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HEALTH AND SAFETY PLAN FOR INITIAL SITE INVESTIGATION AT SIX MUNITIONS  
RESPONSE SITES NAS BRUNSWICK ME  
7/1/2009  
TETRA TECH NUS

**Health and Safety Plan  
for  
Initial Site Investigation  
at the  
Six Munitions Response Sites**

**Naval Air Station Brunswick  
Brunswick, Maine**



**Naval Facilities Engineering Command  
Mid-Atlantic**

**Contract Number N62472-03-D-0057**

**Contract Task Order 069**

**Revision 2  
July 2009**

**HEALTH AND SAFETY PLAN  
INITIAL SITE INVESTIGATION  
SIX MUNITIONS RESPONSE SITES  
LOCATED AT THE  
NAVAL AIR STATION BRUNSWICK  
BRUNSWICK, MAINE**

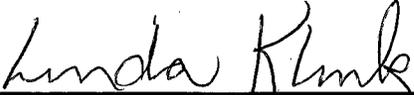
**Submitted to:  
BRAC PMO Northeast  
4911 South Broad Street  
Philadelphia, Pennsylvania 19112-1303**

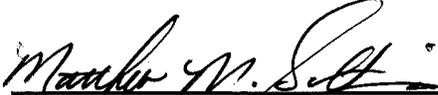
**Submitted by:  
Tetra Tech NUS, Inc.  
234 Mall Boulevard, Suite 260  
King of Prussia, Pennsylvania 19406-1433**

**CONTRACT NUMBER N62467-03-D-0057  
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**PREPARED UNDER THE SUPERVISION OF:      APPROVED FOR SUBMITTAL BY:**

  
\_\_\_\_\_  
**LINDA KLINK  
PROJECT MANAGER  
TETRA TECH NUS, INC.  
PITTSBURGH, PENNSYLVANIA**

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

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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 Air Station (NAS Brunswick), located in Brunswick, Maine. 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 at six Areas of Concern (AOC) located within the Naval Air Station Brunswick. 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 Project Manager (PM). It is the responsibility of the PM to notify all affected personnel of 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 where applicable 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 NAS Brunswick policies and procedures and the site EOD Health and Safety Plan.

### **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 Project Manager (PM) 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. coordinating all health and safety activities with the FOL.
  - ii. selecting, applying, inspecting, and maintaining personal protective equipment.
  - iii. establishing work zones and control points.
  - iv. implementation of the air monitoring program for on-site activities.
  - v. verification of training and medical clearances of on-site personnel status in relation to site activities.
  - vi. implementation of hazard communication, respiratory protection, and associated health and safety programs as it may pertain to site activities.
  - vii. coordination with identified emergency services.
  - viii. providing site specific training for all on-site personnel.
- Compliance with the requirements stipulated in this HASP are monitored by the SSO and coordinated through the CLEAN Health and Safety Manager.



## **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).

For UXO areas and emergency activities personnel will comply with the requirements of the TtNUS NAS Brunswick UXO Health and Safety Plan.

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 UXO, striking a utility, physical hazards, fire and flightline hazards 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 FOL, SSO and the UXO Specialist are responsible for:

- Coordinating with NAS Brunswick Emergency Services personnel to ensure that Tetra Tech NUS emergency action activities are compatible with existing facility emergency response procedures. This will include NAS Brunswick EOD for approval of the TtNUS NAS Brunswick EOD Health and Safety Plan.
- 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.

- In the event of an emergency the FOL will serve as the Incident Commander until Emergency Services arrive. The UXO Specialist will be consulted on all ordnance related matters.
- 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. This will include:
  - Site-specific training
  - Tailgate/Safety Meetings
  - Safe Work Permit Review

## **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. This will be done by the UXO Specialist clearing the surface of any potential ordnance related materials. In addition, the UXO Specialist will provide training and instruction on Ordnance types that may be encountered, avoidance measures

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 or selected assembly point for that area within that 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, when conditions require evacuation personnel will cease all activities being conducted and travel to the assembly areas via cleared pathways established by the UXO Specialist 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 postponed 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:

- 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 **9-1-1** or (207) 921-1719 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.
- Conduct a head count of site personnel at the assembly point using the site logbook.

## **2.8 EMERGENCY EQUIPMENT**

A first aid kit, eye wash unit, and a 10 lb. ABC Fire extinguisher will be placed in all site vehicles, and will be maintained and shall be immediately available for use in the event of an emergency.

## **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 will 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 Fire Department and EMS 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 2-1 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 2-1.**

**TABLE 2-1  
EMERGENCY CONTACT NUMBERS  
NAS BRUNSWICK, BRUNSWICK, MAINE**

AGENCY	TELEPHONE
NAS Brunswick Emergency Number for On-Base Fire and Police and Ambulance	<b>9-1-1</b> or (207) 921-1717
Fire Department (non-emergency)	(207) 921-1717
Police Department (non-emergency)	(207) 921-1717
Mid Coast Hospital	(207) 373-3635
BRAC PMO NE Remedial Project Manager (RPM): Todd Baker	(215) 897-4911
Explosives Safety Officer Brion Hall	(207) 921-1319
EOD Support, NAVSTA Newport, Rhode Island	Contact the RPM and POC
NASB Point of Contact (POC) Michael Fagen	(207) 921-1717
<b>NORTHERN NEW ENGLAND POISON CENTER</b>	(800) 222-1222
Tetra Tech NUS Office, Pittsburgh	(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

## 2.10 EMERGENCY ROUTE TO HOSPITAL

### DIRECTIONS TO HOSPITAL (See next page hospital route map)

Hospital Name:	Mid Coast Hospital	
Hospital Address:	123 Medical Center Drive, Brunswick, ME 04011	
Hospital Telephone:	Emergency Department	(207)373-3635
	General	(207) 729-0181

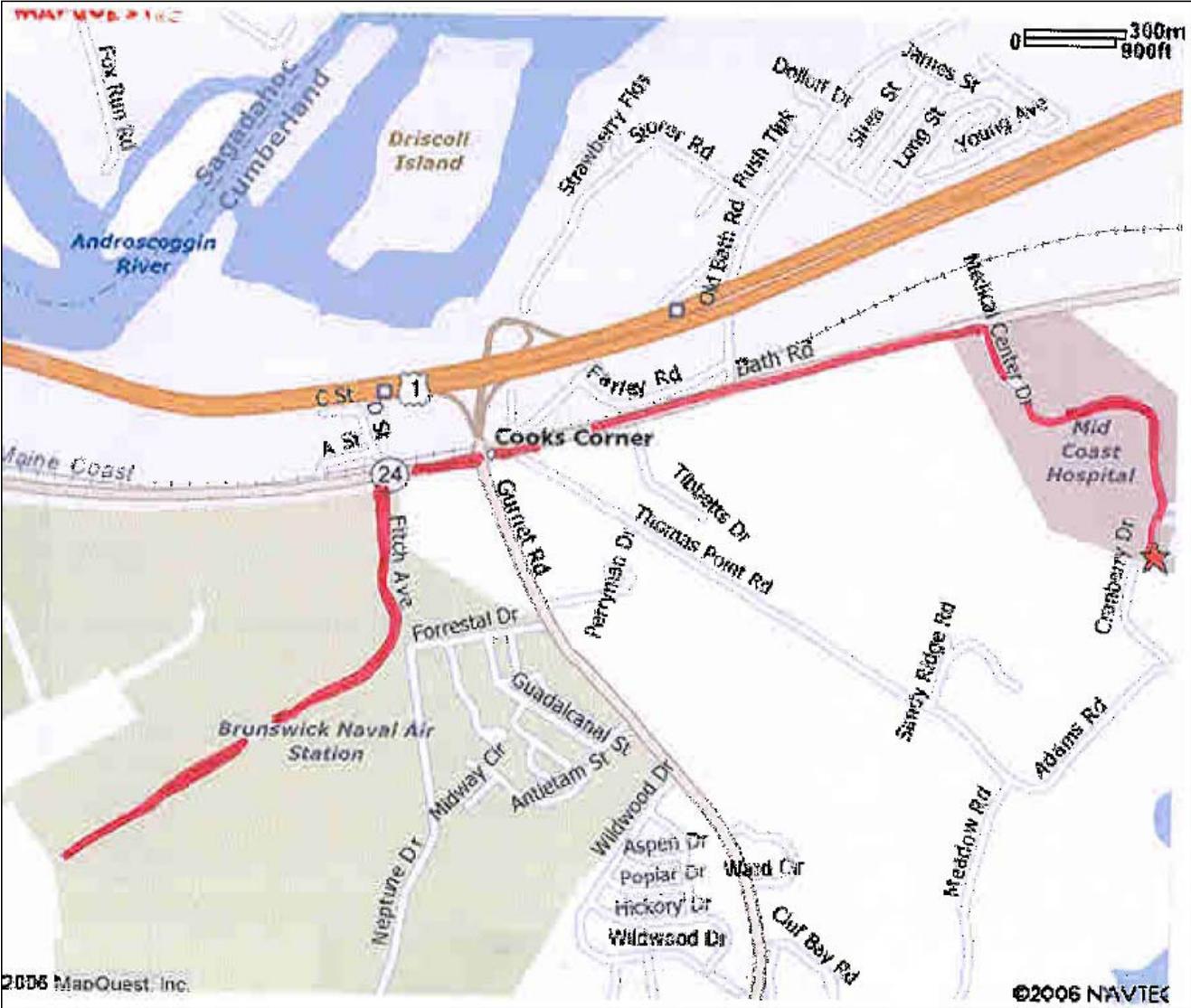
### ROUTE TO EMERGENCY FACILITY (MID COAST HOSPITAL)

Start on FITCH AVE. heading north.  
Turn RIGHT onto ME-24 E/ BATH RD.  
Turn RIGHT onto MEDICAL CENTER DR.  
END at 123 MEDICAL CENTER DR.

**Estimated Time:** 2-3 minutes

**Estimated Distance:** 1.08 miles

FIGURE 2-1  
MAP TO THE EMERGENCY FACILITY (MID COAST HOSPITAL)



## **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 2-2**  
**POTENTIAL EXPOSURE 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
- 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 412-921-7090
- 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 2-2 (continued)**  
**WORKCARE**  
**POTENTIAL EXPOSURE PROTOCOL**

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

Tearing

Headache

Cough

Shortness of Breath

Chest Tightness / Pressure

Nausea / Vomiting

Dizziness

Weakness

**Delayed Symptoms:**

Weakness

Nausea / Vomiting

Shortness of Breath

Cough

Loss of Appetite

Abdominal Pain

Headache

Numbness / Tingling

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

Burning of eyes, nose, or throat

Tearing

Headache

Cough

Shortness of Breath

Chest Tightness / Pressure

Cyanosis

Nausea / Vomiting

Dizziness

Weakness

Loss of Appetite

Abdominal Pain

Numbness / Tingling

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 NAS Brunswick 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 installation was originally constructed and occupied in March 1943 with the primary mission of training British Naval Command (Royal Canadian Air Force) pilots. The station carried out a secondary mission of anti-submarine warfare during World War II. In October 1946, the installation was deactivated and the land and buildings were leased jointly to the University of Maine and Bowdoin College as annexes to ease the overcrowded conditions caused by the G.I. Bill student influx. The University of Maine and Bowdoin College terminated their leases in 1949, and the station was taken over by the Brunswick Flying Service. Following this period of caretaker status, the station was selected by the Navy as a prime center for development. During the development period, the U.S. Air Force reached an agreement with the Navy authorizing the construction of an Air Force Control and Warning Facility on the station as a part of the continental circumferential radar screen.

The station was re-commissioned in March 1951 as a Naval Air Facility with the mission of supporting three land-plane patrol squadrons and one fleet aircraft service squadron and a planned future mission as a master jet base. The station retained the mission of anti-submarine warfare. In December 1950, the Navy requested funds from Congress to be used for this master jet project. Such a base required dual 8,000-foot runways and two outlying fields: one for gunnery and one for carrier practice landings. In addition, the Secretary of Defense submitted a request to Congress for approximately \$20 million in June 1951. This money was to be used for additional barracks, officers' quarters, and enlisted men's clubs; control tower, storage, and communication buildings; and new galleys and mess facilities. The new buildings and facilities would make the station a permanent installation in Brunswick.

In December 1951, the Naval Air Facility was officially changed to the designation of Naval Air Station. The Arctic Survival Training School to provide training in north country survival skills was established in September 1956 to train members deploying to the Arctic in techniques.

