance from the burn pan nor do they bury themselves to a great depth.
4. Generally these subcomponents are NOT constructed of a ferrous metal; rather they are brass or aluminum which a Schonstedt magnetometer does NOT detect.

The following procedure which is a deviation from the TtNUS UXO SOP will be used during the investigation at ABG NSWC Crane:

1. The Schonstedt and down-hole magnetometers will be available at the site should the actual situation require their use.
2. According to the UXO SOP we also will have a White which is capable of locating non-ferrous metals.
3. Using both [Schonstedt and White], A sweep will be conducted at entry route into the ABG.
4. If no significant ferrous surface anomalies ie encountered, the drilling operations will proceed without the 2 foot incremental down-holing requirement.
5. If significant ferrous anomalies or find items in the drilling tailings, we will follow established down-holing procedures.
6. The TtNUS UXO Specialist will be present at during all subsurface activities and will analyze all drill cuttings for the presence of explosive material.

The site-specific training in avoidance techniques and safe work practices will be discussed in detail during site-specific training.

### **6.3 NATURAL HAZARDS**

Insect/animal bites and stings, poisonous plants, and inclement weather are natural hazards that may be present given the location of activities to be conducted. As previously discussed, some portions of the site include vegetated areas which increases the potential for field crews to encounter ticks, bees, mosquitoes/insects, snakes, and poisonous vegetation.

#### **6.3.1 Insect Bites and Stings**

Insect/animal bites and stings are difficult to control given the climate and environmental setting of NSWC Crane. However, in an effort to minimize this hazard the following control measures will be implemented where possible.

- Commercially available bug sprays and repellents will be used whenever possible – Pesticides analytical screening includes chlordane, endrin, lindane, methoxychlor, toxaphene and heptachlor. Commercially available repellants may be used providing they don't contain substances which appear on the analytical list for pesticide analysis. Products such as DEET should not be applied directly to the skin due to potential irritation. This product, when permitted for use, should be applied over clothing articles.

- Where possible, loose-fitting and light-colored clothing with long sleeves should be worn. This will also aid in insect control by providing a barrier between the field person and the insects and to provide easy recognition of crawling insects against the lighter background. Pant legs should be secured to the work-boots using duct tape to prevent access by ticks. Mosquito nets are also recommended for use when commercially available repellents are not permitted.
- Clothing/limited body checks for ticks and other crawling insects should be conducted upon exiting heavily vegetated areas. Workers should perform a more detailed check of themselves when showering in the evening. Ticks prefer moist areas of the body (arm-pits, genitals, etc.) and will migrate to those locations.
- The FOL/SSO will preview all access routes and work areas in an effort to identify physical hazards including nesting areas in and around the work sites. These areas will be flagged and communicated to all site personnel.
- The FOL/SSO must determine if site personnel (through completion of Medical Data Sheets), suffer allergic reactions to bee and other insect stings and bites. Field crew members who are allergic to bites should have their emergency kit containing antihistamine and a preloaded syringe of epinephrine readily available.

Any allergies (insect bites, bee stings, etc.) must be reported on the Medical Data Sheet and to the SSO.

#### **6.3.1.1 Tick and Mosquito Transmitted Illnesses and Diseases**

Ticks and mosquitoes have been identified in the transmission of diseases including Lyme's disease and malaria. Warm months (Spring through early Fall) are the most predominant time for this hazard. Information concerning Lyme's Disease including recognition, evaluation, tick removal, and control is provided in Section 4.0 of the Health and Safety Guidance Manual .

Malaria may occur when a mosquito or other infected insect sucks blood from an infected person, and the insect becomes the carrier to infect other hosts. The parasite reproduces within the mosquito, and is then passed on to another person through the biting action. Acute symptoms include chills accompanied by fever and general flu like symptoms. This generally terminates in a sweating stage. These symptoms may recur every 48 to 72 hours.

#### **Precautions include:**

- Limit outdoor activities during peak mosquito times – at dusk and dawn.

- Avoid standing water
- Wear long-sleeved shirts and long pants whenever you are outdoors.
- Apply insect repellent according to manufacturers instruction to exposed skin. An effective repellent will contain 20% to 30% DEET (N,N-diethyl-meta-toluamide). Avoid products containing more than 30% DEET.
- Spray clothing with repellents containing permethrin or DEET, mosquitoes may bite through thin clothing.

### **6.3.2 Snakes and Other Wild Animals**

Indigenous animals including snakes (poisonous and non-poisonous varieties), raccoons, and other animals native to the region may be present at the site. These animals may be encountered if work locations encroach on nesting or territories claimed by these animals.

To avoid the obvious hazards conveyed as part of a direct encounter, the following actions will be taken to minimize impact on the field crews and/or operations. The FOL/SSO will preview access routes and work locations for nesting areas or signs of animal activities (tracks, foraging areas, etc.). All identified suspect areas will be communicated to the field crews. Snake chaps will be required as a precaution.

#### **6.3.2.1 Snake Bites**

All initial efforts will be directed to avoid, where possible, nesting and territorial areas. However, should field personnel come in contact with these animals and receive a bite, the following actions are necessary.

- Obtain a detailed description of the snake. This and the bite mark will enable medical personnel administering medical aid to provide prompt and correct antidotes, as necessary.
- Immobilize the bite victim to the extent possible. Physical exertion will mobilize the toxins (if poisonous varieties) from the bite point systemically through the body.
- Apply a pressure wrap (for extremities), just above and over the bite area. With a couple wraps of the pressure wrap in place over the bite area, apply a splint, and continue the application of the pressure wrap. The purpose for the splint is to restrict the movement of the extremity, this along with the pressure wrap will aid in restricting the toxins from leaving the site of the bite.
- Seek medical attention immediately.

### 6.3.3 Poisonous Plants

Various plants which can cause allergic reactions may be encountered during field work. These include, poison ivy, poison oak, and poison sumac. Contact with these plants may occur when clearing vegetation for access to work areas, or as a result of movement through these plants. An irritating, allergic reaction can occur after direct contact with the plant or indirect contact through some piece of equipment or clothing article. Oils are transferred from the plant to exposed skin, clothing, or piece of equipment. The degree of the irritating, allergic reaction can vary significantly from one person to the next.

Protective measures to control and minimize the effects of this hazard may include, but not be limited to, the following:

- Identify plants for field personnel.
  - Poison Ivy - Characterized by climbing vines, three leaf configuration ovate to elliptical in shape, deep green leaves with a reddish tint, greenish flowers, and white berries.
  - Poison Sumac - Characterized as a tall bush of the sumac family bearing compound leaves (7-13 entire leaflets), branched from a central axis, drooping, with axillary clusters of white fruit. However, these white fruits and berries may exist only during pubescent stages.
  - Poison oak - Characterized as similar to poison ivy consisting of a shrub, stems erect, 0.3 to 2.0 meters tall, leaflets consist of broad thick lobes coarsely serrated configuration, denser at the base, less so than the top.
- Protective measures may include wearing disposable garments such as Tyvek when clearing brush. These may be carefully removed and disposed of along with any oils accumulated from the plants.
- Personal Hygiene - The oils obtained from the plants will only elicit an allergic response when the person's bare skin layer is contacted. This can be aggravated when skin pores are open (perspiring), or through breaks in the skin such as cuts, nicks, scratches, etc. This can also be accomplished when using excessively hot water for cleaning the skin, which also causes pores to open. Prior to break time, lunchtime, etc. personnel should wash with cool water and soap to remove as much of the oils as possible. In heavily vegetated areas of these plants, additional measures including barrier creams and blocks may be used to prevent the oils from accessing and penetrating the skin.

All of these plants present an airborne sensitization hazard when burned. This is not to occur as part of this scope of work and therefore will not be addressed.

#### 6.3.4 Inclement Weather

Project tasks under this Scope of Work will be performed outdoors. As a result, inclement weather may be encountered. In the event that adverse weather conditions arise (electrical storms, tornados, hailstorms, etc.), the FOL and/or the SSO will be responsible for temporarily suspending or terminating activities until hazardous conditions no longer exist.

Each of these physical hazards is discussed in the Health and Safety Guidance Manual. Additionally, information on these physical hazards and their associated control measures are discussed in Table 5-1 of the site specific HASP.

**TABLE 6-1  
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA  
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Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
RDX Synonym: Cyclo-1,3,5-trimethylene- 2,4,6-trinitramine; Cyclonite; Trimethylenetrini-tramine; T <sub>3</sub> ; RDX	121-82-4	No information found.	Air sampling use particulate filter; gravimetric detection. Sampling and analytical procedures shall be in accordance with NIOSH Method #0500 (Nuisance Dust, Total).	OSHA/NIOSH/ACGIH: 1.5 mg/m <sup>3</sup> (skin); STEL 3 mg/m <sup>3</sup> (skin)	Sensitive to friction, as stable as TNT, explosive when heated to 260°C; 126.6° F  Respiratory Protection: Can use air purifying respirator with an organic vapor cartridge for concentrations up to 75 mg/m <sup>3</sup> . Airborne concentrations above this level use an airline respirator or SCBA.  <b>Recommended Gloves:</b> Impermeable gloves suitable to prevent skin contact. Nitrile gloves have been selected for most other applications.	<b>Boiling Pt:</b> Not available <b>Melting Pt:</b> Pure 399°F; 204.1°C Military grade ~10% HMX ~374°F; ~190°C <b>Freezing Pt:</b> Not available <b>Solubility:</b> Insoluble in water; soluble hot aniline, phenol, and nitric acid <b>Specific Gravity:</b> 1.2 <b>Vapor Pressure:</b> Not available <b>Flash Pt:</b> Heat (explosion in 5 seconds) 500°F; 260°C <b>LEL:</b> Not available <b>UEL:</b> Not available <b>Incompatibles:</b> Strong oxidizers, combustible materials, mercury fulminate, and heat <b>Appearance and odor:</b> Colorless to white crystalline powder, odorless	<b>Routes of exposure:</b> Inhalation, ingestion, skin and eye contact. Sign and symptoms of overexposure may include: headaches, dizziness, nausea, hyperactivity, convulsions, seizures, fatigue, irritability. These effects may be experienced quickly or several hours later. Topically irritating to skin and eyes.
1,1,2,2-Tetrachloroethane	79-34-5	PID: I.P. 11.1 eV, relative response ratio unknown.  FID: 100% response with FID.	Air sample using charcoal tube; carbon disulfide desorption, GC/FID detection. Sampling and analytical protocol in accordance with OSHA Method #07, or NIOSH Method #1003.	OSHA: 5 ppm (skin)  ACGIH; NIOSH: 1 ppm (skin)  IDLH: 100 ppm	Odor threshold for this substance is 7.3 ppm. This level in comparison to the TLV is considered poor. Air purifying elements (organic vapor/acid gas) are recommended for escape purposes only. Combination units (APR/airline respirator) are recommended for working in concentrations in excess of the TLV.  <b>Recommended glove:</b> Butyl rubber 4.6 hrs; solvent dipped, unsupported. PV alcohol >8.00 hrs; Teflon >15.20 hrs; Viton >8.00 hrs	<b>Boiling Pt:</b> 296°F; 147°C <b>Melting Pt:</b> -33 to -47°F; -36 to -43.8°C <b>Solubility:</b> 0.3% <b>Flash Pt:</b> Not available <b>LEL/LFL:</b> Not available <b>UEL/UFL:</b> Not available <b>Vapor Density:</b> Not available <b>Vapor Pressure:</b> 9 mmHg @ 86°F; 30°C <b>Specific Gravity:</b> 1.59 @ 77°F; 25°C <b>Incompatibilities:</b> Strong oxidizers, alkalis, fuming sulfuric acid, and chemically active metals. When heated to decomposition temperatures will emit toxic fumes of chlorine. <b>Appearance and Odor:</b> Colorless to pale yellow liquid with a pungent chloroform like odor.	Overexposure may result in CNS effects including depression, sleepiness, hallucinations, distorted perceptions, tremors(fingers), and stupor (narcosis). Systemically, symptoms may result in nausea, vomiting, abdominal pains, and cramps. May also irritate the eyes, skin, and mucous membranes. Chronic exposures may result in dermatitis, enlarged tender liver, jaundice, hepatitis, kidney, and lung damage.