Topsham Annex was initially developed by the U.S. Air Force in 1956 as an airspace surveillance and communications facility. The Air Force's mission for Topsham Air Force Base, its name during this period, was to perform the mid-coast Maine segment of the Semi-Automatic Ground Environment (SAGE)

system. SAGE was a networked radar and communications system that provided airspace surveillance of the U.S. and Canada during the 1960s. Topsham Air Force Base included the typical support infrastructure of a small military base: barracks, engineering, supply, recreation, administration, communication, etc. In the early 1960s, 51 additional buildings comprising 177 housing units were constructed. In the 1970s, Topsham Annex was acquired by the Navy and placed under the operational control of NASB as a housing annex and space for support units; it was renamed Topsham Annex. Prior to 1956, the installation was occupied by a small dairy farm and woodland. Portions of the Topsham Annex have been excessed (e.g., taken out of service) by the Navy. Four parcels were transferred to the Maine School Administration District (MSAD) No. 75. The property included seven buildings, ball fields, roadways, and parking lots. The Topsham Annex Skeet Range overlaps Parcel 1 of the MSAD No. 75 property along its northern property boundary, and Parcels 2, 3, and 4 of the MSAD No. 75 property are located south of the range.

### **3.1.1 Location and Setting**

The NASB is located in Cumberland County, approximately 25 miles northeast of Portland, Maine. The installation is located just south of United States (U.S.) Route 1, approximately 2 miles east of Brunswick's main business district and 5 miles inland from the Atlantic Ocean.

The NASB sits on approximately 3,200 acres. It is the last active duty Department of Defense (DoD) airfield remaining in the northeastern United States. The NASB is home to three active duty and two Reserve squadrons and 29 tenant commands. The installation is one of Maine's largest employers with over 4,800 military and civilian personnel. The NASB also provides support for other Navy units in Maine, including the Navy ships at Bath, the Navy Security Group at Winter Harbor, the U.S. Naval Radio Station at Cutler, the U.S. Naval Survival School at Rangeley, and the Department of Naval Sciences at the Maine Maritime Academy at Castine. Maps 1A, 1B, and 1C in the site work plan show the general layout of NASB, as well as the locations of the six MRSs that are the focus of this HASP.

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

The following sites will be investigated as part of this field effort

- Site 12
- Former Munitions Bunker West
- The Quarry
- Machine Gun Boresight Range
- NAS Skeet Range
- Topsham Annex Skeet Range

Of these sites, the following sites potentially have Munitions and Explosives of Concern (MEC). These sites will require a UXO escort.

- Site 12
- Former Munitions Bunker West
- The Quarry

### **3.2.1 Site 12 Explosive Ordnance Disposal (EOD) Area Description**

Site 12 EOD Area is a 112.7 acre area located in the southeast portion of the installation. The site is located in a remote, open upland area on Buttermilk Mountain. See Map 5 in the site work plan which shows the layout of the Site 12 EOD Area. The site currently has a 5 to 6 foot tall earthen berm that is 60 feet long by 100 feet wide and occupies approximately one-half of the area suspected of being a former sand/gravel pit.

The Site 12 EOD Area was used from 1981 through June 1, 2004, for disposal of small quantities of ordnance, pyrotechnics, privately manufactured explosive devices, and war souvenirs. Historical and visual evidence suggest that MEC are present at the site.

There is a potential for munitions constituents (MC) associated with the MEC to be present at the site. Based on quantities involved, low level contamination of unburned explosive residues and elevated concentrations of lead, cadmium, chromium, mercury, and perchlorate may be expected in the soils.

### **3.2.2 Former Munitions Bunker West Area Description**

The Former Munitions Bunker West Area is approximately 29 acres in size and is located to the west of the runways. Between 1980 and 2000, U.S. Marines stationed at the installation used the site sporadically to conduct munitions-related security training. Blank small arms ammunition, practice grenades, and limited pyrotechnics (simulators and smoke devices) were used during the training. The area is no longer used to conduct security training. Map 2 in the site work plan shows the layout of the Former Munitions Bunker West Area.

The entire Former Munitions Bunker West Area is suspected munitions and explosives of concern (MEC) area. However, Marines at NASB reported that sweeps of the area were conducted after each training exercise and that all munitions debris was removed from the ground surface. Additionally, no MEC were observed during a site survey conducted by Malcolm Pirnie team members in January of 2003. Therefore, the potential for MEC at the site is considered extremely low.

In addition, the potential exists for MC in the surface soil. Contaminants potentially present at the site include phosphorous from the smoke-generating grenades, metals, and explosives. Based on known frequency of usage, types of items, and likely volume of items deployed, heavy deposition of MC contamination is not expected. Actual concentrations (if any) of MC remaining at the site are unknown.

### **3.2.3 Quarry Description**

The Quarry is located southwest of the runways at the NASB boundary, adjacent to Maine State Route 123. The approximately 4-acre area has been used as a rock quarry and contains an approximately 20- to 30- foot rock face. In the early 1990s, land spreading was conducted at the Quarry. The Quarry was added to the MRP due to an undocumented report that it may have been used for past EOD activities. Map 6 in the site work plan shows the layout for the Quarry.

There is no documentation to support a claim that the Quarry was used for EOD activities. There was also no visual evidence of MEC scrap/fragments found during a visual survey of the Quarry. MC may be associated with the Quarry if MEC is encountered.

The Following sites do not have MEC concerns.

### **3.2.4 Machine Gun Boresight Range Description**

The Machine Gun Boresight Range was located in the eastern portion of the installation. The range encompasses approximately 0.3 acres from the firing line to the berm with an approximately 1029.4 acre Surface Danger Zone (SDZ). The former range was used during the 1950s to align and test fire aircraft mounted guns. Naval aircraft of the 1950s would have fired machine gun ammunition including .30-caliber and .50-caliber. At the time the range was active, the area east of the range was undeveloped and wooded. The range is visible on a 1957 aerial photograph of the installation. Today, however, there are no visible remnants of the Machine Gun Boresight Range or the range berm. A map believed to be from the late 1950s to early 1960s found at the National Archives had the range mislabeled as a pistol range. The exact history or use of the range as a pistol range is unknown. In the early 1960s, the layout of the installation was later changed and eventually taxiways connecting the runways to the range area were removed and the range was abandoned.

Today, Building 55 sits on the approximate area of the former range. Approximately 0.5 acres of the former range SDZ area are paved serving as a parking lot and storage area associated with Building 55. Map 3 of the site work plan shows the layout of the Machine Gun Boresight Range.

The Former Machine Gun Boresight Range is not suspected to contain MEC. It is assumed that all small arms debris onsite were removed when the berm was demolished. The ultimate disposition of the berm is unknown. However, there is the potential for MC. The primary MC of concern associated with machine gun and small arms ranges is lead alloys. By design, the majority of the bullets fired at the range would have landed and accumulated in the berm. It is unknown if NASB has any procedures in place to remove and dispose of lead as it accumulated on the range when it was active or when the range was closed. Sampling data was not available to estimate the potential for lead in the soil.

### **3.2.5 NAS Skeet Range Description**

The Skeet Range was located in the southeast portion of the installation in an open field approximately 75 meters north of and 100 meters east of Building 55. This former range was located adjacent to Range Road just northeast of the taxiway intersection.

The former Skeet Range was used for the training of military personnel during the 1950s. Navy Programming Guidance from the 1950s defined the SDZ of a skeet range as a 900-foot radius from the shooting field giving it an area of 58 acres. The configuration of the range has changed over the years. On range maps from 1952, the range is shown with the direction of fire to the north; however, in a 1957 aerial photograph, the range is shown with the direction of fire to the east. These changes in range layout and direction of fire may have been implemented to maintain a safe separation distance from the shooting field outlined in the Programming Guide, because the area east of the range was undeveloped. Map 4 of the site work plan shows the layout for the Skeet Range.

The lead shot from expended shot gun ammunition is not considered MEC. There is the potential for MC. The primary constituent of concern associated with the Skeet Range is lead and polynuclear aromatic hydrocarbons (PAHs) from the clay targets. It is unknown if the Navy performed any lead removal from the range when it was active or after it was abandoned. During the time the range was operational, lead was not considered an environmental or health hazard. Other associated MC, which are less likely to be of concern, may include antimony (increases hardness actually as a lubricant), arsenic (present in lead), nickel (coating on some shot), and lead azide associated with gunpowder

### **3.2.6 Topsham Annex Skeet Range Description**

The Topsham Annex Skeet Range is located in the northern portion of Topsham Annex along the Navy property line and east of the Mt. Ararat Middle School athletic field. The former 29-acre area was used during the U.S. Air Force's occupation of Topsham Annex prior to the 1970s. Navy Programming Guidance from the 1950s defined the SDZ of a skeet range as a 900-foot radius from the shooting field. Based on the visual survey and historical layout, it appears that the direction of fire was toward the north.

The majority (27 acres) of the SDZ extends off-base onto private property transferred to the MSAD No. 75. No structures remain at the site, but clay target fragments were identified during the visual survey. The site is currently undeveloped, and future use will likely not change on the Navy owned property. The future use of the off-base portion of the range is unknown. Map 7 of the site work plan shows the layout for the Topsham Annex Skeet Range.

The lead shot from expended shot gun ammunition is not considered MEC. However, there is the potential for MC. The primary constituents of concern associated with the Topsham Annex Skeet Range are lead from shot and PAHs from the clay targets. Other MC associated with shotgun ammunition, which are less likely to be of concern, may include: antimony (increases hardness), arsenic (present in lead), nickel (coating on some shot), and lead azide (associated with gunpowder). Data from the July 2004 Investigative Activities indicated that lead is present in the surface soils. The soil samples were taken at the firing point and not within the likely shotfall area; therefore, the samples may not be representative of the entire Topsham Annex Skeet Range.

## 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 six sites will consist of the following tasks:

- Mobilization/Demobilization
- Minor clearing and grubbing
- Soil Boring Activities will include Direct Push Technology (DPT), and hand augering.
- Monitoring Well Installation using DPT.
- Water-level measurements, development, and purging of wells
- Multi-Media Sampling including:
  - Soils (Surface, Subsurface and sediment)
  - Water ( Surface and Groundwater)
  - XRF Sampling and analysis of Lead in soil
- Decontamination of sampling and heavy equipment
- IDW Management
- Surveying

## 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.

Safe Work Permits (SWP) issued for all major activities (See Section 10.10) 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.

### 5.1 GENERAL SAFE WORK PRACTICES

In addition to the task-specific work practices identified on Table 5-1, workers must follow these general 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 through hand to mouth activities exists.
- Wash hands and face thoroughly upon leaving a contaminated or suspected contaminated area to reduce and/or eliminate hand to mouth ingestion of these compounds. Hand wipes may be used for remote location. Hand Wipes such as D-Lead are specifically recommended for the removal of heavy metals.
- Avoid contact with potentially contaminated substances by walking around puddles, pools, mud, or other such areas. Avoid, whenever possible, kneeling on the ground or sitting equipment on 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” at all times.
- 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.
- Be diligent using the 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. Smoking will only be permitted in identified areas.
- Observe coworkers for signs of 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 III Note: NAS Brunswick 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 and posted at the job site.
- 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 for Drill Rigs are provided in Attachment IV. Inspection frequencies will be once every shift (10 day), following repairs, or when the equipment leaves and returns to the site.
- The trip hazards within the work area 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.

### **5.2.2 During Drilling**

- 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.(See above)
- Secure frayed or loose clothing, hair, and jewelry when working near equipment that could become snagged and entangled within rotating parts..
- 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.
- 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 and Base personnel 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.
- 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.
- Fill drums only 80% to control potential spillage and make handling less hazardous.

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**TABLE 5-1  
TASKS/HAZARDS/CONTROL MEASURES SUMMARIZATION  
NAS BRUNSWICK  
BRUNSWICK, MAINE**

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 and Development.</b></p> <ul style="list-style-type: none"> <li>- DPT Rig</li> </ul>	<p><b>Chemical hazards:</b></p> <p>1) No previous analytical data exists for these sites previous site history suggest that the following compounds are the suspected contaminants of concern in soil and groundwater: Arsenic, Chromium, lead, mercury, cadmium, antimony, nickel, General PAH's, and HMX. 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>Further information on these contaminants and other potential contaminants is presented in Table 6-1.</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 at:</p> <ul style="list-style-type: none"> <li>• Site 12</li> <li>• Former Munitions Bunker West</li> <li>• The Quarry.</li> </ul> <p>12) Cuts and Lacerations</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>2) Decontaminate all equipment and supplies between boreholes and prior to leaving the site.</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>- 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>- All self-propelled equipment shall be equipped with movement warning systems.</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 approach 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 utility clearance is obtained. If the field crew questions the validity of the permit, operations will cease and the PM 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. This may also be found in section 7.0 of the HSGM.</b></p> <p>6) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques. See Section 4.4 of the HSGM for additional safe lifting practices.</p> <p>7) Preview work locations for unstable/uneven terrain. See Section 4.1 of the HSGM for additional safe work practices as it pertains to movement of personnel and equipment on 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. Additional information regarding heat and cold stress concerns is provided in Section 4.6 of the TtNUS Health and Safety Guidance Manual.</p> <p>10) Wear eye protection and hard hat when the DPT rig is operating. Restrict all others from the area.</p> <p>11) UXO Avoidance techniques will be employed to minimize potential UXO hazards. Screen work area to ensure that it is clear of MEC. Area must be cleared by the UXO/EOD Specialist per the UXO Health and Safety Plan. Suspicious items will be marked and personnel will leave the area and notify appropriate site contacts as per the UXO HASP..</p> <p>12) Following these measures to reduce the potential for cuts:</p> <ul style="list-style-type: none"> <li>- Use the recommended knife and acetate tube retention tub when cutting open the MacroCore acetate liners. These items have been engineered to allow sample acquisition without putting the sampler at risk.</li> <li>-- When cutting items, always use a sharp knife and always cut away from your body. Do not place items to be cut in your opposite hand or on your knee.</li> <li>- Carry glassware and sharp items such as machetes or brush hooks in protective packaging or sheathed.</li> </ul> <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 9.6 eV lamp (Primary), will be used to screen samples and to detect the presence of any potential volatile organics as a precaution since there is no previous data on these sites. 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 reading above 25 PPMs (greater than 1 minute in duration) 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 Of work clothes exist.</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 work clothes.</li> <li>- Hearing protection during drilling activities</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</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</p> <p>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: Decontaminate and/or secure all drilling and equipment.</p> <p>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 for disposal.</p> <p>Stage 5: Wash face and hands.</p> <p><b>Sampling Equipment Decontamination</b></p> <ul style="list-style-type: none"> <li>• Remove visible soils by washing and rinsing within two buckets at the back of the rig.</li> <li>• Rinse using a low pressure sprayer with potable water.</li> <li>• All sampling components that come in contact with the sample media (cutting shoe) will be rinsed with isopropanol.</li> <li>• Rinse with potable water then deionized water.</li> <li>• Air dry</li> <li>• Scan with PID to insure all decontamination solvents are removed.</li> <li>• Wrap to protect from becoming soiled until used again.</li> </ul> <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>

**TABLE 5-1  
TASKS/HAZARDS/CONTROL MEASURES SUMMARIZATION  
NAS BRUNSWICK  
BRUNSWICK, MAINE**

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
Geographical surveying activities	<p><b>Chemical hazards:</b></p> <p>Exposure to potential site contaminants during surveying activities is unlikely given the nature of surveying work and the limited contact with potentially contaminated media (soils, sediments, surface water, etc.). To further reduce the potential for exposure, site personnel performing surveying activities will minimize contact with potentially contaminated media and will avoid areas where chemical hazards may exist.</p> <p>Refer to Section 6.0 for a list of potential and representative site contaminants. See individual Safe Work Permits contained in Attachment III for specific contaminants of concern associated with particular sites and site activities.</p> <p><b>Physical hazards:</b></p> <ol style="list-style-type: none"> <li>1) Slip, trips, and falls</li> <li>2) Natural hazards (Insect/animal bites and stings, poisonous plants)</li> <li>3) Inclement weather</li> <li>4) Heat Stress</li> <li>5) Cuts/lacerations</li> </ol>	<ol style="list-style-type: none"> <li>1) Preview work locations and site lines for uneven and unstable terrain. Clear necessary vegetation and establish temporary means for traversing hazardous terrain (e.g. rope ladders).</li> <li>2) Avoid potential nesting areas of biting/stinging insects and animals. Use commercially available insect repellents. Avoid contact with poisonous vegetation. Wear appropriate clothing. Tape ankle and wrists areas to prevent ticks, chiggers, etc. from attaching themselves to your skin. Wear light-colored clothing so that ticks and other biting insects can be easily visible and be removed. If working in areas where snakes are a threat, wear snake chaps to protect against bites. Follow directions as specified in section 6.3 concerning natural hazards.</li> <li>3) All operations will be temporarily suspended during electrical storms.</li> <li>4) Control measures for inclement and hot weather are addressed in Section 6.3.2 &amp; 6.3.3 of this document and in Section 4.0 of the Health &amp; Safety Guidance Manual.</li> <li>5) For cutting tools used to clear lines of sight               <ul style="list-style-type: none"> <li>- Maintain the tool's cutting edge</li> <li>- Place tool in protective sheath when not in use</li> <li>- Maintain a 10 foot radius when clearing brush</li> </ul> </li> </ol>	<p>No air monitoring is needed given that volatile contaminants are not likely to be present during surveying activities. The potential for exposure to site contaminants during this activity is considered minimal.</p>	<p>Surveying activities shall be performed in Level D protection</p> <p>Level D Protection consists of the following:</p> <ul style="list-style-type: none"> <li>- Standard field dress including sleeved shirt and long pants</li> <li>- Steel-toe work boots or shoes</li> <li>- <i>Safety glasses, hard hats (if working near machinery or clearing brush)</i></li> <li>- <i>Tyvek coveralls may be worn to provide additional protection against poisonous plants and insects, particularly ticks.</i></li> <li>- <i>Work gloves should be worn for clearing brush.</i></li> <li>- <i>Snake chaps for heavily wooded area where encounters are likely.</i></li> </ul> <p><b>Note:</b> The Safe Work Permit(s) for this task (see Attachment III) 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>Personnel Decontamination - A structured decontamination is not required, as the likelihood of encountering contaminated media is considered remote. However, survey parties should inspect themselves and one another for the presence of ticks when exiting wooded areas, grassy fields, etc. This action will be used to stop the transfer of these insects into vehicles, homes, and offices.</p>
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>- <i>Safety glasses</i></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>

**TABLE 5-1  
TASKS/HAZARDS/CONTROL MEASURES SUMMARIZATION  
NAS BRUNSWICK  
BRUNSWICK, MAINE**

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>Multi-media sampling employing DPT and Hand Augering, including:</p> <p>Soils - Surface - Subsurface - Sediment</p> <p>Water - Surface - Groundwater</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> <p>1) No previous analytical data exists for these sites previous site history suggest that the following compounds are the suspected contaminants of concern in soil and groundwater: Arsenic, Chromium, lead, mercury, cadmium, antimony, nickel, General PAH's, and HMX. 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>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 in excess of 85 dBA 4) Lifting (strain/muscle pulls) 5) Pinches and compressions 6) Slips, trips, and falls 7) Ambient temperature extremes (heat/cold stress) 8) Vehicular and foot traffic 9) Contact with UXO at:  <ul style="list-style-type: none"> <li>• Site 12</li> <li>• Former Munitions Bunker West</li> <li>• The Quarry.</li> </ul> </p> <p>10) Water hazards/drowning</p> <p><b>Natural hazards:</b></p> <p>11) Insect/animal bites and stings, poisonous plants, etc. 12) Cuts and Lacerations 13) 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>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.</p> <p>3) When sampling at an operating DPT rig use hearing protection. The use of hearing protection outside of 25 feet from the DPT rig should be incorporated under the following condition:  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.</p> <p>4) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques (See Lifting Mobilization/Demobilization, Page 1 of 6, Table 5-1).</p> <p>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> </p> <p>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> </p> <p>7) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding heat and cold stress concerns is provided in Section 4 of the TINUS Health and Safety Guidance Manual.</p> <p>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> </p> <p>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.</p> <p>10) While working near water, personnel shall wear U.S. Coast Guard-approved personal flotation devices (PFD). See Section 6 of this HASP for further information on types of PFD. When working on the shore, within 4 ft. of the water edge, lifelines, safety harnesses, and other personal safety devices may be used instead of a PFD.</p> <p>11) Avoid nesting areas, use repellents approved by the FOL. Report potential hazards to the SSO.</p> <p>12) Following these measures to reduce the potential for cuts:  <ul style="list-style-type: none"> <li>- Use the recommended knife and acetate tube retention tub when cutting open the MacroCore acetate liners. These items have been engineered to allow sample acquisition without putting the sampler at risk.</li> <li>-- When cutting items, always use a sharp knife and always cut away from your body. Do not place items to be cut in your opposite hand or on your knee.</li> <li>- Carry glassware and sharp items such as machetes or brush hooks in protective packaging or sheathed.</li> </ul> </p> <p>13) Suspend or terminate operations until directed otherwise by the SSO. (See Section 6.3.4 of this HASP)</p>	<p>See other monitoring comments A direct reading Photoionization Detector (PID) with a 9.6 eV lamp (Primary), or a Flameionization Detector (FID) 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:  <ul style="list-style-type: none"> <li>- Monitor the breathing zone of at-risk and downwind employees. Any sustained reading above 25 PPMs (greater than 1 minute in duration) 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> <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)  <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> <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:  Supporting subsurface investigations at the drill rig.  <ul style="list-style-type: none"> <li>- Decontamination will be the same as prescribed for the drilling activity</li> </ul> </p> <p>Sampling surface water, groundwater, soils and sediments, the following provisions will apply  <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> <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 SUMMARIZATION  
NAS BRUNSWICK  
BRUNSWICK, MAINE**

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 sampling via direct collection (stainless steel bowls, trowels, etc.). to lead in contaminated soil. Samples will be analyzed using XRF.</p>	<p><b>Chemical Hazards</b></p> <p>1) Lead is the contaminant of concern associated with the Munitions Sites. Sampling is not anticipated to bring site personnel into contact with significant concentrations of lead contaminated soil. Sampling does not require TtNUS personnel to continuously work in areas where airborne dusts are present. Avoid any airborne dusts that may be created by site activities and station work areas upwind away from potential dusts. Observations of site dusts, will require area wetting methods to be implemented and further modification of this HASP.</p> <p>Further information on this contaminant 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) Heavy equipment hazards 6) Slip, trips, and falls 7) Natural hazards (Insect/animal bites and stings) 8) Inclement weather / heat stress</p>	<p>1) Avoid contact with potentially contaminated soils particularly dusts that may be generated as a result of excavation operations. Observations of airborne dust will require persons to move upwind and notification of the PHSO. Use safe work practices, PPE, and decontamination/personal hygiene practices to minimize potential exposures via incidental ingestion and skin contact.</p> <p>2) Decontaminate all equipment and supplies between sampling locations and prior to leaving the site.</p> <p>3) When sampling near operating heavy equipment or in the presence of elevated noise sources, use hearing protection. As a general rule of thumb, if you have to raise your voice to talk to someone who is within 2 feet of your location, noise levels may be becoming excessive.</p> <p>4) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques.</p> <p>5) Use high visibility reflective vest to improve visibility. Maintain two way visual contact with equipment operators and never work in an areas within the swing radius of excavator booms.</p> <p>6) Preview work locations for unstable/uneven terrain. Barricade all excavations and other associated drop off points at least 3 feet from the edge. Although deep excavations are not anticipated, site personnel will not be permitted to enter open excavations &gt; 3 feet deep.</p> <p>7) Avoid nesting areas, use commercially available repellents. Report potential hazards to the SSO.</p> <p>8) Suspend or terminate operations until directed otherwise by SSO. Drink plenty of fluids and seek shelter (shade or air conditioned areas) for breaks. If necessary, evaluate workers for heat stress and follow ACGIH guidelines for work/rest regimens.</p>	<p>The primary contaminant of concern is lead which is a solid. Excavation operations performed as part of the removal action may generate airborne dusts. However TtNUS personnel performing confirmation sampling will not have to be present in areas where airborne dusts may exist. The generation of dusts should be minimized to the greatest extent possible to avoid inhalation of lead contaminated dusts or particulates. Evaluation of dust concentrations will be qualitative by observing work conditions for visible dust clouds or accumulations. If necessary potential exposure to contaminants attached to dust particles will be controlled by using water to suppress dusts, by avoiding dust plumes, or by upgrading the level of protection. If airborne dusts are observed, immediately contact the PHSO for additional guidance and modification of this HASP. If necessary, particulate/aerosol monitoring devices and personnel exposure monitoring will be performed.</p> <p>An XRF will be used to analyze lead concentrations within soil. Note: This device has a low energy radiological source – only trained personnel will be permitted to use this device. All operations will be performed in accordance with manufacturer procedures.</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 (sleeved shirt; long pants)</li> <li>- Surgical style nitrile gloves (layered as necessary)</li> <li>- Steel toe safety shoes</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>- <i>Hearing protection for high noise areas, or as required based on the noise level at each operation.</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> </ul> <p><b>Note:</b> The Safe Work Permit(s) for this task (see Attachment III) 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> will consist of a soap/water wash and rinse for outer protective equipment (e.g. boots, gloves, coveralls, etc.). This function will take place at a satellite location. Disposable PPE will be bagged between sampling events. This procedure will consist of</p> <ul style="list-style-type: none"> <li>- Sample acquisition</li> <li>- Clean (Deionized water spray) the outside of the sample containers/label/bag</li> </ul> <p>This decontamination procedure for Level D protection will consist of</p> <ul style="list-style-type: none"> <li>- Equipment drop</li> <li>- Soap/water wash and rinse of outer boots and outer gloves, as applicable</li> <li>- Soap/water wash and rinse of the outer splash suit, as applicable</li> <li>- Wash hands and face, leave contamination reduction zone</li> </ul>
<p>IDW management and moving IDW drums to storage areas</p>	<p><b>Chemical hazards:</b></p> <p>1) No previous analytical data exists for these sites previous site history suggest that the following compounds are the suspected contaminants of concern in soil and groundwater: Arsenic, Chromium, lead, mercury, cadmium, antimony, nickel, General PAH's, and HMX. 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>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:</p> <ul style="list-style-type: none"> <li>- Establish safe zones of approach (i.e. Boom + 3 feet).</li> <li>- Secure all loose articles to avoid possible entanglement.</li> <li>- All equipment shall be equipped with movement warning systems.</li> <li>- All activities are to be conducted consistent with the FDOT permit requirements.</li> </ul> <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/ 11.6 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>