**TABLE 6-1  
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA  
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Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Arsenic	7440-38-2	Particulate form - This substance is unable to be detected by PID/FID.	Air sample using a particulate filter; acid desorption; AAS detection. Sampling and analytical protocol shall proceed in accordance with NIOSH Method #7900.	OSHA: Organic compounds 0.5 mg/m <sup>3</sup> Inorganic compounds 0.01 mg/m <sup>3</sup>  NIOSH: (Ceiling) 0.002 mg/m <sup>3</sup>  ACGIH: 0.01 mg/m <sup>3</sup>  IDLH: 5 mg/m <sup>3</sup> as arsenic	No identifiable warning properties to indicate presence and thereby detection.  <b>Recommended APR Cartridge:</b> Suitable for dust and fume. Organic vapor acid gases with HEPA filter. This substance may be presented as a pesticide; therefore a cartridge suitable for pesticides (MSA-GMP).  <b>Recommended Gloves:</b> This is in the particulate form. Therefore any glove suitable to prevent skin contact (Nitrile has been the one most widely used for the other substances).	<b>Boiling Pt:</b> sublimation @ 1134°F; 612° C <b>Melting Pt:</b> 1497°F; 814°C @ 36 atm <b>Solubility:</b> Insoluble in water; soluble in nitric acid <b>Flash Pt:</b> Nonflammable, however, airborne in the form of a dust this substance will support combustion <b>LEL/LFL:</b> Nonflammable <b>UEL/UFL:</b> Nonflammable <b>Vapor Density:</b> Not available <b>Vapor Pressure:</b> 1 mmHg @ 372°C (sublimes) <b>Specific Gravity:</b> 5.73 <b>Incompatibilities:</b> Oxidizers, halogens, zinc, lithium, azides, and acetylides <b>Appearance and odor:</b> Gray to black, brittle, crystalline, amorphous, odorless.	Overexposure to this substance through inhalation or ingestion may result in ulceration of the nasal septum. GI disturbances resulting in violent purging and vomiting, hoarse voice, sore throat, excessive salivation, peripheral neuropathy (numbness and burning sensations beginning at the extremities followed by motor weakness), respiratory irritation leading to possible pulmonary edema. Skin or eye contact may result in irritation, conjunctiva, dermatitis, and hyperpigmentation (darkening of the areas exposed) of the skin. This substance has been judged to be a Human carcinogen by NTP, and IARC.
Chromium Compounds	7440-47-3 (Element)	Not detectable by PID. Not detectable by FID.	Air sample using mixed cellulose -ester filter; acid desorption and analysis by atomic absorption. Sampling and analytical protocol shall proceed in accordance with NIOSH Method #7024.	OSHA & NIOSH: (Chromium II, III) 0.5 mg/m <sup>3</sup> (Chromium VI) 0.1 mg/m <sup>3</sup> (Ceiling)  ACGIH: 0.5 mg/m <sup>3</sup> (Chromium II, III compounds), 0.05 mg/m <sup>3</sup> (Chromium VI compounds)  IDLH: 30 mg/m <sup>3</sup> (Chromium VI compounds)	The use of a air purifying, full face-piece respirator with a high efficiency particulate filter for concentrations up to 0.1 mg/m <sup>3</sup> .  <b>Recommended Gloves:</b> This is in particulate form. Therefore any glove suitable to prevent skin contact.	<b>Boiling Pt:</b> 4788°F; 2642°C <b>Melting Pt:</b> 3452°F; 1900°C <b>Solubility:</b> Insoluble <b>Flash Pt:</b> Not applicable (Airborne dust may burn or explode when exposed to heat, flame, or incompatible chemicals) <b>LEL/LFL:</b> Not applicable <b>UEL/UFL:</b> Not applicable <b>Vapor Density:</b> Not available <b>Vapor Pressure:</b> 0 mmHg <b>Specific Gravity:</b> 7.14 <b>Incompatibilities:</b> Strong oxidizers, peroxides, and alkalis <b>Appearance and Odor:</b> Appearance and odor vary depending upon the specific compound.	Health hazards are characterized normally through chronic exposure manifesting as histologic fibrosis of the lungs and ulceration of the nasal septum and skin. IARC, NTP and ACGIH list various chromium compounds as possessing carcinogenic properties.
Lead	7439-92-1	Particulate form - Unable to be detected by either PID or FID.	Air sample using a mixed cellulose ester filter; or HNO <sub>3</sub> or H <sub>2</sub> O <sub>2</sub> desorption; or Atomic absorption detection. NIOSH Method #7082 or #7300.	OSHA: 0.05 mg/m <sup>3</sup>  ACGIH: 0.05 mg/m <sup>3</sup>  NIOSH: 0.10 mg/m <sup>3</sup>  IDLH: 100 mg/m <sup>3</sup> as lead	The use of a air purifying, full-face respirator with high efficiency particulate air filter for up to 2.5 mg/m <sup>3</sup> .  <b>Recommended gloves:</b> This is in the particulate form. Therefore any glove suitable to prevent skin contact (Nitrile has been the one most widely used for the other substances).	<b>Boiling Pt:</b> 3164°F; 1740°C <b>Melting Pt:</b> 621°F; 327°C <b>Solubility:</b> Insoluble <b>Flash Pt:</b> Not applicable (Airborne dust may burn or explode when exposed to heat, flame, or incompatible chemicals) <b>LEL/LFL:</b> Not applicable <b>UEL/UFL:</b> Not applicable <b>Vapor Density:</b> Not available <b>Vapor Pressure:</b> 0 mmHg <b>Specific Gravity:</b> 11.34 <b>Incompatibilities:</b> Strong oxidizers, peroxides, sodium acetylide, zirconium, and acids <b>Appearance and Odor:</b> Metal: A heavy ductile, soft gray solid.	Overexposure to this substance via ingestion or inhalation may result in metallic taste in the mouth, dry throat, thirst, Gastrointestinal disorders (burning stomach pain, nausea, vomiting, possible diarrhea sometimes bloody or black, accompanied by severe bouts of colic), CNS effects (muscular weakness, pain, cramps, headaches, insomnia, depression, partial paralysis possibly coma and death. Extended exposure may result in damage to the kidneys, gingival lead line, brain, and anemia.

**TABLE 6-1  
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA  
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Substance	CAS No.	Air Monitoring/Sampling Information	Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information	
Cyanides (as CN)	varies depending of compound	No information found.	Air sample using filter; analyze using specific ion electrode. Sampling and analytical protocol in accordance with established methodology.	OSHA; ACGIH; NIOSH: 5 mg/m <sup>3</sup> (ceiling)  IDLH: 50 mg/m <sup>3</sup>	Inadequate warning properties; recommend the use of supplied air respirators.  <b>Recommended Gloves:</b> Butyl 1.00 hr.	<b>Boiling Pt:</b> 2725°F; 1496°C <b>Melting Pt:</b> 1047°F; 564°C <b>Solubility:</b> 58% <b>Flash Pt:</b> Not available <b>LEL/LFL:</b> Not available <b>UEL/UFL:</b> Not available <b>Vapor Density:</b> Not available <b>Vapor Pressure:</b> 0 mmHg <b>Specific Gravity:</b> 1.6 <b>Incompatibilities:</b> Strong oxidizers, acids, acid salts, chlorates, and nitrates <b>Appearance and odor:</b> KCN and NaCN are white granular or crystalline solids with a faint almond-like odor	Overexposure may result in chemical asphyxiation and death. Symptoms of exposure include weakness, headache, confusion, nausea, vomiting, increased respiratory rate, slow gasping respirations, irritation of the eyes and skin. Target organs are listed as Cardiovascular system, Central nervous system, liver, kidneys, and skin.
Cyclotetramethylene tetranitramine Octagen, (HMX)	2691-41-0	No information found.	Air sampling use particulate filter; gravimetric detection. Sampling and analytical procedures shall be in accordance with NIOSH Method #0500 (Nuisance Dust, Total).	OSHA/NIOSH: 15 mg/m <sup>3</sup> total dust; 5 mg/m <sup>3</sup> respirable fraction.  ACGIH: 10 mg/m <sup>3</sup> for total dust.	Respiratory Protection: Can use air purifying respirator with an organic vapor cartridge for concentrations up to 75 mg/m <sup>3</sup> . Airborne concentrations above this level use an airline respirator or SCBA.  <b>Recommended Gloves:</b> Impermeable gloves suitable to prevent skin contact. Nitrile gloves have been selected for most other applications.	<b>Boiling Pt:</b> Not available <b>Melting Pt:</b> 530°F; 276.7°C <b>Freezing Pt:</b> Not available <b>Solubility:</b> Not available <b>Specific Gravity:</b> Not available <b>Vapor Pressure:</b> Not available <b>Flash Pt:</b> Not available <b>LEL:</b> Not available <b>UEL:</b> Not available  <b>Incompatibles:</b> Not available  <b>Appearance:</b> White powder	<b>Routes of exposure:</b> Inhalation, ingestion, and skin and eye contact.  Signs and symptoms of overexposure will be similar to those specified for RDX.
1,2-Dichloroethylene	540-59-0	PID: I.P. 9.65 eV, high response with PID and 10.2 eV lamp.  FID: 50% response with FID.	Air sample using charcoal tube; and carbon disulfide desorption; Sampling and analytical protocol in accordance with OSHA Method #07; and NIOSH Method #1003.	OSHA; NIOSH; ACGIH: 200 ppm  IDLH: 1000 ppm	Adequate- odor threshold 0.085-17 ppm. Use organic vapor/acid gas cartridges for exceedances above the TWA up to 1,000 ppm. > 1,000 ppm should use pressure-demand supplied air respirator above exposure limits.  <b>Recommended glove:</b> nitrile - 0.12 hrs; viton - 0.95 hrs	<b>Boiling Pt:</b> 117°F; 47°C <b>Melting Pt:</b> 7°F; -13.8°C <b>Solubility:</b> 0.4% <b>Flash Pt:</b> 36°F; 2.2°C <b>LEL/LFL:</b> 5.6% <b>UEL/UFL:</b> 12.8% <b>Vapor Density:</b> 2.0 <b>Vapor Pressure:</b> 180-260 mmHg <b>Specific Gravity:</b> 1.27 @ 90°F; 32°C <b>Incompatibilities:</b> Strong oxidizers, alkalis, potassium hydroxide, and copper. When heated to decomposition temperatures will emit toxic fumes of phosgene. <b>Appearance and Odor:</b> Colorless liquid with an acrid odor.	Overexposure may result in CNS depression with potential to cause sleepiness, hallucinations, distorted perceptions, and stupor (narcosis). Systemically, symptoms may result in nausea, vomiting, weakness, tremors, and cramps. May also irritate the eyes, skin, and mucous membranes. Chronic exposures may result in dermatitis, liver, kidney, and lung damage.

**TABLE 6-1  
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA  
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Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
1,1,1- Trichloroethane (Methyl Chloroform)	71-55-6	PID: I.P. 11.00 eV. High response with PID and 11.7 eV lamp.  FID: 105% response with FID.	Air sample using charcoal tube; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol shall proceed in accordance with OSHA 14 or NIOSH Method 1003.	OSHA and ACGIH: 350 ppm  ACGIH STEL: 450 ppm  NIOSH: 350 ppm (ceiling - 15 minutes)  IDLH: 700 ppm	Questionable warning properties - Odor threshold 390 ppm. Can use full-face air-purifying respirator with organic vapor cartridges for concentrations below 700 ppm.  <b>Recommended glove:</b> Pv Alcohol gloves are recommended for handling free product (> 9.00 hours). Nitrile gloves are adequate for short-term handling of free product or when low concentrations are present in sample media (soils, water, sediments, etc.).	<b>Boiling Pt:</b> 165°F; 74°C <b>Melting Pt:</b> N/A <b>Solubility:</b> 0.4 % <b>Flash Pt:</b> Unknown <b>LEL/LFL:</b> 7.5% <b>UEL/UFL:</b> 12.5% <b>Vapor Density:</b> Unknown <b>Vapor Pressure:</b> 100 mmHg @ 70°F; 21°C <b>Specific Gravity:</b> 1.34 <b>Incompatibilities:</b> Strong caustics, strong oxidizers, chemically-active metals such as zinc, aluminum, magnesium, powders, sodium, potassium, and water. <b>Appearance and odor:</b> Colorless liquid with a mild chloroform-like odor.	Symptoms of exposure include irritation of the eyes and skin, headache, central nervous system (CNS) depression, poor equilibrium, cardiac arrhythmia, and dermatitis. Prolonged or repeated exposure to 1,1,1 -TCA may cause liver damage.  Target organs include the eyes, skin, CNS, and liver.
Trichloroethylene	79-01-6	PID: I.P. 9.45 eV, High response with PID and 10.2 eV lamp.  FID: 70% Response with FID.	Air sample using charcoal tube; carbon disulfide desorption; Sampling and analytical protocol shall proceed in accordance with OSHA Method #07, or NIOSH Method #1022 or #1003.	OSHA: 50 ppm 200 ppm (Ceiling)  ACGIH: 50 ppm 100 ppm STEL  NIOSH: 25 ppm  IDLH: 1000 ppm	Inadequate - Odor threshold 82 ppm. APRs with organic vapor/acid gas cartridges may be used for escape purposes. Exceedances over the exposure limits require the use of positive pressure-demand supplied air respirator.  <b>Recommended gloves:</b> PV Alcohol unsupported >16.00 hrs; Silver shield >6.00 hrs; Teflon >24.00 hrs; or Viton >24.00 hrs; Nitrile (Useable time limit 0.5 hr, complete submersion for the nitrile selection)	<b>Boiling Pt:</b> 188°F; 86.7°C <b>Melting Pt:</b> -99°F; -73°C <b>Solubility:</b> 0.1% @ 77°F; 25°C <b>Flash Pt:</b> 90°F; 32°C <b>LEL/LFL:</b> 8% @ 77°F; 25°C <b>UEL/UFL:</b> 10.5 @ 77°F; 25°C <b>Vapor Density:</b> 4.53 <b>Vapor Pressure:</b> 100 mmHg @ 90°F; 32°C <b>Specific Gravity:</b> 1.46 <b>Incompatibilities:</b> Strong caustics and alkalis, chemically active metals (barium, lithium, sodium, magnesium, titanium, and beryllium) <b>Appearance and Odor:</b> Colorless liquid with a chloroform type odor. Combustible liquid, however, burns with difficulty.	Central nervous system effects including euphoria, analgesia, anesthesia, paresthesia, headaches, tremors, vertigo, and somnolence. Damage to the liver, kidneys, heart, lungs, and skin have also been reported. Contact may result in irritation to the eyes, skin, and mucous membranes. Ingestion may result in GI disturbances including nausea, and vomiting. NIOSH lists this substance a potential human carcinogen.

**TABLE 6-1  
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA  
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Substance	CAS No.	Air Monitoring/Sampling Information	Exposure Limits	Warning/Property Rating	Physical Properties	Health Hazard Information
Manganese	7439-96-5 as Mn	Particulate form - This substance is unable to be detected by PID/FID.	Air sample using particulate filter; acid desorption, ICP detection. Sampling and analytical protocol shall proceed in accordance with NIOSH Method #7300.  OSHA: Ceiling 5 mg/m <sup>3</sup> as a fume 1 mg/m <sup>3</sup>  NIOSH: 1 mg/m <sup>3</sup> for dust and fume 3 mg/m <sup>3</sup> as a STEL  ACGIH: 5 mg/m <sup>3</sup> for dust 1 mg/m <sup>3</sup> for fume  IDLH: 500 mg/m <sup>3</sup>	No identifiable warning properties to indicate presence and thereby detection.  Recommended APR Cartridge: Suitable for dust and fume. Organic vapor acid gases with HEPA filter.  Recommended gloves: This is in the particulate form. Therefore any glove suitable to prevent skin contact (Nitrile has been the one most widely used for the other substances).	Boiling Pt: 3452°F; 1900°C Melting Pt: 2300°F; 1260°C Solubility: Insoluble Flash Pt: Not available (Airborne dust may burn or explode when exposed to heat, flame, or incompatible chemicals. This substance is considered a combustible solid.) LEL/LFL: Not available UEL/UFL: Not available Vapor Density: Not available Vapor Pressure: 1 mmHg @ 2358°F; 1292°C Specific Gravity: 7.20 Incompatibilities: Strong oxidizers, halogens, and nitrates. Will react with water to produce hydrogen gas. Appearance and odor: Silvery solid or reddish-gray, odorless	Overexposure to this product may result in Central Nervous System and pulmonary effects by inhalation. Symptoms may include disturbances in gait and speech, sleepiness, mental confusion, stolid, masklike face, muscular twitching varying from tremors to coarse rhythmical movements of the extremities accompanied by cramps. Symptoms are described as postencephalitic Parkinsonism. Additionally dry throat, tightness in the chest, dyspnea, rales, flu-like symptoms low back pain, and vomiting.
Zinc	7440-66-6	Particulate form - This substance is not detectable using a PID or FID.	Air sample using a particulate filter; acid desorption; AAS detection. Sampling and analytical protocol will proceed in accordance with NIOSH Method #7300.  OSHA: 10 mg/m <sup>3</sup> (Total dust) 5 mg/m <sup>3</sup> (Respirable fraction)  NIOSH: 5 mg/m <sup>3</sup> ,  Ceiling: 15 mg/m <sup>3</sup>  ACGIH: 0.01 mg/m <sup>3</sup>	No identifiable warning properties to indicate presence and thereby detection.  Recommended APR Cartridge: Suitable for dust and fume. Organic vapor acid gases with HEPA filter.  Recommended gloves: This is in the particulate form. Therefore any glove suitable to prevent skin contact (Nitrile has been the one most widely used for the other substances).	Boiling Pt: 1666°F; 908°C Melting Pt: 788°F; 419.8°C Solubility: Insoluble Flash Pt: Not available (Airborne dust may burn or explode when exposed to heat, flame, or incompatible chemicals) LEL/LFL: Not available UEL/UFL: Not available Vapor Density: Not available Vapor Pressure: 0 mmHg Specific Gravity: 7.14 Incompatibilities: Strong acids, halogens, catalytic metals, combustibles, oxidizers, nitril fluoride Appearance and odor: Bluish-white, lustrous metal, odorless	Inhalation of fumes may result in metal fume fever. This condition is characterized by metallic taste, dryness of the throat, coughing with generalized aching and flu-like symptoms. Effects through ingestion may include coughing, difficulty in breathing, and sweating. A human skin irritant. Irritation to the eyes may result from mechanical action.

**TABLE 6-1  
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA  
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Substance	CAS No.	Air Monitoring/Sampling Information	Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information	
Barium	7440-39-3 as Ba  10022-31-8 as Ba (NO <sub>3</sub> ) <sub>2</sub>  10361-37-2 as Ba Cl <sub>2</sub>	Particulate form - This substance is unable to be detected by PID/FID.	Air sample using particulate filter; water desorption; AAS detection. Sampling and analytical protocol shall proceed in accordance with NIOSH Method #7056.	OSHA; NIOSH; ACGIH: 0.5 mg/m <sup>3</sup>  IDLH: 50 mg/m <sup>3</sup>	No identifiable warning properties to indicate presence and thereby detection.  Recommended APR Cartridge: Suitable for dust and fume. Organic vapor acid gases with HEPA filter.  Recommended gloves: This is in the particulate form. Therefore any glove suitable to prevent skin contact (Nitrile has been the one most widely used for the other substances).	<b>Boiling Pt: 2984°F 1640°C (decomposes)</b> <b>Melting Pt: 1337°F 725°C</b> <b>Solubility: Varies between compounds 9/38%</b> <b>Flash Pt: Not available (Airborne dust may burn or explode when exposed to heat, flame, or incompatible chemicals)</b> <b>LEL/LFL: Not available</b> <b>UEL/UFL: Not available</b> <b>Vapor Density: Not available</b> <b>Vapor Pressure: 10 mmHg @ 1920°F 1049°C</b> <b>Specific Gravity: 3.5</b> <b>Incompatibilities: Acids, oxidizers</b> <b>Appearance and odor: Silver to white, odorless</b>	Overexposure to this substance results in the solubilization in the water or stomach acids. Symptoms include vomiting, colic, diarrhea (watery sometimes bloody), slow to irregular pulse, transient hypertension, convulsive tremors, and muscular paralysis resulting in stiffness immobility, leg cramps, twitching, and impairment of speech and swallowing. Overexposure to some compounds via inhalation may result in respiratory distress, dyspnea, and baritosis (a benign pneumoconiosis). Direct contact to the skin or eyes may result in irritation.

## 7.0 AIR MONITORING

Direct reading instruments will be used at the site to evaluate the presence of detectable site contaminants and other potentially hazardous conditions. As a result, specific air monitoring measures and requirements are established in Table 5-1 pertaining to the specific hazards and tasks of an identified operation. Additionally, the Health and Safety Guidance Manual, Section 1.0, contains detailed information regarding direct reading instrumentation, as well as general calibration procedures of various instruments.

### 7.1 INSTRUMENTS AND USE

Instruments will be used primarily to monitor source points and worker breathing zone areas, while observing instrument action levels. Action levels are discussed in Table 5-1 as they may apply to a specific task or location.

#### 7.1.1 Photoionization Detector or Flame Ionization Detector

In order to accurately monitor for any substances which may present an exposure potential to site personnel, a Photoionization Detector (PID) using a lamp energy of 11.7 eV or higher will be used. This instrument will be used to monitor potential source areas (boreholes, monitoring wells, free product recovery, etc.) and to screen the breathing zones of employees during site activities. The PID has been selected because it is capable of detecting potential organic vapors of concern (NOTE: A Flame Ionization Detector [FID] may be used as an alternative to the PID).

Prior to the commencement of any field activities, the background levels of the site must be determined and noted. Daily background readings will be taken away from any areas of potential contamination. These readings, any influencing conditions (i.e., weather, temperature, humidity) and site location must be documented in the field operations logbook or other site documentation (e.g., sample log sheet).

#### 7.1.2 Hazard Monitoring Frequency

Table 5-1 presents the frequencies that hazard monitoring will be performed as well as the action levels which will initiate the use of elevated levels of protection. The SSO may decide to increase these frequencies based on instrument responses and site observations. The frequency at which monitoring is performed will not be reduced without the prior consent of the PHSO or HSM.

## 7.2 INSTRUMENT MAINTENANCE AND CALIBRATION

Hazard monitoring instruments will be maintained and pre-field calibrated by the Tetra Tech NUS Equipment Manager. Operational checks and field calibration will be performed on all instruments each day prior to their use. Field calibration will be performed on instruments according to manufacturer's recommendations (for example, the PID must be field calibrated daily and an additional field calibration must be performed at the end of each day to determine any significant instrument drift). These operational checks and calibration efforts will be performed in a manner that complies with the employees health and safety training, the manufacturer's recommendations, and with the applicable manufacturer standard operating procedure (copies of which can be found in the Health & Safety Guidance Manual which will be maintained on site for reference). All calibration efforts must be documented. Figure 7-1 is provided for documenting these calibration efforts. This information may instead be recorded in a field operations logbook, provided that all of the information specified in Figure 7-1 is recorded. This required information includes the following:

- Date calibration was performed
- Individual calibrating the instrument
- Instrument name, model, and serial number
- Any relevant instrument settings and resultant readings (before and after) calibration
- Identification of the calibration standard (lot no., source concentration, supplier)
- Any relevant comments or remarks



## 8.0 TRAINING/MEDICAL SURVEILLANCE REQUIREMENTS

### 8.1 INTRODUCTORY/REFRESHER/SUPERVISORY TRAINING

#### 8.1.1 Requirements for Tetra Tech NUS Personnel

All Tetra Tech NUS personnel must complete 40 hours of introductory hazardous waste site training in accordance with 29 CFR 1910.120(e) prior to performing work at NSWC Crane. Additionally, Tetra Tech NUS personnel who have had introductory training more than 12 months prior to site work must have completed 8 hours of refresher training within the past 12 months before being cleared for site work. 8-hour Supervisory Training in accordance with 29 CFR 1910.120(e)(4) will be required for site supervisory personnel.

Documentation of Tetra Tech NUS Health and Safety Training will be maintained at the project site. Copies of certificates or other official documentation will be used to fulfill this requirement.

At the request of the U.S. Navy, Tetra Tech NUS will conduct a brief meeting daily to discuss operations planned for that day. At the end of the workday, a short meeting will be held to discuss the operations completed and any problems that were encountered.

#### 8.1.2 Requirements for Subcontractors

All Tetra Tech NUS subcontractor drilling personnel must have completed introductory hazardous waste site training or equivalent work experience as defined in OSHA Standard 29 CFR 1910.120(e) and 8 hours of refresher training meeting the requirements of 29 CFR 1910.120(e)(8) prior to performing field work at NSWC Crane. Surveyors are only required to have the OSHA HAZWOPER training when they could possibly be exposed to hazardous chemicals. Tetra Tech NUS subcontractors must certify that each employee has had such training by sending Tetra Tech NUS a letter, on company letterhead, containing the information in the example letter provided in Figure 8-1, and providing copies of all training certificates.

**FIGURE 8-1**  
**TRAINING LETTER**

The following statements must be typed on company letterhead and signed by an officer of the company and accompany copies of associated training certificates:

LOGO  
XYZ CORPORATION  
555 E. 5th Street  
Nowheresville, Kansas 55555

Month, day, year

Ralph Basinski  
Project Manager  
Tetra Tech NUS  
Foster Plaza 7  
661 Andersen Drive  
Pittsburgh, Pennsylvania 15220

Subject: HAZWOPER Training for NSWG Crane

Dear Mr. Basinski:

As an officer of XYZ Corporation, I hereby state that I am aware of potential hazardous nature of the subject project. I also understand that it is our responsibility to comply with all applicable occupational safety and health regulations including those stipulated in Title 29 of the Code of Federal Regulations (CFR), Parts 1900 through 1910 and Part 126.

I also understand that Title 29 CFR 1910.120 entitled "Hazardous Waste Operations and Emergency Response" requires appropriate level of training for certain employees engaged in hazardous waste operations. In this regard, I hereby state that the following employees have had 40 hours of introductory hazardous waste site training or equivalent work experience as requested by 29 CFR 1910.120(e) and have had 8 hours of refresher training as required by 29 CFR 1910.120(e)(8).

LIST FULL NAMES OF EMPLOYEES AND THEIR SOCIAL SECURITY NUMBERS HERE

Should you have any questions, please contact me at (555) 555-5555.

Sincerely,

(Name of Company Officer)

## 8.2 SITE-SPECIFIC TRAINING

Tetra Tech NUS will provide site-specific training to all Tetra Tech NUS employees and subcontractor personnel who will perform work on this project. Site-specific training will also be provided to all site visitors (DOD, EPA, etc.) who may enter the site to perform functions that may or may not be directly related to site operations. Site-specific training will include:

- Names of personnel and alternates responsible for site safety and health
- Safety, health and other hazards present on site
- Use of personal protective equipment
- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure to site contaminants
- The contents of the site-specific health and safety plan including the contents of Table 5-1 and 6-1.
- Emergency response procedures (evacuation and assembly points)
- Spill response procedures
- Review the contents of relevant Material Safety Data Sheets
- Review Safe Work Permits
- UXO Procedures

Site-specific documentation will be established through the use of Figure 8-2. All site personnel and visitors must sign this document upon receiving site-specific training prior to commencement of site activities.

## 8.3 MEDICAL SURVEILLANCE

### 8.3.1 Medical Surveillance Requirements For Tetra Tech NUS Personnel

All Tetra Tech NUS personnel participating in project field activities will have had a physical examination meeting the requirements of Tetra Tech NUS' medical surveillance program and will be medically qualified to perform hazardous waste site work using respiratory protection.

Documentation for medical clearances will be maintained in the Tetra Tech NUS Pittsburgh office and made available as necessary.



### 8.3.2 Medical Surveillance Requirements For Subcontractors

Subcontractor personnel are required to obtain a certificate of their ability to perform hazardous waste site work and to wear respiratory protection. The "Subcontractor Medical Approval Form" provided in Figure 8-3 of this HASP shall be used to satisfy this requirement providing that it is properly completed and signed by a licensed physician.

Subcontractors who have a company medical surveillance program meeting the requirements of paragraph (f) of OSHA 29 CFR 1910.120 can substitute "Subcontractor Medical Approval Form" with a letter, on company letterhead, containing all of the information in the example letter presented in Figure 8-4.

### 8.3.3 Requirements for All Field Personnel

Each field team member (including subcontractors and visitors entering the exclusion zone) shall be required to complete and submit a copy of the Medical Data Sheet found in the Tetra Tech NUS Health and Safety Guidance Manual. This shall be provided to the SSO prior to participating in site activities. The purpose of this document is to provide site personnel and emergency responders with additional information that may be necessary in order to administer medical attention.

### 8.4 **SUBCONTRACTOR EXCEPTION**

Subcontractors and surveyors who will not enter the exclusion zone during operation, and whose activities involve no potential for exposure to site contaminants, will not be required to meet the requirements for training/medical surveillance, other than site-specific training as stipulated in Section 8-2. **The use of this type of exemption is permissible only with the prior consent of the CLEAN HSM.**

FIGURE 8-3

SUBCONTRACTOR MEDICAL APPROVAL FORM

For employees of \_\_\_\_\_  
Company Name

Participant Name: \_\_\_\_\_ Date of Exam: \_\_\_\_\_

**Part A**

The above-named individual has:

1. Undergone a physical examination in accordance with OSHA Standard 29 CFR 1910.120, paragraph (f) and found to be medically -  
 qualified to perform work at the NSWC Crane work site  
 not qualified to perform work at the NSWC Crane work site  
and,
2. Undergone a physical examination as per OSHA 29 CFR 1910.134(b)(10) and found to be medically -  
 qualified to wear respiratory protection  
 not qualified to wear respiratory protection

My evaluation has been based on the following information, as provided to me by the employer.

- A copy of OSHA Standard 29 CFR 1910.120 and appendices.
- A description of the employee's duties as they relate to the employee's exposures.
- A list of known/suspected contaminants and their concentrations (if known).
- A description of any personal protective equipment used or to be used.
- Information from previous medical examinations of the employee which is not readily available to the examining physician.

**Part B**

I, \_\_\_\_\_, have examined \_\_\_\_\_  
Physician's Name (print) Participant's Name (print)  
and have determined the following information:

**FIGURE 8-3  
SUBCONTRACTOR MEDICAL APPROVAL FORM  
PAGE TWO**

1. Results of the medical examination and tests (excluding finding or diagnoses unrelated to occupational exposure):

---

---

---

2. Any detected medical conditions that would place the employee at increased risk of material impairment of the employee's health:

---

---

---

3. Recommended limitations upon the employee's assigned work:

---

---

---

I have informed this participant of the results of this medical examination and any medical conditions that require further examination or treatment.

Based on the information provided to me, and in view of the activities and hazard potentials involved at the NSWC Crane work site, this participant

- may
- may not

perform his/her assigned task.

Physician's Signature \_\_\_\_\_

Address \_\_\_\_\_

Phone Number \_\_\_\_\_

NOTE: Copies of test results are maintained and available at:

\_\_\_\_\_  
Address

**FIGURE 8-4**

**MEDICAL SURVEILLANCE LETTER**

The following statements must be typed on company letterhead and signed by an officer of the company:

LOGO  
XYZ CORPORATION  
555 E. 5th Street  
Nowheresville, Kansas 55555

Month, day, year

Ralph Basinski  
Project Manager  
Tetra Tech NUS  
Foster Plaza 7  
661 Andersen Drive  
Pittsburgh, Pennsylvania 15220

Subject: Medical Surveillance for NSWC Crane

Dear Mr. Basinski:

As an officer of XYZ Corporation, I hereby state that the persons listed below participate in a medical surveillance program meeting the requirements contained in paragraph (f) of Title 29 of the Code of Federal Regulations (CFR), Part 1910.120 entitled "Hazardous Waste Operations and Emergency Response" I further state that the persons listed below have had physical examinations under this program within the past 12 months and that they have been cleared, by a licensed physician, to perform hazardous waste site work and to wear positive and negative pressure respiratory protection. I also state that, to my knowledge, no person listed below has any medical restriction that would preclude him/her from working at the NSWC Crane Site.

LIST FULL NAMES OF EMPLOYEES AND THEIR SOCIAL SECURITY NUMBERS HERE

Should you have any questions, please contact me at (555) 555-5555.