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BRUNSWICK, MAINE**

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>Decontamination of sampling and heavy equipment</p>	<p><b>Chemical hazards:</b></p> <p>1) No previous analytical data exists for these sites previous site history suggest that the following compounds are the suspected contaminants of concern in soil and groundwater: Arsenic, Chromium, lead, mercury, cadmium, antimony, nickel, General PAH's, and HMX. 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>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) Flying Projectiles</p>	<p>1) Employ protective equipment to minimize contact with site contaminants and hazardous decontamination fluids.</p> <p>- Have a means by which the eyes and/or skin may be flushed (i.e., portable camp shower, emergency eyewash, etc.) readily accessible.</p> <p>- 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.</p> <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) 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. Additional information regarding heat and cold stress concerns is provided in Section 4 of the TiNUS Health and Safety Guidance Manual.</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>
<p>Clearing and Grubbing (Removal of Vegetation)</p>	<p><b>Chemical hazards:</b></p> <p><b>No chemical contamination is anticipated while performing this activity.</b></p> <p><b>Physical hazards:</b></p> <p><b>1) Rotating/cutting machinery and light equipment operation</b></p> <p><b>2) Noise</b></p> <p><b>3) UXO hazards</b></p> <p><b>Natural hazards:</b></p> <p><b>4) Insect/animal/snake/alligator bites or stings, poisonous plants, etc. Refer to Sections 6.3.1 and 6.3.2</b></p> <p><b>5) Inclement weather</b></p>	<p>1) All equipment to be used 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 manufacturers design.</li> <li>- Only manufacturer approved parts may be used in repair of site equipment.</li> <li>- An equipment inspection checklist will be completed prior to the use of project vehicles or tools. (See Attachment III)</li> <li>- Operated by knowledgeable ground crew.</li> <li>- Establish safe zones and routes of approach to the operation (personnel should remain cognizant that this is a multi-task operation with many activities engaged simultaneously).</li> <li>- Restrictions at the operation (All personnel not directly supporting this clearance activity will remain at least 50-100 feet from the point of this operation).</li> <li>- Hand signals with the light equipment operator will be established prior to the commencement of activities.</li> <li>- Work areas will be kept clear of clutter.</li> <li>- Secure all loose articles to avoid possible entanglement.</li> <li>- All self propelled equipment shall be equipped with movement warning systems.</li> <li>- All personnel working amongst equipment traffic are required to wear reflective vests for high visibility</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 insure its operational status.</li> </ul> <p>2) Due to high levels of operationally generated noise, excessive noise control will be facilitated through the use of hearing protection.</p> <p>3) 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 TiNUS UXO SOP will be followed</p> <p>4) Avoid nesting areas, employ repellents. Report potential hazards to the SSO.</p> <p>5) Suspend or terminate operations until directed otherwise by SSO</p>	<p>Not required during removal of vegetation as this activity is designed to keep the areas accessible to monitoring wells. It is not anticipated that hazardous materials will be encountered during this activity.</p>	<p><b>Level D - (Minimum Requirements) For vegetation clearance activities:</b></p> <ul style="list-style-type: none"> <li>- <b>Field attire (Long sleeve shirt; long pants)</b></li> <li>- <b>Steel toe safety shoes/boots</b></li> <li>- <b>Safety glasses/chipper (mesh) face shield</b></li> <li>- <b>Hardhat</b></li> <li>- <b>Reflective vest for high traffic areas</b></li> <li>- <b>Hearing protection</b></li> <li>- <b>Work gloves</b></li> <li>- <b>Chain saw chaps for chain saw operator.</b></li> </ul>	<p>Personnel Decontamination will consist of:</p> <ul style="list-style-type: none"> <li>- Wash hands and face, leave contamination reduction zone</li> </ul>

## 6.0 HAZARD ASSESSMENT

The following section provides information regarding the chemical and physical hazards associated with the NAS Brunswick 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: Antimony, Arsenic, Cadmium, Chromium, Lead, Mercury, Nickel, PAH's, and HMX. 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 work 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
- Water hazards

### **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**

The following sites have Munitions and Explosives of Concern (MEC). These sites will require a UXO escort.

- Site 12
- Former Munitions Bunker West
- The Quarry.

Because of the prior uses of these areas that are being investigated, there is a possibility that UXO may be encountered during site operations. All activities at these sites will be conducted consistent with the UXO procedures discussed in Attachment VI of this HASP and with the Accident Prevention Plan for Munitions of Concern for these sites. 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 MEC/MEC Related Items Hazards**

One of the obvious hazards associated with this activity is the potential for encountering MEC. The unintended detonation of MEC or a MEC related item could result in injury or possibly death. To minimize this potential, the following measures will be incorporated  
MEC avoidance measures include:

- TtNUS Unexploded Ordnance (UXO) support specialist will perform a visual and magnetic survey sweep of all the areas the Site Inspection Team will enter. During the pre-planning phase of the visit the team will identify the areas they wish to inspect.

- The Team will follow instructions and directions provided by the UXO support specialist. The Team will restrict themselves to the areas identified by the UXO support specialist.
- The Team will be directed not to pick up, kick, or otherwise disturb articles lying on the ground.
- At no time will the Team be permitted to engage in intrusive activities such as digging or unearthing items.
- Personnel will be assigned in such a manner as to permit the direct visual observation of one another as well as provide any emergency assistance should it be required.
- Personnel will notify the UXO Escort(s) should they encounter suspected MEC articles or unidentified items.
- There shall be NO SMOKING, eating, drinking, chewing gum or tobacco, or other hand-to-mouth activities permitted while on the site.
- No matches, lighters, or other fire, flame, or spark-producing devices shall be taken onto the site.
- Personnel shall not use cell phones or radios in the vicinity of any site areas that may contain suspected MEC items.
- Personnel shall suspend all outdoor activities in the event of inclement weather (thunderstorms, lightning, heavy rain).

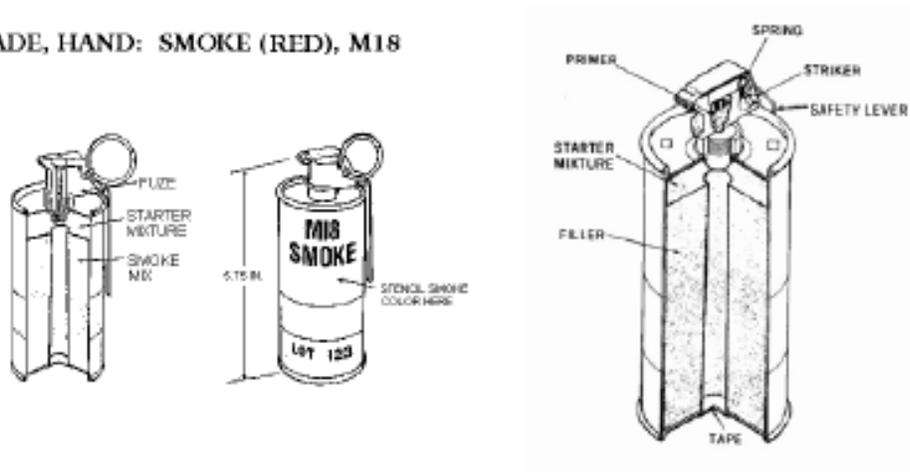
The following MEC items were identified as potential UXO the Site Inspection Team may encounter during the site visit. These items are similar to the ones mentioned in documents containing information about the sites to be visited. Components from these items may also be present at the site.

## FORMER MUNITIONS BUNKER WEST AREA

The following list represents the types of munitions suspected to have been used at the Former Munitions Bunker West Area.

**Nomenclature:** Grenade Hand Smoke M18

### GRENAD, HAND: SMOKE (RED), M18



**Ordnance Family:** Pyrotechnic

**DODIC:** G945

**Filler:** Smoke Mixture (White phosphorus??) Identify

**Filler weight:**  $\pm$  326.03 g

**Item weight:** 536 g (19 oz)

**Diameter:** 64 mm

**Length:** 146 mm (5.75in)

**Maximum Range:** N/A

**Fuze:** Cocked- Striker, Delay-igniting

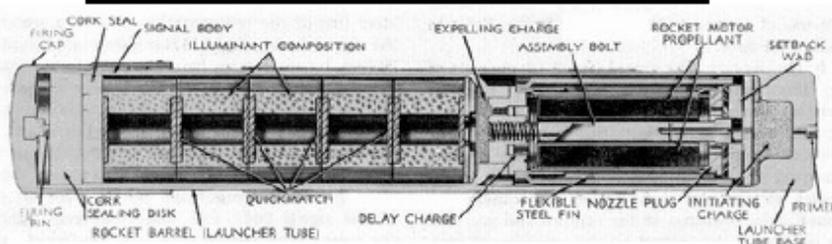
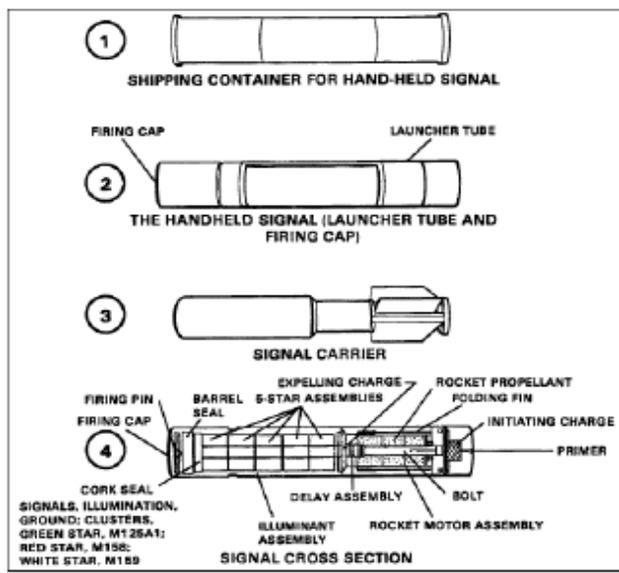
**Usage:** The M18 is a hand-thrown, smoke grenade which can emit red, yellow, green, or violet smoke for 50 to 90 seconds. These grenades use a pyrotechnic, delay-igniting fuze which provides an approximate 2-second delay.

**Description:** The M18 grenade may be olive drab with a light green band around the lower body and nomenclature and smoke color stenciled in light green, or light green with stenciled the color of the smoke. The top of the grenade is painted the color of the smoke.