Sincerely,

(Name of Company Officer)

## **9.0 SPILL CONTAINMENT PROGRAM**

### **9.1 SCOPE AND APPLICATION**

During this operation hazardous soils and waters are not expected to be encountered. Purge fluids and sampling decontamination fluids will be collected and discharged into the NSWC Crane sanitary sewer system at a designated location. All soil cuttings will be screened for VOC's. If readings are at background levels, the soil will be mixed with bentonite and used to fill the well.

### **9.2 HAZARDOUS SOILS AND FLUIDS**

Quantities of bulk potentially hazardous materials (greater than 55-gallons) will not be handled during site activities conducted as part of the scope of work. If for some reason significant quantities of hazardous waste water (decontamination, and purge) and hazardous Investigative-Derived Wastes (IDW) are generated as part of site activities the following procedures will be applied. As needed, 55 -gallon drums will be used to contain hazardous waste waters, IDW, and other unwanted items generated during investigatory activities. These drums will be labeled with the site name (SWMU, AOC, or IRP Site and location), drum number, the type of contents (purge waters), volume, the date, point of contact with telephone number.

Samples will be analyzed to characterized the material and determine appropriate disposal measures. Once characterized they can be removed from the staging area and disposed of in accordance with Federal, State and local regulations.

### **9.3 POTENTIAL SPILL AREAS**

Potential spill areas will be monitored in an ongoing attempt to prevent and control further potential contamination of the environment. Currently, there are various areas vulnerable to this hazard including the following:

- Areas used for central staging of resources
- Areas used for central staging of IDW materials
- Decontamination area

Additionally, areas designated for handling, loading, and unloading of potentially contaminated waters, and debris present limited potential for leaks or spills. Monitoring of these areas will be done at least weekly.

### **9.3.1 Site Drums/Containers**

All drums/containers used for containing liquids will be sealed, labeled, and staged within a centralized area awaiting shipment or disposal. Drums used for the storage and transportation of IDW will meet the packaging requirements for steel drums category U.N. 1A2, removable head as specified in paragraph 9.6.1, United Nations Transport of Dangerous Goods.

#### **9.3.1.1 Staging Area Configuration**

The staging area will be configured to support this spill prevention and control program. The area will be configured as follows:

- Where possible secondary containment will be provided. For liquids, this will include a bermed area sufficient in size to hold 10% of the total volume of liquids or the volume of largest container, whichever is greater. This calculation of secondary containment will also consider any displacement by containers or pallets. This bermed area will be lined (plastic liner or other impermeable surface) to prevent any spillage inside the containment from saturating the ground.
- Drums will be organized no more than four to a pallet. The drums label and the head bolt arranged as such to permit reading/review or removal of the head without requiring the drum to be moved on the pallet. Drums will be segregated to site and media. A minimum of two feet shall be maintained between each row of pallets to permit access for spill response measures.

### **9.4 LEAK AND SPILL DETECTION**

To establish an early detection of potential spills or leaks, a periodic (once a week) walk around by the SSO will be conducted during working hours to visually determine 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, or sand, which will be stored at the staging area in a conspicuously marked drum. This material too, will be containerized for disposal pending analyses. All inspections will be documented in the project logbook.

## **9.5 PERSONNEL TRAINING AND SPILL PREVENTION**

All 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.

## **9.6 SPILL PREVENTION AND CONTAINMENT EQUIPMENT**

The following represents the minimum equipment which will be maintained at the staging area at all times for the purpose of supporting this Spill Prevention/Containment Program.

Spill Response Equipment:

- Sand, clean fill, vermiculite, or other noncombustible absorbent (oil-dry);
- Drums (55-gallon U.N 1A2)
- Portable storage tanks or additional drums
- Shovels, rakes, and brooms
- Labels

PPE stored at the staging area:

- Rubber boot covers, nitrile outer gloves, PVC rain-suit or other form of impermeable splash protection, should it be required.

## **9.7 SPILL CONTROL PLAN**

This section describes the procedures the Tetra Tech NUS field crew members will employ upon the detection of a spill or leak.

- 1) Notify the SSO or FOL immediately upon the detection of a leak or spill.
- 2) Employ the personnel protective equipment stored at the staging area. Take immediate actions to stop the leak or spill by plugging or patching the drum or raising the leak to the highest point. Spread the absorbent material in the area of the spill covering completely.
- 3) Transfer the material to a new container, collect and containerize the absorbent material. Label the new container appropriately. Await analyses for treatment or disposal options.

- 4) All spills occurring on soils, grassy areas, gravel lots will be re-containerized including 2-inches of top cover on which the spill occurred, and await test results for treatment or disposal options.

It is not anticipated that a spill will occur in which the field crews cannot handle. Should this occur notification of appropriate emergency response agencies will be carried out by the FOL or SSO.

## 10.0 SITE CONTROL

This section outlines the means by which Tetra Tech NUS will delineate work zones and use these work zones in conjunction with decontamination procedures to prevent the spread of contaminants into previously unaffected areas of the site. It is anticipated that a three-zone approach will be used during work at this site. This three zone approach will utilize an exclusion zone, a contamination reduction zone, and a support zone. It is also anticipated that this control measure will be used to control access to site work areas. Use of such controls will restrict the general public, minimize the potential for the spread of contaminants, and protect individuals who are not cleared to enter work areas.

### 10.1 EXCLUSION ZONE

The exclusion zone will be considered those areas of the site of known or suspected contamination. It is not anticipated that significant amounts of surface contamination are present in the proposed work areas of this site. The exclusion zone for this activity will be fragmented to represent the areas where the soil is disturbed through intrusive activities. When necessary, exclusion zones will be delineated using barrier tape, cones and/or drive poles, and postings to inform personnel other than the field crew. The exclusion zones for this project will be limited to those areas of the site where active work is being performed:

- Monitoring well installation (Hollow stem auger, Air rotary, Direct Push Technology). The exclusion zone for this activity will be set at the height of the mast, plus five feet surrounding the point of operation, with a minimum of 25 feet. This distance will also apply when subsurface soil sampling from behind these type rigs.
- Monitoring well development and sampling. The exclusion zone for this activity will be set at 10 feet surrounding the well head and discharge collection container.
- Decontamination operation. The exclusion zone for this activity will be set at 25 feet surrounding the gross contamination wash and rinse as well as 25 feet surrounding the heavy equipment decontamination area.
- Investigative Derived Waste (IDW) area will be delineated. Only authorized personnel should be allowed access.

#### 10.1.1 Exclusion Zone Clearance

Access to work areas will be controlled by Tetra Tech NUS personnel. No persons will be permitted to enter site exclusion zones without site-specific training. Site visitors will be provided site-specific training and will be escorted by Tetra Tech NUS personnel at all times (see Section 10.4).

## **10.2 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. The personnel and equipment decontamination will not take place in this area, but will take place at a central location established for this project. This area instead will serve as a focal point in supporting exclusion zone activities. When applicable, this area will be delineated using barrier tape, cones and/or drive poles, and postings to inform and direct facility personnel.

## **10.3 SUPPORT ZONE**

The support zone for this project will be the area where site vehicles will be parked, equipment will be unloaded, and where food and drink containers will be maintained. In all cases, the support zones will be established at areas of the site where exposure to site contaminants would not be expected during normal working conditions or foreseeable emergencies.

## **10.4 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 NUS
- Regulatory personnel (EPA, OSHA, etc.)
- NSWCrane or DOD Personnel
- Other authorized visitors

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

Once access to NSWCrane is obtained all personnel who require site access into areas of ongoing operations will be required to obtain permission from the FOL and SSO. The prerequisites for all site visitors wishing to observe operations in progress in the exclusion zone are discussed below:

- All site visitors will be routed to the FOL, who will sign them into the field logbook. Information to be recorded in the logbook will include the individual's name (proper identification required), the entity which they represent, and the purpose of the visit.

- All site visitors will be required to produce the necessary information supporting clearance to the site. This shall include information attesting to applicable training (40-hours of HAZWOPER training) and medical surveillance as stipulated in Section 8.0 of this document. In addition, to enter the site operational zones during planned activities, all visitors will be required to first go through site-specific training covering the topics stipulated in Section 8.2 of this HASP.

Once the site visitors have completed the above items, they will be permitted to enter the operational zone. All visitors are required to observe the protective equipment and site restrictions in effect at the site at the time of their visit. Any unauthorized site visitation will cause the termination of all on-site activities until the unauthorized visitor is removed from the area. Removal of unauthorized visitors will be accomplished with support from the Base Contact and Base Security. All site visitors granted access to the exclusion zones during ongoing operations will be escorted by a Tetra Tech NUS representative (arranged for by the FOL) at all times while the visitor remains in the exclusion zone.

#### **10.5 SITE SECURITY**

Tetra Tech NUS will retain control over active operational areas. The FOL will serve as a focal point for site personnel, and will serve as the final line of security for the work areas. As stated above all work will cease in the event of unauthorized personnel entering the exclusion zone. Work will remain temporarily suspended until the unauthorized visitor can be removed. The Base Contact will serve as the primary enforcement contact for removing unauthorized visitors.

#### **10.6 SITE MAP**

Once the areas of contamination, access routes, utilities, topography, and dispersion routes are determined, a site map will be generated and adjusted as site conditions change. These maps will show utility locations, potential points of contact with the public, roadways, and other significant characteristics that may impact site operations and safety. Site maps will be posted to illustrate up-to-date collection of contaminants and adjustment of zones and access points.

#### **10.7 BUDDY SYSTEM**

Personnel engaged in on-site activities will practice the "buddy system" to ensure the safety of all personnel involved in this operation.

#### **10.8 MATERIAL SAFETY DATA SHEET (MSDS) REQUIREMENTS**

Tetra Tech NUS personnel will provide MSDSs for all chemicals brought on-site. The contents of these documents will be reviewed by the SSO with the user(s) of the chemical substances prior to any actual

use or application of these substances on site. A chemical inventory of all chemicals used on site will be developed. (See Section 5.0 of the Health and Safety Guidance Manual) A copy of the Chemical Inventory List will be provided to the Fire Department, as they would serve as primary responders to the work/storage building should the need arise. The MSDSs will then be maintained in a central location and will be available for anyone to review upon request.

## **10.9 COMMUNICATION**

As personnel may not always be working in proximity to one another during field activities, a supported means of communication between field crews will be used as necessary. As a result, two-way radio communication devices will be used by field personnel while at the site. All two-way radio communications intended for use at NSWCC Crane, will have GSA approval prior to being brought on-site for use.

External communication will be accomplished by using provided telephones at the site. External communication will primarily be used for the purpose of resource and emergency resource communications.

## **10.10 SAFE WORK PERMITS**

All exclusion zone work conducted in support of this project will be performed using Safe Work Permits (SWPs) to guide and direct field crews on a task by task basis. An example of the SWP to be used is illustrated in Figure 10-1. Attachment V contains partially completed SWP for tasks that are to be performed as part of the investigation. Information such as field crew performing the task, date, time, procedure reviews, and equipment preparation information need to be completed by the FOL or SSO prior to the initiation of site activities. SWPs will be further supported by the daily safety meetings. This effort will ensure all site specific considerations and changing conditions are incorporated into the planning effort. All permits will require the signature of the FOL and/or SSO. All personnel engaged in on-site activities will be aware of the elements indicating levels of protection and precautionary measures to be used.

Use of these permits will provide the communication line for reviewing protective measures and hazards associated with each operation. This HASP will be used as the primary reference for selecting levels of protection and control measures. The SWP will take precedence over the HASP when more conservative measures are required based on specific site conditions.

Upon completion of work specified on the SWP, the person accepting the permit will return it to the SSO.

Any problems encountered regarding control measures taken will be annotated on the permit or a separate sheet of paper and returned to the SSO for review and evaluation.

**FIGURE 10-1  
SAFE WORK PERMIT**

Permit No. \_\_\_\_\_ Date: \_\_\_\_\_ Time: From \_\_\_\_\_ to \_\_\_\_\_

**SECTION I: General Job Scope** (To be filled in by person performing work)

- I. Work limited to the following (description, area, equipment used): \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
- II. Names: \_\_\_\_\_  
 \_\_\_\_\_
- III. On-site Inspection conducted  Yes  No Initials of Inspector \_\_\_\_\_  
TtNUS                      NTC Orlando

**SECTION II: General Safety Requirements** (To be filled in by permit issuer)

- IV. Protective equipment required                      Respiratory equipment required
- |                                  |                                  |  |   |
|----------------------------------|----------------------------------|--|---|
| Level D <input type="checkbox"/> | Level B <input type="checkbox"/> | Full face APR <input type="checkbox"/> | Escape Pack <input type="checkbox"/>    |
| Level C <input type="checkbox"/> | Level A <input type="checkbox"/> | Half face APR <input type="checkbox"/> | SCBA <input type="checkbox"/>           |
| Detailed on Reverse              |                                  | SKA-PAC SAR <input type="checkbox"/>   | Bottle Trailer <input type="checkbox"/> |
|                                  |                                  | Skid Rig <input type="checkbox"/>      | None <input type="checkbox"/>           |
- Modifications/Exceptions: \_\_\_\_\_  
 \_\_\_\_\_

V. Chemicals of Concern	Action Level(s)	Response Measures
_____	_____	_____
_____	_____	_____

- VI. Additional Safety Equipment/Procedures
- |   |   |
|---|---|
| Hardhat..... <input type="checkbox"/> Yes <input type="checkbox"/> No                   | Hearing Protection (Plugs/Muffs).... <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Safety Glasses..... <input type="checkbox"/> Yes <input type="checkbox"/> No            | Safety belt/harness..... <input type="checkbox"/> Yes <input type="checkbox"/> No             |
| Chemical/splash goggles..... <input type="checkbox"/> Yes <input type="checkbox"/> No   | Radio..... <input type="checkbox"/> Yes <input type="checkbox"/> No                           |
| Splash Shield..... <input type="checkbox"/> Yes <input type="checkbox"/> No             | Barricades..... <input type="checkbox"/> Yes <input type="checkbox"/> No                      |
| Splash suits/coveralls..... <input type="checkbox"/> Yes <input type="checkbox"/> No    | Gloves (Type)..... <input type="checkbox"/> Yes <input type="checkbox"/> No                   |
| Steel toe/shank Workboots..... <input type="checkbox"/> Yes <input type="checkbox"/> No | Work/rest regimen..... <input type="checkbox"/> Yes <input type="checkbox"/> No               |
- Modifications/Exceptions: \_\_\_\_\_  
 \_\_\_\_\_

- VII. Procedure review with permit acceptors                      Yes      NA                      Yes      NA
- |   |  |
|---|--|
| Safety shower/eyewash (Location & Use)..... <input type="checkbox"/> <input type="checkbox"/> | Emergency alarms..... <input type="checkbox"/> <input type="checkbox"/>  |
| Procedure for safe job completion..... <input type="checkbox"/> <input type="checkbox"/>      | Evacuation routes..... <input type="checkbox"/> <input type="checkbox"/> |
| Contractor tools/equipment inspected..... <input type="checkbox"/> <input type="checkbox"/>   | Assembly points..... <input type="checkbox"/> <input type="checkbox"/>   |

- VIII. Equipment Preparation                      Yes      NA
- |  |                          |                          |
|--|--------------------------|--------------------------|
| Equipment drained/depressured.....                         | <input type="checkbox"/> | <input type="checkbox"/> |
| Equipment purged/cleaned.....                              | <input type="checkbox"/> | <input type="checkbox"/> |
| Isolation checklist completed.....                         | <input type="checkbox"/> | <input type="checkbox"/> |
| Electrical lockout required/field switch tested.....       | <input type="checkbox"/> | <input type="checkbox"/> |
| Blinds/misalignments/blocks & bleeds in place.....         | <input type="checkbox"/> | <input type="checkbox"/> |
| Hazardous materials on walls/behind liners considered..... | <input type="checkbox"/> | <input type="checkbox"/> |

- IX. Additional Permits required (Hot work, confined space entry, excavation etc.).....  Yes  No  
*If yes, fill out appropriate section(s) on safety work permit addendum*

- X. Special instructions, precautions: \_\_\_\_\_  
 \_\_\_\_\_

Permit Issued by: \_\_\_\_\_ Permit Accepted by: \_\_\_\_\_  
 Job Completed by: \_\_\_\_\_ Date: \_\_\_\_\_

## 11.0 CONFINED SPACE ENTRY

Personnel under the provisions of this HASP are not allowed, under any circumstances, to enter confined spaces. A confined space is defined as an area that has one or more of the following characteristics:

- Is large enough and so configured that an employee can bodily enter and perform assigned work.
- Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry).
- Is not designed for continuous employee occupancy.
- Contains or has a potential to contain a hazardous atmosphere.
- Contains a material that has the potential to engulf an entrant.
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross-section.
- Contains any other recognized, serious, safety or health hazard.