**Reference:** ORDATA II Version 1.0

**Nomenclature:** Signal Illumination Ground M125A1

# M125A1



**Ordnance Family:** Pyrotechnic/Flare

**DODIC:** L314

**Propellant Charge:** Black powder (Not identified in Table 6-1)

**Filler:** Color Dependent (Same comment)

**Filler weight:** + not provided

**Item weight:** 503.5 g (1.11 lbs)

**Diameter:** 42 mm (1.564in)

**Length:** 258 mm (10.5in)

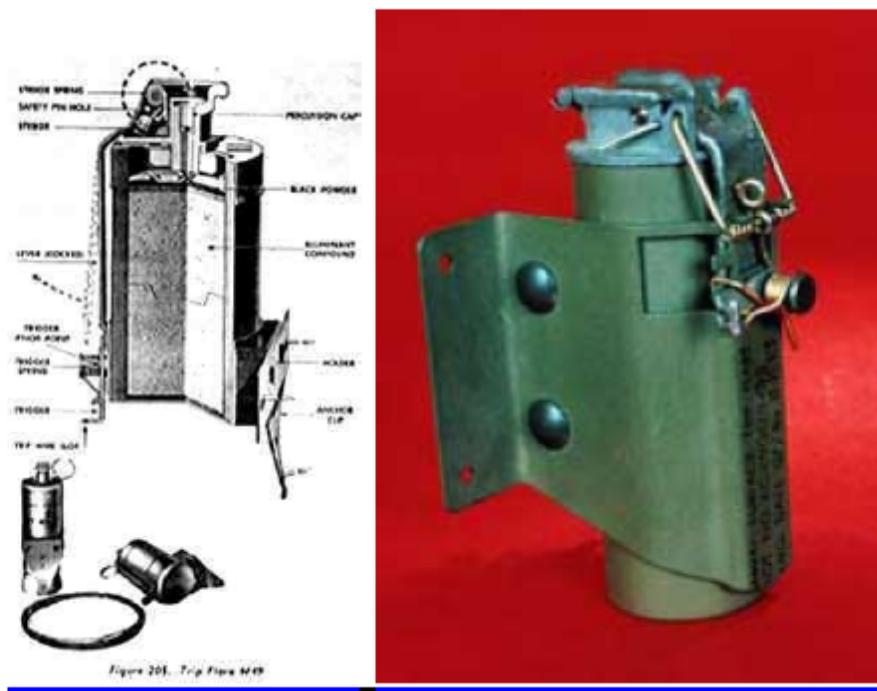
**Maximum Range:** 250 m (273yds)

**Usage:** Ground pyrotechnic signals are capable of signaling for communication or illuminating a small area.

**Description:** These signals are issued in their own launching mechanism and are designed to reach a minimum height of 200 meters. This group of signals includes five-star clusters, single-star parachutes, and smoke parachutes. Handheld signals have replaced all rifle-projected pyrotechnic signals and chemical grenades.

**Reference:** ORDATA Online, FM3-23.30

**Nomenclature:** Flare surface Trip M49A1



**Ordnance Family:** Smoke – Pyrotechnic

**DODIC:** L495

**Filler:** Pyrotechnic composition (Same comment)

**Filler weight:** ± not provided

**Item weight:** 1.44 lbs

**Dia:** not provided

**Length:** not provided

**Fuze:** Mechanical (pull, pressure release)

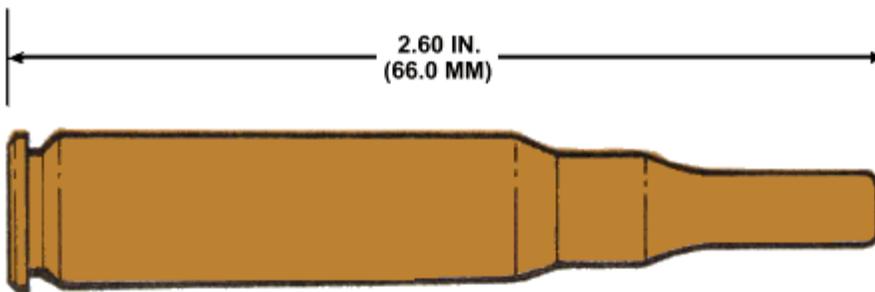
**Usage:** The purpose of the flare is to reveal the approach of enemy troops. Fixed to one end is a pull-type, spring-actuated firing mechanism to which the trip wire is attached. Enclosed in the tube are the primer, black-powder charge, impregnated muslin disc, and pyrotechnic composition. Two 40-foot lengths of wire are available, making it possible to have two trip wires running in opposite directions. A web belt secures the flare to a tree.

**Item Description:** The flare has a grenade-shaped cylindrical body, with a nose fuze that protrudes 0.875-inch from the head end. A mounting bracket and a spring-loaded trigger mechanism are mounted on a metal base cap. The upper arm of the trigger is attached to a trip wire, and the lower arm of the trigger restrains the safety lever after the removal of the safety pin.

**Reference:** ORDATA Online

**Nomenclature:** Simulator Noise Cartridge Assault Rock trainer, MK 103 Mod 0  
(No Picture)

**Nomenclature:** Cartridge 7.62 Blank M82 Linked



Used by M60, M219 and M240 machine guns, and the M14 rifle. For use during training when simulated live fire is desired. A blank firing attachment (BFA) should be used to fire this ammunition.

This cartridge consists of a primer and propellant contained in a brass case shaped to conform to the configuration of the service round. The propellant is held in by a wad. The mouth of the cartridge is sealed and crimped.

**Nomenclature:** Cartridge 5.56 Blank M20 Linked and non-linked

### 5.56MM M200 BLANK

The 5.56mm M200 provides simulated firing for training exercises where the M16A1, M16A2, M4 rifles, M249 machine gun and M231 weapon are used.

Characteristics	
Height (max)	1.900 in
Weight	134.5 grains

Ballistics	
Muzzle Velocity	NS
Chamber Pressure (avg)	NS
Accuracy	NS
Action Time	NS



The 5.56-mm blank M200 (M2 link, A075) blank cartridge has no projectile. The case mouth is closed with a seven-petal rosette crimp and has a violet tip. The original M200 blank cartridge had a white tip. Field use of this cartridge resulted in residue buildup, which caused malfunctions. Only the violet-tipped M200 cartridge should be used. The blank round is used during training when simulated live fire is desired. An M15A2 blank-firing attachment must be used to fire this ammunition.

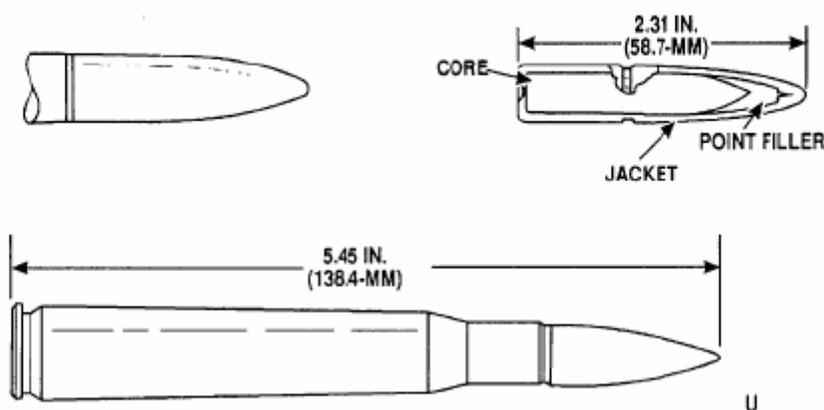
## MACHINE GUN BORE SIGHT RANGE

The following list represents the types of munitions suspected to have been used at the Machine Gun Bore Site Range. Munitions listed include machine gun ammunition used in aircraft mounted guns and pistol ammunition from the 1950s.

**Nomenclature:** .50 Caliber Small Arms Ammunition

# .50 Caliber Small Arms

CARTRIDGE, CALIBER .50, BALL, M2



**Ordnance Family:** Small Arms

**DODIC:** A552

**Filler:** Single or Double Base Powder

**Filler weight:** ± Various

**Item weight:** 1813 gr

**Diameter:** .50 Caliber

**Length:** 5.45 in. (138.4 mm)

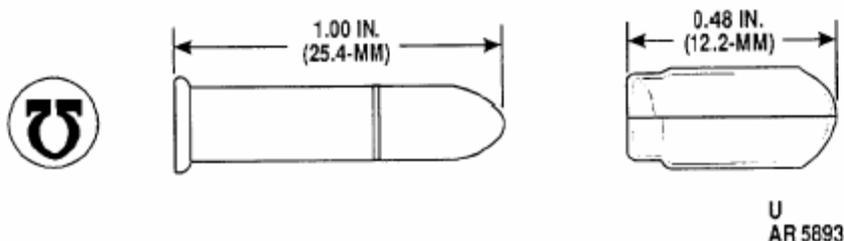
**Usage:** Machine Guns, Caliber .50, M2 and M85. The cartridge is intended for use against personnel or unarmored targets.

**Description:** BALL Cartridge. The cartridge is identified by a plain bullet tip.

**Reference:** TM 43-0001-27

**Nomenclature:** .22 Caliber Small Arms Ammunition

## .22 Caliber Small Arms



**Ordnance Family:** Small Arms

**DODIC:** A086

**Filler:** Single or Double Base Powder

**Filler weight:** 2.5 gr

**Item weight:** 416 gr

**Projectile Weight:** 40.5 gr

**Diameter:** .22 Caliber

**Length:** 1 in. (25.4 mm)

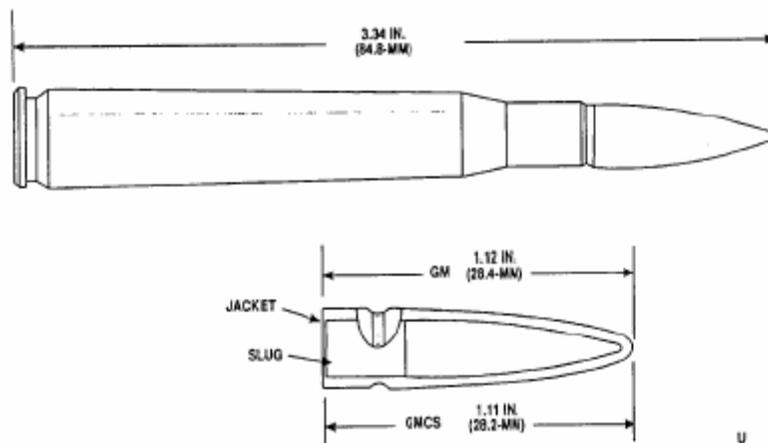
**Usage:** Subcaliber Rifle M2A1; Caliber .22 Rifle; Remington Models 40X and M513T; Steven's Model 416-2; Winchester Models 52 and 75; Machine Gun Trainers M3 and M4; pistols for gallery practice and training purposes. The cartridge is intended for use against small game for survival purposes.

**Description:** BALL Cartridge. The cartridge is identified by a plain bullet tip.

**Reference:** TM 43-0001-27

**Nomenclature:** .30 Caliber Small Arms Ammunition

## .30 Caliber Small Arms



**Ordnance Family:** Small Arms

**DODIC:** A212

**Filler:** Single or Double Base Powder

**Filler weight:** ± Various

**Item weight:** 416 gr

**Diameter:** .30 Caliber

**Length:** 3.34 in. (84.8mm)

**Usage:** Machine Guns, Caliber .30, M37, M1919A4 and M1919A6; and Rifle, Caliber .30, M1. The cartridge is intended for use against personnel or unarmored targets.

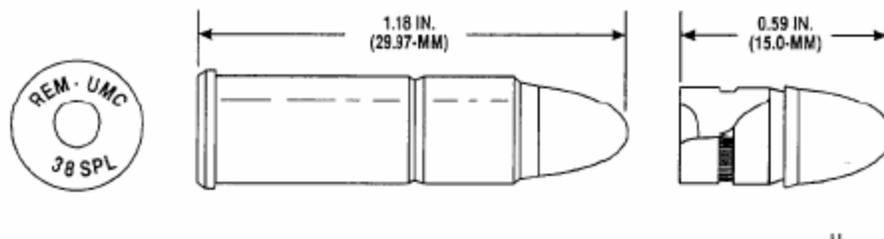
**Description:** BALL Cartridge. The cartridge is identified by a plain bullet tip.

**Reference:** TM 43-0001-27



**Nomenclature:** .38 Caliber Small Arms Ammunition

## .38 Caliber Small Arms



**Ordnance Family:** Small Arms

**DODIC:** A408

**Filler:** Single or Double Base Powder

**Filler weight:** 4.8 gr

**Item weight:** 196 gr

**Projectile Weight:** 60.5 gr

**Diameter:** .38 Caliber

**Length:** 1.18 in. (29.97mm)

**Usage:** Caliber .38 weapons. The cartridge is for CONUS-guard or security use in caliber .38 weapons.

**Description:** BALL Cartridge. The cartridge is identified by a plain bullet tip.

**Reference:** TM 43-0001-27

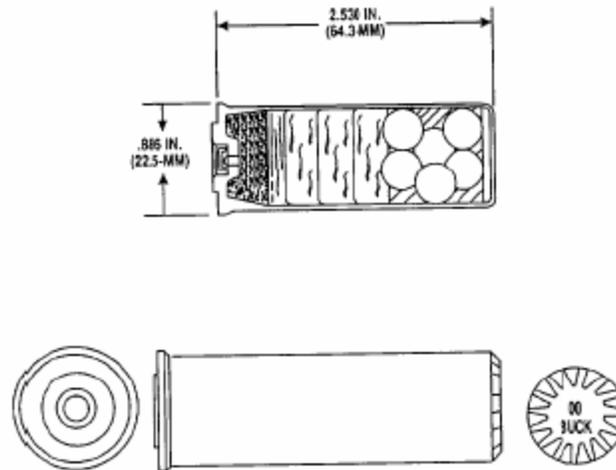
## SKEET RANGE/TOPSHAM ANNEX SKEET RANGE

The following list represents the types of munitions suspected to have been used at the range.

**Nomenclature:** 12 Gage Shotgun, NO 00

# 12 Gage Shotgun, NO 00

CARTRIDGE, 12 GAGE, SHOTGUN, NO. 00, M162



**Ordnance Family:** Small Arms

**DODIC:** A011

**Filler:** Smokeless Powder

**Filler weight:** ± Various

**Item weight:** 0.736 gr

**Diameter:** .886 in

**Length:** 2.53 in. (64.3 mm)

**Usage:** Military issue shotgun, 2-3/4 inch chamber. The cartridge is intended for guard and combat use.

**Description:** The cartridge case is all plastic, and is loaded with smokeless powder and No. 00 commercial shot.

**Reference:** TM 43-0001-27

Based on historical documents and information obtained during the data collection process, there is no evidence of MEC at the Skeet Range as only small arms were used.. Firing records were not available, and there is no defensible method of determining the amount of ammunition potentially fired at the range. The 1958 Programming Guidance indicated that the range was used for pilot training. It is unknown if the range was also used for recreational purposes.

## **SITE 12 EXPLOSIVE ORDNANCE DISPOSAL AREA/QUARRY**

Known operations occurred at this site and a large variety of MEC items possibly remain.

The six sites have been used for ammunition operations from the early 1900s to the present. This allows for the Site Inspection Team to come into contact with many other unknown items.

### **6.2.4 X-Rays from Innov-X**

The XRF instrument (Innov-X) contains a sealed radioisotope source that is used to produce an x-ray that irradiates the sample. X-rays produced by these instruments undergo either scattering or absorption by atoms contained within the sample (soil). It is the absorption of the x-rays (known as the photoelectric effect) that ultimately leads to the detection of metal compounds within the soil. The instruments used for XRF analysis do not present a significant ionizing radiation exposure concern provided they are operated in accordance with manufacturer's instruction. Site personnel must be trained and knowledgeable in the operation of the XRF unit. Site personnel using the XRF will refer to the operators manual and will use appropriate engineering and administrative controls to prevent exposure to x-rays. Radiation dosimetry conducted during similar projects using XRF instruments, did not indicate a radiation exposure concern.

### **6.2.5 Water Hazards**

Planned activities involve locations that are near bodies or on bodies of water. Sampling activities will possibly be conducted from a motorized pontoon boat. To avoid potential hazards associated with working near water (drowning), the field team shall employ lifelines (tie-off procedure), safety harnesses, when within 4 feet of the water edge. When working out of a boat, U.S. Coast Guard (USCG) approved personal flotation devices (PFD) will be used. Due to the obvious hazards associated with working on or near water edge during inclement weather, field activities may be temporarily suspended or terminated at the discretion and direction of the FOL or SSO.

#### **U.S.C.G. Flotation Device Types**

Use the following information to determine the proper type of U.S.C.G. PFD.

#### **Off Shore Life Jacket (Type I, 22lbs buoyancy)**

Type I life jacket is the best choice for rough or open waters. This type will float you the best and is favorable if rescue may be long in coming. This type will turn an unconscious person upright in the water. Though is bulky it does have a highly visible color for easier detection.



### **Near Shore Buoyant Vest (Type II, 15.5lbs buoyancy)**

Type II is a good choice for calmer waters. It will turn most unconscious persons face-up in the water. Though it is less bulky than Type I, it is not intended for long hours in calm or rough water.



### **Flotation Aid (Type III, 15.5lbs buoyancy)**

Type III is probably the most comfortable device offering more freedom of movement, such as water skiing or fishing, but is not intended for rough water. Also, an unconscious person may end up face-down in the water.



### **Throwable Devices (Type IV)**

Throwable devices are intended for calm waters with heavy boat traffic where help is always close. It is not intended for unconscious persons or non-swimmers or long hours in the water. They are good backups for the other devices.



Site personnel shall wear Type III personal flotation devices in the event someone falls overboard, boats sinks or capsizes. Type IIIs were selected as they offer the most flexibility for working while still meeting minimum requirements for buoyancy. In situations where personal flotation devices cannot be worn due to the task to be conducted, the flotation devices shall be immediately available/accessible. It is recommended that personal flotation devices be continually worn during colder months due to the potential for hypothermia to restrict muscle movement and therefore, self rescue and maintaining buoyancy. In addition, a single Type IV Throwable Flotation Device shall be maintained on board the boat with at least 90 feet of 3/8 polypropylene line.

When work activities take personnel within four feet of navigable waters edge personnel will have immediately accessible a lifeline with a throwing bag or Type IV flotation device facilitate extraction from the water. Personnel working on waters edge will do so using the buddy system to assist in rescue efforts, if needed.

### **Working with Waders**

If wearing commercially available waders or chest waders read and follow the manufacturer's instructions. Use the buddy system and wear a secure life line or approved USCG personal flotation device.

- Always wear a wading belt. Without a wading belt, one accidental slip is all it takes to get into a dangerous "fill-up" situation.
- Wear wading shoes or boot-foot waders with soles that grip the type of bottom you're on. Rubber cleat soles are best for sand, fine gravel, soft silt or mud. Felt soles are best for bottoms made up of irregular-size rocks and algae-covered bedrock. Cleated or studded felt soles work well in swift water with a slick rock bottom.

### **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 NAS Brunswick. 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.

### **6.3.3 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, 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.

#### **6.3.5 Temperature Extremes (Heat Stress and Cold Stress)**

Given the anticipated project schedule, encountering extremely high ambient temperatures during the planned work could be encountered. Likewise, exposures to extremely cold temperatures could be encountered due to the geographic location of the project site. If such conditions are encountered, information on heat and cold stress recognition, prevention, and control may be found in Section 4.6 of the Health & Safety Guidance Manual.

**TABLE 6-1  
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA**

Substance	CAS No.	Air Monitoring 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>4</sub> ; RDX	121-82-4	No information found.	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.
Arsenic	7440-38-2	Particulate form - This substance is unable to be detected by PID/FID.	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.

**TABLE 6-1  
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA**

Substance	CAS No.	Air Monitoring Information	Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Lead	7439-92-1	Particulate form - Unable to be detected by either PID or FID.	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.
Cyclotetramethylene tetranitramine Octagen, (HMX)	2691-41-0	No information found.	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.

**TABLE 6-1  
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA**

Substance	CAS No.	Air Monitoring Information	Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
General PAHs / Coal Tar Pitch Volatiles / Creosote / cresol (Fluoranthene, pyrene, benzo(a) anthracene, benzo(a) pyrene, benzo(f)fluoranthene, benzo(k)fluoranthene), etc.)	(CAS Numbers vary depending on specific compound)	PID: I.P. of 8.97 eV, relative response ratio unknown.  FID: Response factor unknown but given the substances flammability, detection by FID can be anticipated.	General PAHs:  Most PAHs have no established exposure limits. Other Coal Tar Pitch Volatiles / PAHs such as chrysene and benzo(a)pyrene have an exposure limit of 0.2 mg/m <sup>3</sup> (OSHA and ACGIH).  NIOSH; 0.1 mg/m <sup>3</sup>  Creosote / Cresol:  OSHA; ACGIH: 5 ppm skin  NIOSH: 2.3 ppm  IDLH: 250 ppm	<b>Adequate - use a full-face air-purifying respirator with organic vapor / dust/mist cartridge up to 250 ppm. Cresol has an Odor Threshold of 0.00005-0.0079 ppm.</b>  <b>Recommended gloves: Viton &gt;96.00 hrs; butyl rubber &gt;90.00 hrs; neoprene &gt;4.50 hrs</b>	<b>Properties of various PAHs/Coal Tar Pitch Volatiles vary depending upon the specific compound.</b>  <b>For Creosote/Cresol:</b> <b>Boiling Pt: 376-397°F; 191-203°C</b> <b>Melting Pt: 52-96°F; 10.9-35.5°C</b> <b>Solubility: Insoluble</b> <b>Flash Pt: 178°F; 81°C</b> <b>LEL/LFL: Not available</b> <b>UEL/UFL: Not available</b> <b>Vapor Density: 3.72</b> <b>Vapor Pressure: 1 mmHg @ 100-127°F; 38-53°C</b> <b>Specific Gravity: 1.030-1.038</b> <b>Incompatibilities: Nitric acid, oleum, chlorosulfonic acid, oxidizers</b> <b>Appearance and Odor: Yellowish or colorless, flammable, oily liquid (often brownish because of impurities or oxidation)</b>	Regulated based on effects on respiratory tract and skin irritation Other effects may include eye irritation and central nervous system, disturbances. Acute exposures may result in difficulty breathing, respiratory failure and skin and eye irritation and burns. Chronic exposure may damage the liver, kidneys, lungs and skin and cause photosensitivity.  IARC, NTP, NIOSH, ACGIH, and the EPA list some PAHs such as benzo(a)pyrene as a potential carcinogen (ARC 2A, NTP-2, ACGIH TLV-A2, NIOSH-X, EPA-B2).
Mercury	7439-97-6	Jerome Mercury Vapor Analyzer  This substance is unable to be detected by PID/FID.	OSHA; NIOSH; ACGIH: as alkyl compounds 0.01 mg/m <sup>3</sup> ; STEL 0.03 mg/m <sup>3</sup>  IDLH: 10 mg/m <sup>3</sup>	No identifiable warning properties to indicate presence and thereby detection.  <b>Recommended APR Cartridge:</b> Suitable for Metallic mercury with HEPA filter. Preferably, with an end-of-service life indicator.  <b>Recommended gloves:</b> Rubber gloves	<b>Boiling Pt:</b> 674°F; 356.9°C <b>Melting Pt:</b> -38°F; -38.89°C <b>Solubility:</b> Insoluble <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> 0.0012 mmHg @ 77°F; 25°C <b>Specific Gravity:</b> 13.6 <b>Incompatibilities:</b> Acetylene, ammonia, chlorine dioxide, azides, calcium, sodium carbide, lithium, rubidium, and copper <b>Appearance and odor:</b> Silvery-white heavy mobile liquid, odorless	This substance is corrosive to all points of contact. Systemic symptoms include irritability, wakefulness, muscle weakness and tremors, increased reflexes, gingivitis, anorexia, headache, tinnitus, hypermobility, GI disturbances (nausea, vomiting), diarrhea (sometimes bloody), liver changes, dermatitis, and fever. Symptoms experienced via inhalation include to those above coughing, chest pain, dyspnea, bronchial pneumonitis, and excessive salivation.