For further information on confined space consult the Health and Safety Guidance Manual or call the Manager, Health Sciences. If confined space operations are to be performed as part of the scope of work, detailed procedures and training requirements will be addressed in an addendum or the site specific health and safety plan.

## 12.0 MATERIALS AND DOCUMENTS

The Tetra Tech NUS FOL shall ensure the following materials/documents are taken to the project site and used when required.

- A complete copy of this HASP
- Health and Safety Guidance Manual
- Incident Reports
- Medical Data Sheets
- Material Safety Data Sheets for all chemicals brought on site, including decon solutions, fuels, lime, sample preservatives, calibration gases, etc.
- A full-size OSHA Job Safety and Health Poster (posted in the site trailers)
- Training/Medical Surveillance Documentation Form (Blank)
- Emergency Reference Information (Section 2.0, extra copy for posting)

### 12.1 MATERIALS TO BE POSTED OR MAINTAINED AT THE SITE

The following documentation is to be posted or maintained at the site for quick reference purposes. In situations where posting these documents is not feasible, (such as no office trailer), these documents should be separated and immediately accessible.

**Chemical Inventory Listing (posted)** - This list represents all chemicals brought on-site, including decontamination solutions, sample preservations, fuel, etc.. This list should be posted in a central area.

**Material Safety Data Sheets (MSDS) (maintained)** - The MSDSs should also be in a central area accessible to all site personnel. These documents should match all the listings on the chemical inventory list for all substances employed on-site. It is acceptable to have these documents within a central folder and the chemical inventory as the table of contents.

**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.

**Site Clearance (maintained)** - This list is found within the training section of the HASP (See Figure 8-2). This list identifies all 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.

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

**Medical Data Sheets/Cards (maintained)** - Medical Data Sheets will be filled out by on-site personnel and filed in a central location. 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 all personnel to be carried on their person.

**Hearing Conservation Standard (29 CFR 1910.95) (posted)** - this standard will be posted anytime hearing protection or other noise abatement procedures are employed.

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

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

The purpose of maintaining or posting this information, as stated above, is to allow site personnel quick access. Variations concerning location and methods of presentation are acceptable, providing the objection is accomplished.

## 13.0 GLOSSARY

ABG	Ammunition Burning Grounds
ACGIH	American Conference of Governmental Industrial Hygienists
APR	Air Purifying Respirators
CAAA	Crane Army Ammunition Activity
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
CLEAN	Comprehensive Long-Term Environmental Action Navy
CNS	Central Nervous System
CQP	Construction Quality Plan
CSP	Certified Safety Professional
CTO	Contract Task Order
DR	Demolition Range
DRI	Direct Reading Instruments
eV	electron Volts
FID	Flame Ionization Detector
FOL	Field Operations Leader
HSGM	Health and Safety Guidance Manual
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HEPA	High Efficiency Particulate Air
HSM	Health and Safety Manager
IDLH	Immediately Dangerous to Life and Health
LSC	Little Sulphur Creek
NAD	Naval Ammunition Depot
N/A	Not Available
NIOSH	National Institute Occupational Safety and Health
NSWC	Naval Surface Warfare Center
OB/OD	Open Burning/Open Detonation
OJT	Old Jeep Trail
ORR	Old Rifle Range
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor)
PEL	Permissible Exposure Limit
PHSO	Project Health and Safety Manager

PID	Photo Ionization Detector
PM	Project Manager
PPE	Personal Protective Equipment
PPM	Parts Per Million
PVC	Poly Vinyl Chloride
RCRA	Resource Conservation and Recovery Act
SAP	Sampling and Analyses Plan
SCBA	Self Contained Breathing Apparatus
SSO	Site Safety Officer
STEL	Short Term Exposure Limit
SWL	Sanitary Waste Landfill
SWMU	Solid Waste Management Unit
TOM	Task Order Manager
TWA	Time Weighted Average
UV	Ultra Violet
WP	Work Plan

**ATTACHMENT I**

**INJURY/ILLNESS PROCEDURE  
AND REPORT FORM**



CASE NO. \_\_\_\_\_

**TETRA TECH NUS, INC.**

**INJURY/ILLNESS PROCEDURE  
WORKER'S COMPENSATION PROGRAM**

---

**WHAT YOU SHOULD DO IF YOU ARE INJURED OR DEVELOP AN ILLNESS AS A RESULT OF YOUR EMPLOYMENT:**

- If injury is minor, obtain appropriate first aid treatment.
- If injury or illness is severe or life threatening, obtain professional medical treatment at the nearest hospital emergency room.
- If incident involves a chemical exposure on a project work site, follow instructions in the Health & Safety Plan.
- Immediately report any injury or illness to your supervisor or office manager. In addition, you must contact your Human Resources representative, Marilyn Diethorn at (412) 921-8475, and the Corporate Health and Safety Manager, Matt Soltis at (412) 921-8912 within 24 hours. You will be required to complete an Injury/Illness Report (attached). You may also be required to participate in a more detailed investigation from the Health Sciences Department.
- If further medical treatment is needed, The Hartford Network Referral Unit will furnish a list of network providers customized to the location of the injured employee. These providers are to be used for treatment of Worker's Compensation injuries subject to the laws of the state in which you work. Please call Marilyn Diethorn at (412) 921-8475 for the number of the Referral Unit.

**ADDITIONAL QUESTIONS REGARDING WORKER'S COMPENSATION:**

Contact your local human resources representative, corporate health and safety coordinator, or Corporate Administration in Pasadena, California, at (626) 351-4664.

Worker's compensation is a state-mandated program that provides medical and disability benefits to employees who become disabled due to job related injury or illness. Tetra Tech, Inc. and its subsidiaries (Tetra Tech or Company) pay premiums on behalf of their employees. The type of injuries or illnesses covered and the amount of benefits paid are regulated by the state worker's compensation boards and vary from state to state. Corporate Administration in Pasadena is responsible for administering the Company's worker's compensation program. The following is a general explanation of worker's compensation provided in the event that you become injured or develop an illness as a result of your employment with Tetra Tech or any of its subsidiaries. Please be aware that the term used for worker's compensation varies from state to state.

**WHO IS COVERED:**

All employees of Tetra Tech, whether they are on a full-time, part-time or temporary status, working in an office or in the field, are entitled to worker's compensation benefits. All employees must follow the above injury/illness reporting procedures. Consultants, independent contractors, and employees of subcontractors are not covered by Tetra Tech's Worker's Compensation plan.

**WHAT IS COVERED:**

If you are injured or develop an illness caused by your employment, worker's compensation benefits are available to you subject to the laws of the state you work in. Injuries do not have to be serious; even injuries treated by first aid practices are covered and must be reported. Please note that if you are working out-of-state and away from your home office, you are still eligible for worker's compensation benefits.



TETRA TECH, INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT

To: \_\_\_\_\_  
Subsidiary Health and Safety Representative

Prepared by: \_\_\_\_\_

cc: \_\_\_\_\_  
Workers Compensation Administrator

Position: \_\_\_\_\_

Project name: \_\_\_\_\_

Office: \_\_\_\_\_

Project number: \_\_\_\_\_

Telephone number: \_\_\_\_\_

Fax number: \_\_\_\_\_

**Information Regarding Injured or Ill Employee**

Name: \_\_\_\_\_

Office: \_\_\_\_\_

Home address: \_\_\_\_\_

Gender: M  F  No. of dependents: \_\_\_\_\_

\_\_\_\_\_

Marital status: \_\_\_\_\_

Home telephone number: \_\_\_\_\_

Date of birth: \_\_\_\_\_

Occupation (regular job title): \_\_\_\_\_

Social security number: \_\_\_\_\_

Department: \_\_\_\_\_

Date of Accident: \_\_\_\_\_

Time of Accident: \_\_\_\_\_ a.m.  p.m.

Time Employee Began Work: \_\_\_\_\_

Check if time cannot be determined

**Location of Incident**

Street address: \_\_\_\_\_

City, state, and zip code: \_\_\_\_\_

County: \_\_\_\_\_

Was place of accident or exposure on employer's premises? Yes  No

**Information About the Incident**

**What was the employee doing just before the incident occurred?** Describe the activity as well as the tools, equipment, or material the employee was using. Be specific. Examples: "Climbing a ladder while carrying roofing materials"; "Spraying chlorine from hand sprayer"; "Daily computer key-entry"

**What Happened?** Describe how the injury occurred. Examples: "When ladder slipped on wet floor, worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time"

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.



TETRA TECH, INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT (Continued)

Information About the Incident (Continued)

What was the injury or illness? Describe the part(s) of the body affected and how it was affected. Be more specific than "hurt," "pain," or "sore." Examples "Strained back"; "Chemical burn, right hand"; "Carpal tunnel syndrome, left wrist"

Describe the Object or Substance that Directly Harmed the Employee: Examples: "Concrete floor"; "Chlorine"; "Radial arm saw." If this question does not apply to the incident, write "Not applicable."

Did the employee die? Yes [ ] No [ ] Date of death: \_\_\_\_\_

Was employee performing regular job duties? Yes [ ] No [ ]

Was safety equipment provided? Yes [ ] No [ ] Was safety equipment used? Yes [ ] No [ ]

Note: Attach any police reports or related diagrams to this report.

Witness (Attach additional sheets for other witnesses.)

Name: \_\_\_\_\_

Company: \_\_\_\_\_

Street address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip code: \_\_\_\_\_

Telephone number: \_\_\_\_\_

Medical Treatment Required? [ ] Yes [ ] No [ ] First aid only

Name of physician or health care professional: \_\_\_\_\_

If treatment was provided away from the work site, provide the information below.

Facility name: \_\_\_\_\_

Street address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip code: \_\_\_\_\_

Telephone number: \_\_\_\_\_

Was the employee treated in an emergency room? [ ] Yes [ ] No

Was the employee hospitalized over night as an in-patient? [ ] Yes [ ] No

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.



TETRA TECH, INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT (Continued)

**Corrective Action(s) Taken by Unit Reporting the Accident:**

**Corrective Action Still to be Taken (by whom and when):**

**Name of Tetra Tech employee the injury or illness was first reported to:** \_\_\_\_\_

**Date of Report:** \_\_\_\_\_ **Time of Report:** \_\_\_\_\_

I have reviewed this investigation report and agree, to the best of my recollection, with its contents.

\_\_\_\_\_  
 Printed Name of Injured Employee Telephone Number

\_\_\_\_\_  
 Signature of Injured Employee Date

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

Title	Printed Name	Signature	Telephone Number	Date
Office Manager				
Project Manager				
Site Safety Coordinator or Office Health and Safety Representative				

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.



TETRA TECH, INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT (Continued)

**To Be Completed by the Subsidiary Health and Safety Representative**

**Classification of Incident:**

Injury     Illness

**Result of Incident:**

First aid only

Days away from work

Remained at work but incident resulted in job transfer or work restriction

Incident involved days away and job transfer or work restriction

Medical treatment only

No. of days away from work \_\_\_\_\_

Date employee left work \_\_\_\_\_

Date employee returned to work \_\_\_\_\_

No. of days placed on restriction or job transfer \_\_\_\_\_

OSHA Recordable Case Number \_\_\_\_\_

**To Be Completed by Human Resources**

Social security number: \_\_\_\_\_

Date of hire: \_\_\_\_\_ Hire date for current job: \_\_\_\_\_

Wage information: \$ \_\_\_\_\_ per  Hour  Day  Week  Month

Position at time of hire: \_\_\_\_\_

Current position: \_\_\_\_\_ Shift hours: \_\_\_\_\_

State in which employee was hired: \_\_\_\_\_

Status:  Full-time  Part-time Hours per week: \_\_\_\_\_ Days per week: \_\_\_\_\_

Temporary job end date: \_\_\_\_\_

**To Be Completed during Report to Workers Compensation Carrier**

Date reported: \_\_\_\_\_ Reported by: \_\_\_\_\_

Confirmation number: \_\_\_\_\_

Name of contact: \_\_\_\_\_

Field office of claims adjuster: \_\_\_\_\_

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.