**TABLE 6-1  
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA**

Substance	CAS No.	Air Monitoring Information	Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Chromium Compounds	7440-47-3 (Element)	Not detectable by PID. Not detectable by FID.	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.
Cadmium	7440-43-9	Particulate Form - Unable to be easily detected by PID or FID.	OSHA: 2 µg/m <sup>3</sup> (0.002 mg/m <sup>3</sup> )  ACGIH: 0.01 mg/m <sup>3</sup> (total particulate); 0.002 mg/m <sup>3</sup> (respirable particulate)  IDLH: 9 mg/m <sup>3</sup> (as cd)	The use of an air purifying, full face-piece respirator with a high efficiency particulate air filter for concentrations up to 0.25 mg/m <sup>3</sup> .  Recommended Gloves: This is in particulate form. Therefore any glove suitable to prevent skin contact.	<b>Boiling Pt:</b> 1412°F; 767°C <b>Melting Pt:</b> 610°F; 321°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> 1 mmHg @ 741°F; 394°C <b>Specific Gravity:</b> 8.65 @ 90°F; 32°C <b>Incompatibilities:</b> Strong oxidizers, elemental sulfur, selenium, tellurium, zinc, nitric acid, and hydrazoic acid <b>Appearance and Odor:</b> <b>Metal:</b> Silver-white, blue-tinged lustrous, odorless solid. <b>Fume:</b> yellow-brown, finely divided particulate dispersed in air.	Overexposure to this substance may result in irritation to the respiratory tract, dyspnea, tightness in the chest, coughing, possibly pulmonary edema. Overexposure to fumes causes symptoms characteristic of the flu (headaches, chills, muscle aches, nausea, vomiting, diarrhea). Chronic exposure may result in damage to the lungs, kidneys and liver. This substance has been identified as a confirmed animal; potential human carcinogen by IARC and NTP.

**TABLE 6-1  
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA**

Substance	CAS No.	Air Monitoring Information	Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Antimony	7440-36-0	Particulate form - unable to be detected by PID/FID.	OSHA/NIOSH/ACGIH: 0.5 mg/m3  IDLH: 50 mg/m3	Metallic taste resulting from exposure.  Recommended Air Purifying Cartridges: Protect from dusts, fumes, and mists use HEPA filters.  Recommended gloves: This is in the particulate form. Therefore any glove suitable to prevent skin contact.	<b>Boiling Pt: 2975°F; 1635°C</b> <b>Melting Pt: 1166°F; 630°C</b> <b>Solubility: Insoluble</b> <b>Flash Pt: Nonflammable</b> <b>LEL/LFL: Nonflammable</b> <b>UEL/UFL: Nonflammable</b> <b>NOTE: This substance is nonflammable but may present a moderate explosion hazard when airborne dusts of an adequate concentration are exposed to flames.</b> <b>Vapor Density: Not available</b> <b>Vapor Pressure: 1 mmHg @ 1627°F; 886°C</b> <b>Specific Gravity: 6.684 @ 77°F; 25°C</b> <b>Incompatibles: Acids, oxidizers, halogens</b> <b>Appearance and odor: silvery gray, lustrous metal</b>	This substance is considered a poison by ingestion, irritating to the skin and mucous membranes causing inflammation to the nose, mouth, and throat. Chronic exposure may result in some forms of dermatitis. Ingestion may result in a metallic taste, vomiting, colic, and diarrhea. Chronic exposure may result in addition to those stated above indigestion, loss of appetite and weight, and diarrhea. Sores in the mouth along with a sore throat help distinguish this form of poisoning from other forms of metallic poisoning such as lead and arsenic. Inhalation at excessive concentrations may result in difficulty in breathing, headaches and a bloody discharge from the nose, and chemical pneumonitis.
Nickel	7440-02-0	Particulate form - This substance is unable to be detected by PID/FID.	OSHA: as Ni metal and insoluble compounds 1 mg/m3  NIOSH: 0.015 mg/m3  ACGIH: 0.05 mg/m3 IDLH: 10 mg/m3	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 material 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: 4946°F; 2730°C</b> <b>Melting Pt: 2651°F; 1455°C</b> <b>Solubility: Insoluble acid</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: 1 mmHg @ 3290°F; 1810°C</b> <b>Specific Gravity: 8.90</b> <b>Incompatibilities: Strong acids, halogens, sulfur, wood and other combustibles, nickel nitrate, and oxidizers</b> <b>Appearance and odor: Silvery white, hard, malleable ductile metal, odorless</b>	Symptoms of overexposure to this product may include headaches, vertigo, delirium, extreme weakness, GI disturbance and pain including nausea vomiting and diarrhea, coughing, hyperpnea, cyanosis, weakness, allergic dermatitis, nickel itch, pulmonary asthma, chest pains tightness, dyspnea, dry cough, and conjunctivitis. This substances has been identified as a Human carcinogen by NTP and IARC.

## 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.

### 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

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, 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.

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 X-Ray Fluorescence (XRF) Detector

An Innov-X XRF detector (or equivalent) will be used to screen surface and subsurface soils to determine concentrations of lead. The XRF provides real-time readings presented in part per million (ppm) concentrations. Although the XRF analysis will likely be performed after samples are collected, data obtained from the analysis can be used to calculate airborne dust quotients that if experienced at the work site, would result in an exposure threat to site personnel. It should be noted however, that site activities are unlikely to present airborne dust that would be necessary to present an inhalation exposure threat. Furthermore, based on available data from previous investigations, it is unlikely that contaminants are present at concentrations that would pose an inhalation exposure concern.

### **7.1.3 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 or supplying rental vendor. 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 are to be supplied with the instruments.). 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 and Subcontractor Personnel**

All Tetra Tech NUS and subcontractor personnel must complete 40 hours of introductory hazardous waste site training in accordance with 29 CFR 1910.120(e) prior to performing work at NAS Brunswick. Additionally, Tetra Tech NUS and subcontractor 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 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.

### **8.2 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 8-1. 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 and Subcontractor Personnel**

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

Documentation for medical clearances will be maintained at the site for all personnel and made available as necessary.



### **8.3.2 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.

- The Medical Data Sheets will not be maintained in a secure location. They will be maintained in a file box or binder accessible to all members of the field crew. This is intended to make these document quickly accessible so they can accompany the injured party to the hospital.
- DO NOT include information that you do not wish others to know, only information that may be pertinent in an emergency situation or treatment.
- If you are concerned about any of these provisions, DO NOT complete the medical data sheet, but convey any critical information verbally to the SSO. This would include any information about allergic reactions or drug allergies that would be critical in your treatment.

#### **8.3.2.1 Medical Data Sheet Exception Health Insurance Portability and Accountability (HIPAA) Requirements – The Privacy Rule**

The Privacy Rule took effect April 14, 2003. Loosely interpreted it establishes regulations for the use and disclosure of Protected Health Information (PHI) by the entity collecting that information. PHI is any information about health status (such as that you may report on your Medical Data Sheet Information), provision of health care, or payment for health care. This rule also requires Tetra Tech NUS, Inc. in this case to insure the confidentiality of communication (Medical Data Sheets). This provision severely limits the ability of the Medical Data Sheet to convey information you would want the Doctor to know regarding PHI if you were incapacitated. This rule also limits the SSO ability to insure provisions are in place to provide timely response for instance to an allergic reaction. So before you complete the Medical Data Sheet understand that:

The Medical Data Sheets will not be maintained in a secure location. They will be maintained in a file box or binder accessible to all members of the field crew. This is intended to make these documents quickly accessible so they can accompany the injured party to the hospital.

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

If you are concerned about any of these provisions do not complete the medical data sheet, but convey verbally to the SSO any information about allergic reactions or drug allergies that would be critical in your treatment.

#### **8.4 SUBCONTRACTOR EXCEPTION**

Subcontractors such as surveyors who will not enter the exclusion zone during operation, and whose activities involve no potential for exposure to site contaminants or UXO, 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.**

## **9.0 SPILL CONTAINMENT PROGRAM**

### **9.1 SCOPE AND APPLICATION**

The spill containment program is intended to provide direction to Tetra Tech NUS, Inc. and subcontractor field personnel regarding areas that may be vulnerable to spill and what control measures are necessary.

### **9.2 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
- DPT Drill Rigs

Monitoring of these areas will be done at least weekly.

#### **9.2.1 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.

##### **9.2.1.1 Staging Area Configuration**

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

- 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 four feet shall be maintained between each row of pallets to permit access for spill response measures and to remove drums.

#### **9.2.1.5 DPT Drill Rigs**

DPT rigs are notorious for blowing hydraulic lines resulting in the release of hydraulic fluid near the back of the drill rig where the borehole is located. To minimize this potential the following measures will be taken.

##### **Prevention:**

- Inspect all hoses and connectors for tightness and indications of wear and potential failure. Replace as necessary.
- Where possible, place plastic under the back of the rig to catch any releases.

##### **Response:**

- Maintain spill pads and/or absorbent at the DPT rig in order to respond quickly in the event of a failure.

### **9.3 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.

### **9.4 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.

### **9.5 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, cat litter, 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.

## **9.6 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, given the small footprint created through this investigative method. 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/Soil Boring (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, or 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.
- This distance will also apply when performing sampling and XRF analysis.
- 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. Where decontamination is conducted at the rig, this boundary will be incorporated into the DPT boundary demarcation.
- Investigative Derived Waste (IDW) area will be delineated. Only authorized personnel should be allowed access into the staging areas.

### **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 Visitors).

## **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. 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.)
- NAS Brunswick or DOD Personnel
- Other authorized visitors

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

Once access to NAS Brunswick 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 per 29 CFR 1910.1200. 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 NAS Brunswick, will have approval prior to being brought on-site for use.

External communication will be accomplished by using provided telephones at the site or cellular phones. 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 \_\_\_\_\_

**I. Work limited to the following (description, area, equipment used):** \_\_\_\_\_  
\_\_\_\_\_

**II. Primary Hazards:** Potential hazards associated with this task: \_\_\_\_\_  
\_\_\_\_\_

**III. Field Crew:** \_\_\_\_\_

**IV. On-site Inspection conducted**  Yes  No Initials of Inspector TtNUS  
**Equipment Inspection required**  Yes  No Initials of Inspector TtNUS

**V. Protective equipment required**  Level D  Level B   
 Level C  Level A   
**Respiratory equipment required** Yes  Specify on the reverse  
No   
Modifications/Exceptions: \_\_\_\_\_

VI. Chemicals of Concern	Hazard Monitoring	Action Level(s)	Response Measures
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

**Primary Route(s) of Exposure/Hazard:** \_\_\_\_\_

**(Note to FOL and/or SSO: Each item in Sections VII, VIII, and IX must be checked Yes, No, or NA)**

**VII. Additional Safety Equipment/Procedures**

- |   |   |
|---|---|
| Hard-hat ..... <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/Cellular Phone ..... <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 – Work) ..... <input type="checkbox"/> Yes <input type="checkbox"/> No             |
| Impermeable apron ..... <input type="checkbox"/> Yes <input type="checkbox"/> No            | Work/rest regimen ..... <input type="checkbox"/> Yes <input type="checkbox"/> No                |
| Steel toe work shoes or boots .... <input type="checkbox"/> Yes <input type="checkbox"/> No | Chemical Resistant Boot Covers .... <input type="checkbox"/> Yes <input type="checkbox"/> No    |
| High Visibility vest ..... <input type="checkbox"/> Yes <input type="checkbox"/> No         | Tape up/use insect repellent ..... <input type="checkbox"/> Yes <input type="checkbox"/> No     |
| First Aid Kit ..... <input type="checkbox"/> Yes <input type="checkbox"/> No                | Fire Extinguisher ..... <input type="checkbox"/> Yes <input type="checkbox"/> No                |
| Safety Shower/Eyewash ..... <input type="checkbox"/> Yes <input type="checkbox"/> No        | Other ..... <input type="checkbox"/> Yes <input type="checkbox"/> No                            |

Modifications/Exceptions: \_\_\_\_\_

VIII. Site Preparation	Yes	No	NA
Utility Locating and Excavation Clearance completed.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Physical Hazards Identified and Isolated (Splash and containment barriers).....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**IX. Additional Permits required** (Hot work, confined space entry, excavation etc.) .....  Yes  No  
*If yes, SHSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090*

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

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

## 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 a space that:

- 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.

A **Permit Required Confined Space** is a confined space that has one or more of the following characteristics:

- 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 signed 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)
- Tetra Tech NUS, Inc. Health and Safety Policy
- Training/Medical Surveillance Documentation Form (Blank)
- Emergency Contact 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 as long as all personnel know the location.