**ATTACHMENT II**  
**MEDICAL DATA SHEET**

**MEDICAL DATA SHEET**

This Medical Data Sheet must be completed by all 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 \_\_\_\_\_

Name of Next Kin \_\_\_\_\_

Drug or other Allergies \_\_\_\_\_

Particular Sensitivities \_\_\_\_\_

Do You Wear Contacts? \_\_\_\_\_

Provide a Checklist of Previous Illnesses or Exposure to Hazardous Chemicals \_\_\_\_\_

\_\_\_\_\_

What medications are you presently using? \_\_\_\_\_

\_\_\_\_\_

Do you have any medical restrictions? \_\_\_\_\_

\_\_\_\_\_

Name, Address, and Phone Number of personal physician: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

I am the individual described above. I have read and understand this HASP.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

**ATTACHMENT III**

**EQUIPMENT INSPECTION CHECKLIST**

## EQUIPMENT INSPECTION

**COMPANY:** \_\_\_\_\_ **UNIT NO.** \_\_\_\_\_

**FREQUENCY:** Inspect daily, document prior to use and as repairs are needed.

Inspection Date: \_\_\_\_/\_\_\_\_/\_\_\_\_ Time: \_\_\_\_\_ Equipment Type: \_\_\_\_\_

(e.g., bulldozer)

Good    Need Repair    N/A

Tires or tracks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hoses and belts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cab, mirrors, safety glass	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Turn signals, lights, brake lights, etc. (front/rear) for equipment approved for highway use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Is the equipment equipped with audible back-up alarms and back-up lights?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Horn and gauges	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Brake condition (dynamic, park, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fire extinguisher (Type/Rating - _____)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fluid Levels:			
- Engine oil	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Transmission fluid	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Brake fluid	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Cooling system fluid	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Windshield wipers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
- Hydraulic oil	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oil leak/lube	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coupling devices and connectors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exhaust system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Blade/boom/ripper condition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Accessways: Frame, hand holds, ladders, walkways (non-slip surfaces), guardrails?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Power cable and/or hoist cable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Steering (standard and emergency)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Safety Guards:**

Yes    No

- |   |                          |                          |
|---|--------------------------|--------------------------|
| - Around rotating apparatus (belts, pulleys, sprockets, spindles, drums, flywheels, chains) all points of operations protected from accidental contact? _____ | <input type="checkbox"/> | <input type="checkbox"/> |
| - Hot pipes and surfaces exposed to accidental contact? _____   | <input type="checkbox"/> | <input type="checkbox"/> |
| - All emergency shut offs have been identified and communicated to the field crew? _____  | <input type="checkbox"/> | <input type="checkbox"/> |
| - Have emergency shutoffs been field tested? _____  | <input type="checkbox"/> | <input type="checkbox"/> |
| - Results? _____  | <input type="checkbox"/> | <input type="checkbox"/> |
| - Are any structural members bent, rusted, or otherwise show signs of damage? _____   | <input type="checkbox"/> | <input type="checkbox"/> |
| - Are fueling cans used with this equipment approved type safety cans? _____  | <input type="checkbox"/> | <input type="checkbox"/> |

- Have the attachments designed for use (as per manufacturer's recommendation) with this equipment been inspected and are considered suitable for use? \_\_\_\_\_

**Portable Power Tools:**

- Tools and Equipment in Safe Condition? \_\_\_\_\_
- Saw blades, grinding wheels free from recognizable defects (grinding wheels have been sounded)? \_\_\_\_\_
- Portable electric tools properly grounded? \_\_\_\_\_
- Damage to electrical power cords? \_\_\_\_\_
- Blade guards in place? \_\_\_\_\_
- Components adjusted as per manufacturers recommendation? \_\_\_\_\_

**Cleanliness:**

- Overall condition (is the decontamination performed prior to arrival on-site considered acceptable)? \_\_\_\_\_
- Where was this equipment used prior to its arrival on site? \_\_\_\_\_
- Site Contaminants of concern at the previous site? \_\_\_\_\_
- Inside debris (coffee cups, soda cans, tools and equipment) blocking free access to foot controls? \_\_\_\_\_

**Operator Qualifications (as applicable for all heavy equipment):**

- Does the operator have proper licensing where applicable, (e.g., CDL)? \_\_\_\_\_
- Does the operator, understand the equipments operating instructions? \_\_\_\_\_
- Is the operator experienced with this equipment? \_\_\_\_\_
- Does the operator have emotional and/or physical limitations which would prevent him/her from performing this task in a safe manner? \_\_\_\_\_
- Is the operator 21 years of age or more? \_\_\_\_\_

**Identification:**

- Is a tagging system available, for positive identification, for tools removed from service? \_\_\_\_\_

**Additional Inspection Required Prior to Use On-Site**

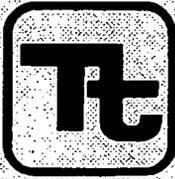
- |   | Yes                      | No                       |
|---|--------------------------|--------------------------|
| - Does equipment emit noise levels above 90 decibels?       | <input type="checkbox"/> | <input type="checkbox"/> |
| - If so, has an 8-hour noise dosimetry test been performed? | <input type="checkbox"/> | <input type="checkbox"/> |
| - Results of noise dosimetry: _____                         |                          |                          |
| - Defects and repairs needed: _____                         |                          |                          |
| - General Safety Condition: _____                           |                          |                          |
| - Operator or mechanic signature: _____                     |                          |                          |

Approved for Use:     Yes             No

\_\_\_\_\_  
Site Safety Officer Signature

**ATTACHMENT IV**

**UTILITY LOCATING  
AND  
EXCAVATION CLEARANCE**



# STANDARD OPERATING PROCEDURES

TETRA TECH NUS, INC.

Number	HS-1.0	Page	1 of 15
Effective Date	12/03	Revision	2
Applicability	Tetra Tech NUS, Inc.		
Prepared	Health & Safety		
Approved	D. Senovich <i>DS</i>		

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 scars and patches, and topographical depressions. Note the location of any emergency shut off switches. Any additional information regarding utility

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

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

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

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## 5.2 Overhead Power Lines

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

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

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

## 6.0 UNDERGROUND LOCATING TECHNIQUES

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

### 6.1 Geophysical Methods

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

#### **Electromagnetic Induction**

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

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

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

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## Magnetics

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

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

## Ground Penetrating Radar

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

## 6.2 Passive Detection Surveys

### Acoustic Surveys

Acoustic location methods are generally most applicable to waterlines or gas lines. A highly sensitive Acoustic Receiver listens for background sounds of water flowing (at joints, leaks, etc.) or to sounds introduced into the water main using a transducer. Acoustics may also be applicable to determine the location of plastic gas lines.

### Thermal Imaging

Thermal (i.e., infrared) imaging is a passive method for detecting the heat emitted by an object. Electronics in the infrared camera convert subtle heat differentials into a visual image on the viewfinder or a monitor. The operator does not look for an exact temperature; rather they look for heat anomalies (either elevated or suppressed temperatures) characteristic of a potential utility line.

The thermal fingerprint of underground utilities results from differences in temperature between the atmosphere and the fluid present in a pipe or the heat generated by electrical resistance. In addition, infrared scanners may be capable of detecting differences in the compaction, temperature and moisture content of underground utility trenches. High-performance thermal imagery can detect temperature differences to hundredths of a degree.

## 6.3 Intrusive Detection Surveys

### Vacuum Excavation

Vacuum excavation is used to physically expose utility services. The process involves removing the surface material over approximately a 1' x 1' area at the site location. The air-vacuum process proceeds with the simultaneous action of compressed air-jets to loosen soil and vacuum extraction of the resulting

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debris. This process ensures the integrity of the utility line during the excavation process, as no hammers, blades, or heavy mechanical equipment comes into contact with the utility line, eliminating the risk of damage to utilities. The process continues until the utility is uncovered. Vacuum excavation can be used at the proposed site location to excavate below the "utility window" which is usually 8 feet.

### **Hand Excavation**

When the identification and location of underground utilities cannot be positively confirmed through document reviews and/or other methods, borings and excavations may be cleared via the use of non-conductive hand tools. This should always be done in conjunction with the use of detection equipment. This would be required for all locations where there is a potential to impact buried utilities. The minimum hand-excavation depth that must be reached is to be determined considering the geographical location of the work site. This approach recognizes that the placement of buried utilities is influenced by frost line depths that vary by geographical region. Attachment 2 presents frost line depths for the regions of the contiguous United States. At a minimum, hand excavation depths must be at least to the frost line depth (see Attachment 2) plus two (2) feet, but never less than 4 feet below ground surface (bgs). For hand excavation, the hole created must be reamed large enough to be at least the diameter of the drill rig auger or bit prior to drilling. For soil gas surveys, the survey probe shall be placed as close as possible to the cleared hand excavation. It is important to note that a post-hole digger must not be used in this type of hand excavation activity.

### **Tile Probe Surveys**

For some soil types, site conditions, and excavation requirements, non-conductive tile probes may be used. A tile probe is a "T"-handled rod of varying lengths that can be pushed into the soil to determine if any obstructions exist at that location. Tile probes constructed of fiberglass or other nonconductive material are readily available from numerous vendors. Tile probes must be performed to the same depth requirements as previously specified. As with other types of hand excavating activities, the use of a non-conductive tile probe, should always be in conjunction with suitable utility locating detection equipment.

## **7.0 INTRUSIVE ACTIVITIES SUMMARY**

The following list summarizes the activities that must be performed prior to beginning subsurface activities:

1. Map and mark all subsurface locations and excavation boundaries using white paint or markers specified by the client or property owner.
2. Notify the property owner and/or client that the locations are marked. At this point, drawings of locations or excavation boundaries shall be provided to the property owner and/or client so they may initiate (if applicable) utility clearance.

Note: Drawings with confirmed locations should be provided to the property owner and/or client as soon as possible to reduce potential time delays.

3. Notify "One Call" service. If possible, arrange for an appointment to show the One Call representative the surface locations or excavation boundaries in person. This will provide a better location designation to the utilities they represent. You should have additional drawings should you need to provide plot plans to the One Call service.
4. Implement supplemental utility detection techniques as necessary and appropriate to conform utility locations or the absence thereof.

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5. Complete Attachment 3, Utility Clearance Form. This form should be completed for each excavation location. In situations where multiple subsurface locations exist within the close proximity of one another, one form may be used for multiple locations provided those locations are noted on the Utility Clearance Form. Upon completion, the Utility Clearance Form and revised/annotated utility location map becomes part of the project file.

**8.0 REFERENCES**

OSHA Letter of Interpretation, Mr. Joseph Caldwell, Attachment 4  
 OSHA 29 CFR 1926(b)(2)  
 OSHA 29 CFR 1926(b)(3)  
 TINUS Utility Locating and Clearance Policy  
 TINUS SOP GH-3.1; Resistivity and Electromagnetic Induction  
 TINUS SOP GH-3.2; Magnetic and Metal Detection Surveys  
 TINUS SOP GH-3.4; Ground-penetrating Radar Surveys

**ATTACHMENT 1  
LISTING OF UNDERGROUND UTILITY CLEARANCE RESOURCES**



**American Public Works Association**  
2345 Grand Boulevard, Suite 500, Kansas City, MO 64108-2625  
Phone (816) 472-6100 • Fax (816) 472-1610  
Web www.apwa.net • E-mail apwa@apwa.net

**ONE-CALL SYSTEMS INTERNATIONAL  
CONDENSED DIRECTORY**

**Alabama**

Alabama One-Call  
1-800-292-8525

**Alaska**

Locate Call Center of Alaska, Inc.  
1-800-478-3121

**Arizona**

Arizona Blue Stake  
1-800-782-5348

**Arkansas**

Arkansas One Call System, Inc.  
1-800-482-8998

**California**

Underground Service Alert North  
1-800-227-2600  
Underground Service Alert of Southern  
California  
1-800-227-2600

**Colorado**

Utility Notification Center of Colorado  
1-800-922-1987

**Connecticut**

Call Before You Dig  
1-800-922-4455

**Delaware**

Miss Utility of Delmarva  
1-800-282-8555

**Florida**

Sunshine State One-Call of Florida, Inc.  
1-800-432-4770

**Georgia**

Underground Protection Center, Inc.  
1-800-282-7411

**Hawaii**

Underground Service Alert North  
1-800-227-2600

**Idaho**

Dig Line Inc.  
1-800-342-1585  
Kootenai County One-Call  
1-800-428-4950  
Shoshone - Benewah One-Call  
1-800-398-3285

**Illinois**

JULIE, Inc.  
1-800-892-0123  
Digger (Chicago Utility Alert Network)  
312-744-7000

**Indiana**

Indiana Underground Plant Protection  
Service  
1-800-382-5544

**Iowa**

Iowa One-Call  
1-800-292-8989

**Kansas**

Kansas One-Call System, Inc.  
1-800-344-7233

**Kentucky**

Kentucky Underground Protection Inc.  
1-800-752-6007

**Louisiana**

Louisiana One Call System, Inc.  
1-800-272-3020

**Maine**

Dig Safe System, Inc.  
1-888-344-7233

**Maryland**

Miss Utility  
1-800-257-7777  
Miss Utility of Delmarva  
1-800-282-8555

**Massachusetts**

Dig Safe System, Inc.  
1-888-344-7233

**Michigan**

Miss Dig System, Inc.  
1-800-482-7171

**Minnesota**

Gopher State One Call  
1-800-252-1168

**Mississippi**

Mississippi One-Call System, Inc.  
1-800-227-6477

**Missouri**

Missouri One-Call System, Inc.  
1-800-344-7483

**Montana**

Utilities Underground Protection Center  
1-800-424-5555  
Montana One Call Center  
1-800-551-8344

**Nebraska**

Diggers Hotline of Nebraska  
1-800-331-5668

**Nevada**

Underground Service Alert North  
1-800-227-2600

**New Hampshire**

Dig Safe System, Inc.  
1-888-344-7233

**New Jersey**

New Jersey One Call  
1-800-272-1000

**New Mexico**

New Mexico One Call System, Inc.  
1-800-321-2537  
Las Cruces- Dona Ana Blue Stakes  
1-888-526-0400

**New York**

Dig Safely New York  
1-800-882-7962  
New York City- Long Island One Call  
Center  
1-800-272-4480

**North Carolina**

The North Carolina One-Call Center,  
Inc.  
1-800-632-4949

**North Dakota**

North Dakota One-Call  
1-800-785-0555

**Ohio**

Ohio Utilities Protection Service  
1-800-362-2764  
Oil & Gas Producers Underground  
Protect'n Svc  
1-800-925-0988

**Oklahoma**

Call Okie  
1-800-522-6543

**Oregon**

Oregon Utility Notification Center/One  
Call Concepts  
1-800-332-2344

**Pennsylvania**

Pennsylvania One Call System, Inc.  
1-800-242-1776

**Rhode Island**

Dig Safe System, Inc.  
1-888-344-7233

**South Carolina**

Palmetto Utility Protection Service Inc.  
1-888-721-7877

**South Dakota**

South Dakota One Call  
1-800-781-7474

**Tennessee**

Tennessee One-Call System, Inc.  
1-800-351-1111

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**ATTACHMENT 1 (Continued)**

**Texas**

Texas One Call System  
1-800-245-4545  
Texas Excavation Safety System, Inc.  
1-800-344-8377  
Lone Star Notification Center  
1-800-669-8344

**Utah**

Blue Stakes of Utah  
1-800-662-4111

**Vermont**

Dig Safe System, Inc.  
1-888-344-7233

**Virginia**

Miss Utility of Virginia  
1-800-552-7001  
Miss Utility (Northern Virginia)  
1-800-257-7777

**Washington**

Utilities Underground Location Center  
1-800-424-5555  
Northwest Utility Notification Center  
1-800-553-4344  
Inland Empire Utility Coordinating  
Council  
509-456-8000

**West Virginia**

Miss Utility of West Virginia, Inc.  
1-800-245-4848

**Wisconsin**

Diggers Hotline, Inc.  
1-800-242-8511

**Wyoming**

Wyoming One-Call System, Inc.  
1-800-348-1030  
Call Before You Dig of Wyoming  
1-800-849-2476

**District of Columbia**

Miss Utility  
1-800-257-7777

**Alberta**

Alberta One-Call Corporation  
1-800-242-3447

**British Columbia**

BC One Call  
1-800-474-6886

**Ontario**

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

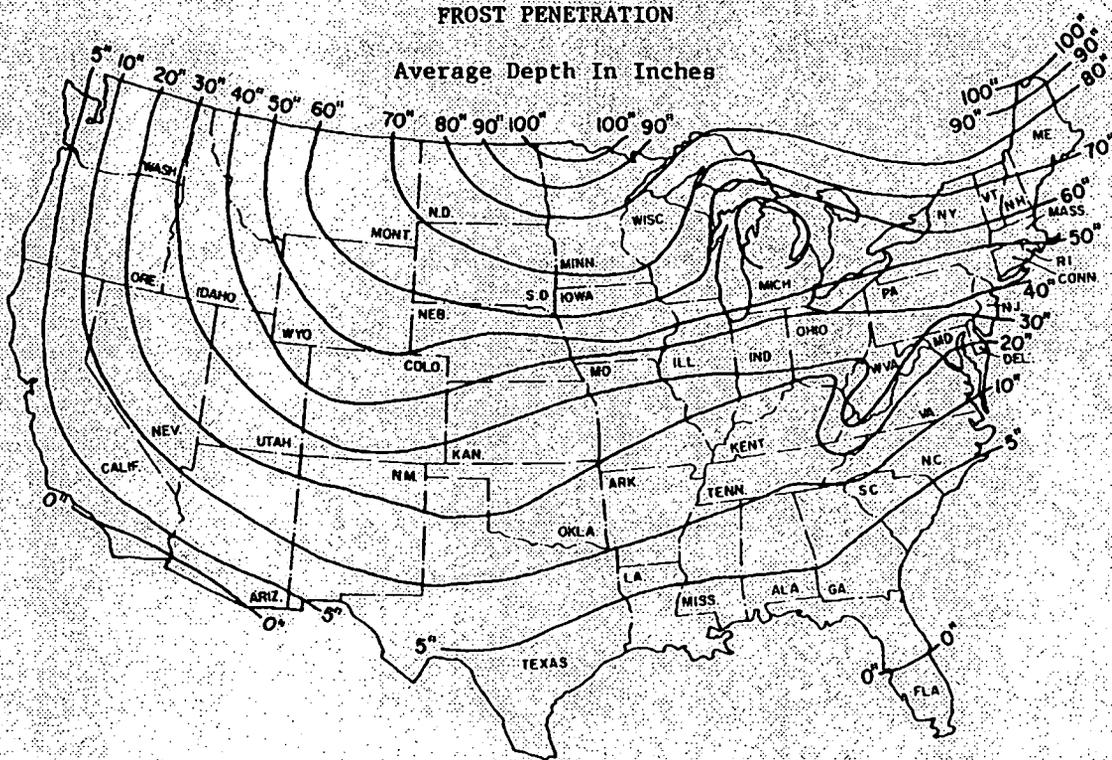
**Quebec**

Info-Excavation  
1-800-663-9228

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ATTACHMENT 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
g) State One-Call agency called? yes no N/A
h) Geophysical survey performed? yes no N/A
i) Hand excavation performed (with concurrent use of utility detection device)? yes no N/A
j) Trench/excavation probed? yes no N/A

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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#### ATTACHMENT 4 (Continued)

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 V**  
**SAFE WORK PERMITS**

**SAFE WORK PERMIT  
DECONTAMINATION ACTIVITIES  
NSWC, CRANE INDIANA**

Permit No. \_\_\_\_\_ Date: \_\_\_\_\_ Time: From \_\_\_\_\_ to \_\_\_\_\_

**SECTION I: General Job Scope**

- I. Work limited to the following (description, area, equipment used): Decontamination of sampling equipment. Brushes and spray bottles will be used to decon small sampling equipment
- II. Required Monitoring Instrument(s): None required
- III. Field Crew: \_\_\_\_\_
- IV. On-site Inspection conducted  Yes  No Initials of Inspector TINUS

**SECTION II: General Safety Requirements (To be filled in by permit issuer)**

- IV. Protective equipment required
  - Level D  Level B
  - Level C  Level A
  - Detailed on Reverse
- Respiratory equipment required
  - Full face APR
  - Half face APR
  - SKA-PAC SAR
  - Skid Rig
- Escape Pack
- SCBA
- Bottle Trailer
- None

Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, safety glasses, safety footwear, and nitrile gloves.

V. Chemicals of Concern	Action Level(s)	Response Measures
<u>None anticipated given the nature of surveying activities and limited contact w/ media.</u>	_____	_____

- VI. Additional Safety Equipment/Procedures
 

Hard-hat .....	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Hearing Protection (Plugs/Muffs).....	<input type="checkbox"/> Yes <input type="checkbox"/> No
Safety Glasses .....	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Safety belt/harness .....	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Chemical/splash goggles .....	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Radio .....	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Splash Shield .....	<input type="checkbox"/> Yes <input type="checkbox"/> No	Barricades.....	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Splash suits/coveralls.....	<input type="checkbox"/> Yes <input type="checkbox"/> No	Gloves (Type - Nitrile).....	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Steel toe Work shoes or boots.....	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Work/rest regimen .....	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Modifications/Exceptions: PVC rain suits or PE or PVC coated Tyvek for protection against splashes and overspray. Chemical resistant boot covers if excessive liquids are generated or to protected footwear.

- VII. Procedure review with permit acceptors
 

	Yes	NA		Yes	NA
Safety shower/eyewash (Location & Use).....	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Emergency alarms .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Procedure for safe job completion .....	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Evacuation routes.....	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Contractor tools/equipment/PPE inspected .....	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Assembly points .....	<input checked="" type="checkbox"/>	<input type="checkbox"/>

- VIII. Site Preparation
 

	Yes	NA
Utility Locating and Excavation Clearance completed .....	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Vehicle and Foot Traffic Routes Cleared and Established .....	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Physical Hazards Barricaded and Isolated .....	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Emergency Equipment Staged .....	<input type="checkbox"/>	<input checked="" type="checkbox"/>

- IX. Additional Permits required (Hot work, confined space entry, excavation etc.).  Yes  No  
*If yes, complete permit required or contact Health Sciences, Pittsburgh Office*

- X. Special instructions, precautions: Chemical hazards with decontamination because of use of fluids such as isopropyl alcohol, methanol, etc. To minimize the potential for exposure, site personnel will use PPE and prevent contact with potentially contaminated equipment. Refer to the manufacturer's MSDS regarding PPE, handling, storage, and first-aid measures related to decontamination fluids.

Permit Issued by: \_\_\_\_\_ Permit Accepted by: \_\_\_\_\_

**SAFE WORK PERMIT FOR  
MOBILIZATION AND DEMOBILIZATION ACTIVITIES  
NSWC, CRANE INDIANA**

Permit No. \_\_\_\_\_ Date: \_\_\_\_\_ Time: From \_\_\_\_\_ to \_\_\_\_\_

**SECTION I: General Job Scope**

- I. Work limited to the following (description, area, equipment used): Mobilization and demobilization activities
- II. Required Monitoring Instruments: None
- III. Field Crew: \_\_\_\_\_
- IV. On-site Inspection conducted  Yes  No Initials of Inspector TtNUS

**SECTION II: General Safety Requirements (To be filled in by permit issuer)**

- V. Protective equipment required
  - Level D  Level B
  - Level C  Level A
  - Detailed on Reverse
- Respiratory equipment required
  - Full face APR
  - Half face APR
  - SAR
  - Skid Rig
- Escape Pack
- SCBA
- Bottle Trailer
- None

Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, safety glasses and safety footwear. Hard hats and hearing protection will be worn when working near operating equipment.

VI. Chemicals of Concern	Action Level(s)	Response Measures
<u>None anticipated given the nature of surveying activities and limited contact w/ media.</u>	_____	_____

- VII. Additional Safety Equipment/Procedures
 

Hard-hat	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Hearing Protection (Plugs/Muffs)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Safety Glasses	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Safety belt/harness	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Chemical/splash goggles	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Radio	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Splash Shield	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Barricades	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Splash suits/coveralls	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Gloves (Type - Nitrile)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Steel toe Work shoes or boots	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Work/rest regimen	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Modifications/Exceptions: Reflective vests for high traffic areas. Tyvek coverall to protect against natural hazards (e.g., ticks). If working in areas where snakes are a threat, wear snake chaps to protect against bites.

VIII. Procedure review with permit acceptors	Yes	NA	Yes	NA
Safety shower/eyewash (Location & Use)	<input type="checkbox"/>	<input type="checkbox"/>	Emergency alarms	<input type="checkbox"/>
Procedure for safe job completion	<input type="checkbox"/>	<input type="checkbox"/>	Evacuation routes	<input type="checkbox"/>
Contractor tools/equipment/PPE inspected	<input type="checkbox"/>	<input type="checkbox"/>	Assembly points	<input type="checkbox"/>

- IX. Site Preparation
 

Utility Locating and Excavation Clearance completed	<input type="checkbox"/>	Yes	NA
Vehicle and Foot Traffic Routes Cleared and Established	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Physical Hazards Barricaded and Isolated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emergency Equipment Staged	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- X. Additional Permits required (Hot work, confined space entry, excavation etc.).  Yes  No  
*If yes, complete permit required or contact Health Sciences, Pittsburgh Office*

XI. Special instructions, precautions: Preview work locations to identify potential hazards (slips, trips, and falls, natural hazards, etc.) Avoid potential nesting areas. Wear light colored clothing so that ticks and other biting insects can be easily visible and can be removed. Inspect clothing and body for ticks. Minimize contact with potentially contaminated media. Suspend site activities in the event of inclement weather. All sampling areas will be screened for UXO prior to field crews performing activities at this site.

Permit Issued by: \_\_\_\_\_ Permit Accepted by: \_\_\_\_\_

**SAFE WORK PERMIT FOR  
MULTI MEDIA SAMPLING  
NSWC, CRANE INDIANA**

Permit No. \_\_\_\_\_ Date: \_\_\_\_\_ Time: From \_\_\_\_\_ to \_\_\_\_\_

**SECTION I: General Job Scope**

- I. Work limited to the following (description, area, equipment used): Multi media sampling including surface and subsurface soils, ground water and IDW sampling. Monitoring well purging and development.
- II. Required Monitoring Instrument(s): PID with at least a 11.7 eV lamp
- III. Field Crew: \_\_\_\_\_
- IV. On-site Inspection conducted  Yes  No Initials of Inspector TtNUS

**SECTION II: General Safety Requirements (To be filled in by permit issuer)**

- |  |  |  |
|--|--|--|
| V. Protective equipment required   | Respiratory equipment required         |  |
| Level D <input checked="" type="checkbox"/> Level B <input type="checkbox"/> | Full face APR <input type="checkbox"/> | Escape Pack <input type="checkbox"/>     |
| Level C <input type="checkbox"/> Level A <input type="checkbox"/>            | Half face APR <input type="checkbox"/> | SCBA <input type="checkbox"/>            |
| Detailed on Reverse  | SAR <input type="checkbox"/>           | Bottle Trailer <input type="checkbox"/>  |
|  | Skid Rig <input type="checkbox"/>      | None <input checked="" type="checkbox"/> |

Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, safety footwear, and nitrile gloves

- |  |   |  |
|--|---|--|
| VI. Chemicals of Concern   | Action Level(s)   | Response Measures  |
| <u>Site contaminants include metals, RDX, HMX and Low levels of VOCs</u> | <u>Any sustained readings above background in worker breathing zone</u> | <u>Suspend site activities report to an unaffected area.</u> |

- |   |   |  |
|---|---|--|
| VII. Additional Safety Equipment/Procedures |   |  |
| Hard-hat .....                              | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Hearing Protection (Plugs/Muffs) ..... |
| Safety Glasses .....                        | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Safety belt/harness .....              |
| Chemical/splash goggles .....               | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Radio .....                            |
| Splash Shield .....                         | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Barricades .....                       |
| Splash suits/coveralls .....                | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Gloves (Type - Nitrile) .....          |
| Steel toe Work shoes or boots .....         | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | Work/rest regimen .....                |
- Modifications/Exceptions: Reflective vests for high traffic areas. Tyvek coverall if there is a potential for soiling work cloths and PVC or PE coated Tyvek if saturation or work cloths may occur.

- |  |                                     |                          |                         |  |
|--|-------------------------------------|--------------------------|-------------------------|--|
| VIII. Procedure review with permit acceptors   | Yes                                 | NA                       | Yes                     | NA   |
| Safety shower/eyewash (Location & Use) .....   | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Emergency alarms .....  | <input checked="" type="checkbox"/> <input type="checkbox"/> |
| Procedure for safe job completion .....        | <input type="checkbox"/>            | <input type="checkbox"/> | Evacuation routes ..... | <input checked="" type="checkbox"/> <input type="checkbox"/> |
| Contractor tools/equipment/PPE inspected ..... | <input type="checkbox"/>            | <input type="checkbox"/> | Assembly points .....   | <input checked="" type="checkbox"/> <input type="checkbox"/> |

- |   |                                     |                          |
|---|-------------------------------------|--------------------------|
| IX. Site Preparation  | Yes                                 | NA                       |
| Utility Locating and Excavation Clearance completed .....     | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Vehicle and Foot Traffic Routes Cleared and Established ..... | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Physical Hazards Barricaded and Isolated .....                | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Emergency Equipment Staged .....                              | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

- X. Additional Permits required (Hot work, confined space entry, excavation etc.).  Yes  No  
*If yes, complete permit required or contact Health Sciences, Pittsburgh Office*

- XI. Special instructions, precautions Suspicious materials or items shall be avoided and reported to the site contact. All surface locations and approach lanes will be cleared by an on-site EOD technician.

Permit Issued by: \_\_\_\_\_ Permit Accepted by: \_\_\_\_\_

**SAFE WORK PERMIT  
SOIL BORING OPERATIONS  
NSWC, CRANE INDIANA**

Permit No. \_\_\_\_\_ Date: \_\_\_\_\_ Time: From \_\_\_\_\_ to \_\_\_\_\_

**SECTION I: General Job Scope**

- I. Work limited to the following (description, area, equipment used): Soil boring using Direct Push Technology. Monitoring well installation and development.
- II. Required Monitoring Instrument(s): PID with at least a 11.7 eV lamp
- III. Field Crew: \_\_\_\_\_
- IV. On-site Inspection conducted  Yes  No Initials of Inspector TtNUS

**SECTION II: General Safety Requirements (To be filled in by permit issuer)**

- V. Protective equipment required
 

Level D <input checked="" type="checkbox"/>	Respiratory equipment required
Level B <input type="checkbox"/>	Full face APR <input type="checkbox"/>
Level C <input type="checkbox"/>	Half face APR <input type="checkbox"/>
Level A <input type="checkbox"/>	SAR <input type="checkbox"/>
Detailed on Reverse	Skid Rig <input type="checkbox"/>
	Escape Pack <input type="checkbox"/>
	SCBA <input type="checkbox"/>
	Bottle Trailer <input type="checkbox"/>
	None <input checked="" type="checkbox"/>

Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, safety footwear, and nitrile gloves

VI. Chemicals of Concern	Action Level(s)	Response Measures
<u>Site contaminants include metals, RDX, HMX and Low levels of VOCs</u>	<u>Any sustained readings above background in worker breathing zone</u>	<u>Suspend site activities report to an unaffected area.</u>

- VII. Additional Safety Equipment/Procedures
 

Hard-hat <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Hearing Protection (Plugs/Muffs) <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Safety Glasses <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Safety belt/harness <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Chemical/splash goggles <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Radio <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Splash Shield <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Barricades <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Splash suits/coveralls <input type="checkbox"/> Yes <input type="checkbox"/> No	Gloves (Type - Nitrile) <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Steel toe Work shoes or boots <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Work/rest regimen <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Modifications/Exceptions: Reflective vests for high traffic areas. Tyvek coverall if there is a potential for soiling work cloths and PVC or PE coated Tyvek if saturation or work cloths may occur

VIII. Procedure review with permit acceptors	Yes	NA	
Safety shower/eyewash (Location & Use) <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Emergency alarms <input checked="" type="checkbox"/>
Procedure for safe job completion <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Evacuation routes <input checked="" type="checkbox"/>
Contractor tools/equipment/PPE inspected <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Assembly points <input checked="" type="checkbox"/>

- IX. Site Preparation
 

Utility Locating and Excavation Clearance completed <input checked="" type="checkbox"/>	Yes	NA
Vehicle and Foot Traffic Routes Cleared and Established <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Physical Hazards Barricaded and Isolated <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Emergency Equipment Staged <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

- X. Additional Permits required (Hot work, confined space entry, excavation etc.)  Yes  No  
*If yes, complete permit required or contact Health Sciences, Pittsburgh Office*

- XI. Special instructions, precautions Suspicious materials or items shall be avoided and reported to the site contact. All subsurface locations and approach lanes will be cleared to a depth of 10 feet by an on-site EOD technician.

Permit Issued by: \_\_\_\_\_ Permit Accepted by: \_\_\_\_\_

**SAFE WORK PERMIT  
FOR  
SURVEYING  
NSWC CRANE, INDIANA**

Permit No. \_\_\_\_\_ Date: \_\_\_\_\_ Time: From \_\_\_\_\_ to \_\_\_\_\_

**SECTION I: General Job Scope**

- I. Work limited to the following (description, area, equipment used): Surveying (geographical) sampling locations, and site features.
- II. Required Monitoring Instruments: None
- III. Field Crew: \_\_\_\_\_
- IV. On-site Inspection conducted  Yes  No Initials of Inspector TINUS OTHER

**SECTION II: General Safety Requirements (To be filled in by permit issuer)**

- |  |  |  |
|--|--|--|
| IV. Protective equipment required  | Respiratory equipment required         |  |
| Level D <input checked="" type="checkbox"/> Level B <input type="checkbox"/> | Full face APR <input type="checkbox"/> | Escape Pack <input type="checkbox"/>     |
| Level C <input type="checkbox"/> Level A <input type="checkbox"/>            | Half face APR <input type="checkbox"/> | SCBA <input type="checkbox"/>            |
| Detailed on Reverse  | SKA-PAC SAR <input type="checkbox"/>   | Bottle Trailer <input type="checkbox"/>  |
|  | Skid Rig <input type="checkbox"/>      | None <input checked="" type="checkbox"/> |

Level D Minimum Requirements: Sleeved shirt and long pants and safety footwear.

Modifications/Exceptions:

- |   |                 |                   |
|---|-----------------|-------------------|
| V. Chemicals of Concern   | Action Level(s) | Response Measures |
| <u>None anticipated given the nature of surveying activities and limited contact w/ potentially contaminated media.</u> |                 |                   |

VI. Additional Safety Equipment/Procedures

- |   |  |
|---|--|
| Hard-hat ..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No                      | Hearing Protection (Plugs/Muffs) ... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Safety Glasses ..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No                | Safety belt/harness ..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No            |
| Chemical/splash goggles ..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No       | Radio ..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No                          |
| Splash Shield ..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No                 | Barricades ..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No                     |
| Splash suits/coveralls ..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No        | Gloves (Type - Nitrile) ..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No        |
| Steel toe Work shoes or boots ..... <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | Work/rest regimen ..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No              |

Modifications/Exceptions: ve vests for high traffic areas. Tyvek coverall to protect against natural hazards (e.g., ticks). If working in areas where snakes are a threat, wear snake caps to protect against bites. Avoid nesting/habitat areas when possible.

- |   |                                     |                                     |                          |                                     |
|---|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------|
| VII. Procedure review with permit acceptors   | Yes                                 | NA                                  | Yes                      | NA                                  |
| Safety shower/eyewash (Location & Use).....   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Procedure for safe job completion.....        | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Contractor tools/equipment/PPE inspected..... | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
|   |                                     |                                     | Emergency alarms.....    | <input type="checkbox"/>            |
|   |                                     |                                     | Evacuation routes.....   | <input type="checkbox"/>            |
|   |                                     |                                     | Assembly points.....     | <input type="checkbox"/>            |

- |   |                          |                                     |
|---|--------------------------|-------------------------------------|
| VIII. Equipment Preparation                                 | Yes                      | NA                                  |
| Equipment drained/depressurized .....                       | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Equipment purged/cleaned .....                              | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Isolation checklist completed .....                         | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Electrical lockout required/field switch tested .....       | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Blinds/misalignments/blocks & bleeds in place.....          | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Hazardous materials on walls/behind liners considered ..... | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

- IX. Additional Permits required (Hot work, confined space entry, excavation etc.).  Yes  No  
If yes, complete permit required or contact Health Sciences, Pittsburgh Office

X. Special instructions, precautions: Preview work locations to identify potential hazards (slips, trips, and falls, natural hazards, etc.) Avoid potential nesting areas. Wear light colored clothing so that ticks and other biting insects can be easily visible and can be removed. Inspect clothing and body for ticks. Minimize contact with potentially contaminated media. Suspend site activities in the event of inclement weather.

Permit Issued by: \_\_\_\_\_ Permit Accepted by: \_\_\_\_\_

**ATTACHMENT VI**  
**TtNUS UNEXPLODED ORDNANCE SOP**

## UXO Policy Variance at the Ammunition Burning Ground [ABG], NSWC Crane

As the UXO Project Coordinator, I am responsible to ensure safe and appropriate procedures are in place and practiced to protect NUS and subcontractor personnel.

I have to agree with Tom that the statement by Mr. Waggoner that "we've never had problems before" is not a proper assessment of the risk to forego Corporate Policy.

However, evaluation of the situation presented by Ralph [and I'll discuss this further with Mr. Waggoner to confirm assumptions] does support deviation given the following:

1. Open Burning [OB] is not a method used to dispose of heavy cased, energetically filled munitions. It's used to dispose of propellant [loose or contained within rocket/missile motors], propelling charges [such as used on artillery rounds] and bulk explosives.
2. Items [such as motors] may contain subcomponents, which can contain small quantities explosives, which do represent a hazard.
3. OB does result in the ejection of items, however because the subcomponents tend to be small, they generally don't scatter a great distance from the burn pan nor do they bury themselves to a great depth.
4. Generally these subcomponents are NOT constructed of a ferrous metal; rather they are brass or aluminum which a Schonstedt magnetometer does NOT detect.

Given this, I propose we consider the following concerning deviation from policy at the ABG NSWC Crane:

1. I will bring both the Schonstedt and down-hole magnetometers should the actual situation require their use.
2. According to the UXO SOP presented to me by Phil Blackwell, we also have a White which is capable of locating non-ferrous metals. Provided I can locate this, I'll bring it also.
3. Using both [Schonstedt and White], I'll sweep an entry route into the ABG.
4. If we are not detecting any significant ferrous surface anomalies, we will proceed with drilling operations without the 2 foot incremental down-holing requirement.
5. Should we encounter significant ferrous anomalies or find items in the drilling tailings, we will follow established down-holing procedures.

Hopefully, this provides an appropriate level of Risk Assessment and Contingency Planning to support a variance to established Policy.

Wes Rogers



# STANDARD OPERATING PROCEDURES

TETRA TECH NUS, INC.

Number	HS-2.0	Page	1 of 14
Effective Date	09/03	Revision	1
Applicability	Tetra Tech NUS, Inc.		
Prepared	Earth Sciences Department		
Approved	D. Senovich <i>DS</i>		

Subject UNEXPLODED ORDNANCE AND CHEMICAL WARFARE AGENTS ACTIVITIES

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## 1.0 GENERAL

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

## 2.0 PURPOSE

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

## 3.0 APPLICABILITY

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

## 4.0 RESPONSIBILITIES

### Project Manager

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

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

### UXO Technician

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

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

Subject  UNEXPLODED ORDNANCE AND CHEMICAL WARFARE AGENTS ACTIVITIES	Number HS-2.0	Page 3 of 14
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- Participating in the development and conductance of site specific training sessions and daily tailgate meetings to communicate UXO/CWM matters to the field personnel
- Maintaining a sound familiarity with the contents of this SOP, the contents of the references listed in section 9.1, and keeping current with new information and technology pertinent to UXO/CWM matters

#### **Site Health and Safety Officer**

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

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

#### **Corporate Health and Safety Manager**

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

### **5.0 LOCATION OF OPERATIONS**

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

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

### **6.0 PERSONNEL QUALIFICATIONS AND REQUIREMENTS**

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

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

Subject  UNEXPLODED ORDNANCE AND CHEMICAL WARFARE AGENTS ACTIVITIES	Number HS-2.0	Page 4 of 14
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c. UXO personnel are responsible for maintaining current status with training and medical surveillance requirements, as specified in the project-specific Health and Safety Plans and OSHA 29 CFR 1010.120, paragraphs (e) and (f).

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

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

## 7.0 PERSONNEL LIMITS

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

7.1 Personnel Limits for UXO Operations:

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

## 8.0 MATERIAL LIMITS

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

## 9.0 SAFETY REQUIREMENTS

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

- a. OSHA 29 CFR 1910.120 and 1926.65 – Hazardous Waste Operations and Emergency Response (HAZWOPER). Available online at:  
[http://www.osha.gov/pls/oshaweb/owasfch.search\\_form?p\\_doc\\_type=STANDARDS&p\\_toc\\_level=0&p\\_keyvalue=OSHA\\_Std\\_toc.html](http://www.osha.gov/pls/oshaweb/owasfch.search_form?p_doc_type=STANDARDS&p_toc_level=0&p_keyvalue=OSHA_Std_toc.html)

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

9.2 Specific Safety Requirements:

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

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

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

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## 10.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

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

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

## 11.0 EMERGENCY RESPONSE AND CONTINGENCY PLANS

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

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

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

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

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

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

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

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

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

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

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

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

## 12.0 TYPICAL CLIENT/FACILITY SAFETY POINTS OF CONTACT

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

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

## 13.0 TOOLS AND EQUIPMENT

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

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### **13.1 Personal Protective Equipment**

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

### **13.2 Air Monitoring Equipment**

- a. Explosive/O<sub>2</sub> Meter (Combustible Gas Indicator)
- b. Direct reading Organic Vapor Analyzer (PID or FID)
- c. Direct reading particulate meter
- d. Radiation Survey Meters and TLD Badges

### **13.3 Geophysical/Hydrology Survey Instrumentation**

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

### **13.4 UXO Support Equipment**

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

### **13.5 CWM Support Equipment**

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

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### 13.6 Decontamination Equipment

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

### 13.7 Hand Tools/ Miscellaneous Equipment

As may be required.

## 14.0 ENVIRONMENTAL CONCERNS

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

Every effort will be made to:

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

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

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

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

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

## 15.0 UXO/CWM PROCEDURES FOR FIELD OPERATIONS

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

- a. Initial entry into suspect areas
- b. CWM operations
- c. Surface and subsurface sampling
- d. Monitoring well installation
- e. Exploratory trenching

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f. Geophysical surveys

g. Other miscellaneous operations

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

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

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

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

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

Prior to any subsurface intrusive sampling, another check with a magnetometer needs to be accomplished. The GA-52Cx Magnetic Locator (magnetometer) can be used for collecting

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subsurface samples not greater than 0.5 feet. If excavation of a borehole or hand auguring hole is to exceed this depth, a MG-220 Magnetic Gradiometer (down-hole magnetometer) shall be utilized with readings taken at two feet depth intervals.

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

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

- a. The GA-52Cx magnetometer will be used directly over the borehole site to check for buried items down to 0.5 feet. After a surface check, the UXO-qualified technician will hand auger down to a depth of two feet and check down the hole using the MG-220 magnetometer.
- b. Once the hand-auguring hole has been cleared, the drill rig will be positioned over the proposed borehole. Drilling will commence to a depth of four feet, the drill auger will be removed from the borehole, the drill crew chief and UXO personnel will make observations of the soil from the core barrel and the soil removed from the hole by hand auger (if needed). The drilling log and lithologic log will be maintained in accordance with standard practices, noting any metal objects that may be found.
- c. The drilling derrick will be secured and drill rig moved to a position at least 20 feet from the borehole.
- d. The borehole will be checked again with the MG-220 magnetometer.
- e. If UXO or magnetic anomaly is present, the borehole will be abandoned and another location selected. The new borehole should be at least six feet from the original borehole. If a UXO or anomaly is not detected and the clearance is given, the drill rig shall be positioned back over the borehole, and drilling will proceed to the next depth (6 feet).
- f. Repeat above steps at intervals of 2 feet, until a depth of ten feet is reached. At the ten-foot interval, a magnetometer reading shall be taken with the MG-220 set on the maximum sensitivity. The instrument will detect larger objects (approaching 100 lbs.) that could be expected to penetrate to depths of 10 feet or more.
- g. After reaching the depth of ten feet, the above steps will be repeated at intervals of 4 feet, until the desired depth is reached.

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

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

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

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

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

When using the magnetometer or the EM-61, a UXO-qualified technician will conduct a surface sweep of the area to be surveyed to ensure that no surface ordnance or other hazards exist. The magnetometer is a passive instrument; therefore, no special ordnance safety precautions are required.

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

- 15.8 Miscellaneous Operations – due to the potential of UXO/CWM materials being encountered during field activities, UXO support will be provided at all site locations. UXO support will be

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provided for any and all field activities that are in areas suspected to contain UXO and/or CWM. These areas also include those areas covered with water and creeks, canals, etc.

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

## 16.0 HAZARD CONTROL BRIEF

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

The following information will be given during the daily briefings:

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

## 17.0 SECURITY

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