**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

ACGIH	American Conference of Governmental Industrial Hygienists
APR	Air Purifying Respirators
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
CLEAN	Comprehensive Long-Term Environmental Action Navy
CNS	Central Nervous System
CSP	Certified Safety Professional
CTO	Contract Task Order
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
N/A	Not Available
NIOSH	National Institute Occupational Safety and Health
NAS	Naval Air Station
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
PM	Project Manager
TWA	Time Weighted Average
UV	Ultra Violet
WP	Work Plan

**ATTACHMENT I**

**INCIDENT REPORT FORM**



<b>Report Date</b>	<b>Report Prepared By</b>	<b>Incident Report Number</b>

**INSTRUCTIONS:**

All incidents (including those involving subcontractors under direct supervision of Tetra Tech personnel) must be documented on the IR Form.

Complete any additional parts to this form as indicated below for the type of incident selected.

TYPE OF INCIDENT (Check all that apply)	Additional Form(s) Required for this type of incident
Near Miss (No losses, but could have resulted in injury, illness, or damage)	<input type="checkbox"/> Complete IR Form Only
Injury or Illness	<input type="checkbox"/> Complete Form IR-A; Injury or Illness
Property or Equipment Damage, Fire, Spill or Release	<input type="checkbox"/> Complete Form IR-B; Damage, Fire, Spill or Release
Motor Vehicle	<input type="checkbox"/> Complete Form IR-C; Motor Vehicle

**INFORMATION ABOUT THE INCIDENT**

**Description of Incident**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

<b>Date of Incident</b>	<b>Time of Incident</b>
	_____ AM <input type="checkbox"/> PM <input type="checkbox"/> <i>OR</i> Cannot be determined <input type="checkbox"/>
<b>Weather conditions at the time of the incident</b>	<b>Was there adequate lighting?</b>
	_____ Yes <input type="checkbox"/> No <input type="checkbox"/>

**Location of Incident**

\_\_\_\_\_ Was location of incident within the employer's work environment? Yes  No

<b>Street Address</b>	<b>City, State, Zip Code and Country</b>

<b>Project Name</b>	<b>Client:</b>

<b>Tt Supervisor or Project Manager</b>	<b>Was supervisor on the scene?</b>
	Yes <input type="checkbox"/> No <input type="checkbox"/>

**WITNESS INFORMATION (attach additional sheets if necessary)**

<b>Name</b>	<b>Company</b>

<b>Street Address</b>	<b>City, State and Zip Code</b>

**Telephone Number(s)**

\_\_\_\_\_



**CORRECTIVE ACTIONS**

Corrective action(s) immediately taken by unit reporting the incident:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Corrective action(s) still to be taken (by whom and when):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**ROOT CAUSE ANALYSIS LEVEL REQUIRED**

Root Cause Analysis Level Required: Level - 1  Level - 2  None

**Root Cause Analysis Level Definitions**

<b>Level - 1</b>	<p><b>Definition:</b> A Level 1 RCA is conducted by an individual(s) with experience or training in root cause analysis techniques and will conduct or direct documentation reviews, site investigation, witness and affected employee interviews, and identify corrective actions. Activating a Level 1 RCA and identifying RCA team members will be at the discretion of the Corporate Administration office.</p> <p>The following events may trigger a Level 1 RCA:</p> <ul style="list-style-type: none"> <li>▪ Work related fatality</li> <li>▪ Hospitalization of one or more employee where injuries result in total or partial permanent disability</li> <li>▪ Property damage in excess of \$75,000</li> <li>▪ When requested by senior management</li> </ul>
<b>Level - 2</b>	<p><b>Definition:</b> A Level 2 RCA is self performed within the operating unit by supervisory personnel with assistance of the operating unit HSR. Level 2 RCA will utilize the 5 Why RCA methodology and document the findings on the tools provided.</p> <p>The following events will require a Level 2 RCA:</p> <ul style="list-style-type: none"> <li>▪ OSHA recordable lost time incident</li> <li>▪ Near miss incident that could have triggered a Level 1 RCA</li> <li>▪ When requested by senior management</li> </ul>

Complete the Root Cause Analysis Worksheet and Corrective Action form. Identify a corrective action(s) for each root cause identified within each area of inquiry.

**NOTIFICATIONS**

Title	Printed Name	Signature	Telephone Number	Date
Project Manager or Supervisor				
Site Safety Coordinator or Office H&S Representative				
Operating Unit H&S Representative				
Other: _____				

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

### INSTRUCTIONS:

Complete all sections below for incidents involving injury or illness.  
Do NOT leave any blanks.  
Attach this form to the IR FORM completed for this incident.

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

## INJURY / ILLNESS DETAILS

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

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

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**Describe the object or substance that directly harmed the individual:** Examples: "Concrete floor"; "Chlorine"; "Radial Arm Saw". If this question does not apply to the incident, write "Not Applicable".

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## MEDICAL CARE PROVIDED

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

---

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

<b>Name of physician or health care professional</b>	<b>Facility Name</b>
<b>Street Address, City State and Zip Code</b>	<b>Type of Care?</b>
	Was individual treated in emergency room? Yes <input type="checkbox"/> No <input type="checkbox"/>
	Was individual hospitalized overnight as an in-patient? Yes <input type="checkbox"/> No <input type="checkbox"/>
<b>Telephone Number</b>	Did the individual die? Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, date: _____
	Will a worker's compensation claim be filed? Yes <input type="checkbox"/> No <input type="checkbox"/>

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

## SIGNATURES

I have reviewed this report and agree that all the supplied information is accurate

Affected individual (print)	Affected individual (signature)	Telephone Number	Date

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

**INSTRUCTIONS:**

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

**Incident Report Number: (From the IR Form)**

**TYPE OF INCIDENT (Check all that apply)**

Property Damage       Equipment Damage       Fire or Explosion       Spill or Release

**INCIDENT DETAILS**

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

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Response Actions Taken:**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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

**Agency(s) Contact Name(s)**

\_\_\_\_\_  
\_\_\_\_\_

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

Item:	Extent of damage:	Estimated repair cost

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

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

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

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

**NOTIFICATIONS**

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

Who is responsible for reporting incident to outside agency(s)?    Yes  Client  Other  Name: \_\_\_\_\_

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

**INSTRUCTIONS:**

Complete all sections below for incidents involving motor vehicle accidents. Do NOT leave any blanks.  
Attach this form to the IR FORM completed for this incident.

<b>Incident Report Number: (From the IR Form)</b>	
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**INCIDENT DETAILS**

<b>Name of road, street, highway or location where accident occurred</b>	<b>Name of intersecting road, street or highway if applicable</b>

<b>County</b>	<b>City</b>	<b>State</b>

<b>Did police respond to the accident?</b>	<b>Did ambulance respond to the accident?</b>
Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>

<b>Name and location of responding police department</b>	<b>Ambulance company name and location</b>

<b>Officer's name/badge #</b>	
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Did police complete an incident report? Yes  No  If yes, police report number: \_\_\_\_\_  
Request a copy of completed investigation report and attach to this form.

**VEHICLE INFORMATION**

How many vehicles were involved in the accident? \_\_\_\_\_ (Attach additional sheets as applicable for accidents involving more than 2 vehicles.)

Vehicle Number 1 – Tetra Tech Vehicle		Vehicle Number 2 – Other Vehicle	
<b>Vehicle Owner / Contact Information</b>		<b>Vehicle Owner / Contact Information</b>	
<b>Color</b>		<b>Color</b>	
<b>Make</b>		<b>Make</b>	
<b>Model</b>		<b>Model</b>	
<b>Year</b>		<b>Year</b>	
<b>License Plate #</b>		<b>License Plate #</b>	
<b>Identification #</b>		<b>Identification #</b>	
<b>Describe damage to vehicle number 1</b>		<b>Describe damage to vehicle number 2</b>	
<b>Insurance Company Name and Address</b>		<b>Insurance Company Name and Address</b>	
<b>Agent Name</b>		<b>Agent Name</b>	
<b>Agent Phone No.</b>		<b>Agent Phone No.</b>	
<b>Policy Number</b>		<b>Policy Number</b>	

## DRIVER INFORMATION

Vehicle Number 1 – Tetra Tech Vehicle		Vehicle Number 2 – Other Vehicle	
Driver's Name		Driver's Name	
Driver's Address		Driver's Address	
Phone Number		Phone Number	
Date of Birth		Date of Birth	
Driver's License #		Driver's License #	
Licensing State		Licensing State	
Gender	Male <input type="checkbox"/> Female <input type="checkbox"/>	Gender	Male <input type="checkbox"/> Female <input type="checkbox"/>
Was traffic citation issued to Tetra Tech driver? Yes <input type="checkbox"/> No <input type="checkbox"/>		Was traffic citation issued to driver of other vehicle? Yes <input type="checkbox"/> No <input type="checkbox"/>	
Citation #		Citation #	
Citation Description		Citation Description	

## PASSENGERS IN VEHICLES (NON-INJURED)

List all non-injured passengers (excluding driver) in each vehicle.  
 Driver information is captured in the preceding section.  
 Information related to persons injured in the accident (non-Tt employees) is captured in the section below on this form.  
 Injured Tt employee information is captured on FORM IR-A

Vehicle Number 1 – Tetra Tech Vehicle		Vehicle Number 2 – Other Vehicle	
How many passengers (excluding driver) in the vehicle? _____		How many passengers (excluding driver) in the vehicle? _____	
Non-Injured Passenger Name and Address		Non-Injured Passenger Name and Address	
Non-Injured Passenger Name and Address		Non-Injured Passenger Name and Address	
Non-Injured Passenger Name and Address		Non-Injured Passenger Name and Address	

## INJURIES TO NON-TETRA TECH EMPLOYEES

Name of injured person 1				Address of injured person 1		
Age	Gender	Car No.	Location in Car	Seat Belt Used?	Ejected from car?	Injury or Fatality?
	Male <input type="checkbox"/> Female <input type="checkbox"/>			Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>	Injured <input type="checkbox"/> Died <input type="checkbox"/>
Name of injured person 2				Address of injured person 2		
Age	Gender	Car No.	Location in Car	Seat Belt Used?	Ejected from car?	Injury or Fatality?
	Male <input type="checkbox"/> Female <input type="checkbox"/>			Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>	Injured <input type="checkbox"/> Died <input type="checkbox"/>

## OTHER PROPERTY DAMAGE

Describe damage to property other than motor vehicles	
Property Owner's Name	Property Owner's Address

**COMPLETE AND SUBMIT DIAGRAM DEPICTING WHAT HAPPENED**

A large, empty rectangular box with a thin black border, intended for drawing a diagram. The box occupies most of the page below the header.

# **ATTACHMENT II**

## **MEDICAL DATA SHEET**

## MEDICAL DATA SHEET

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

Project \_\_\_\_\_

Name \_\_\_\_\_ Home Telephone \_\_\_\_\_

Address \_\_\_\_\_

Age \_\_\_\_\_ Height \_\_\_\_\_ Weight \_\_\_\_\_

Person to notify in the event of an emergency: Name: \_\_\_\_\_

Phone: \_\_\_\_\_

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

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

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

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

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

\_\_\_\_\_

\_\_\_\_\_

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

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

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

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\_\_\_\_\_

Name (Print clearly)

\_\_\_\_\_

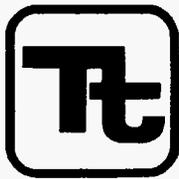
Signature

\_\_\_\_\_

Date

**ATTACHMENT III**

**UTILITY LOCATING  
AND  
EXCAVATION CLEARANCE**



TETRA TECH NUS, INC.

# STANDARD OPERATING PROCEDURES

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Effective Date 12/03	Revision 2
Applicability Tetra Tech NUS, Inc.	
Prepared Health & Safety	
Approved D. Senovich	

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)  
 TtNUS Utility Locating and Clearance Policy  
 TtNUS SOP GH-3.1; Resistivity and Electromagnetic Induction  
 TtNUS SOP GH-3.2; Magnetic and Metal Detection Surveys  
 TtNUS SOP GH-3.4; Ground-penetrating Radar Surveys

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



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

**ONE-CALL SYSTEMS INTERNATIONAL  
CONDENSED DIRECTORY**

<b>Alabama</b> Alabama One-Call 1-800-292-8525	<b>Iowa</b> Iowa One-Call 1-800-292-8989	<b>New Jersey</b> New Jersey One Call 1-800-272-1000
<b>Alaska</b> Locate Call Center of Alaska, Inc. 1-800-478-3121	<b>Kansas</b> Kansas One-Call System, Inc. 1-800-344-7233	<b>New Mexico</b> New Mexico One Call System, Inc. 1-800-321-2537 Las Cruces- Dona Ana Blue Stakes 1-888-526-0400
<b>Arizona</b> Arizona Blue Stake 1-800-782-5348	<b>Kentucky</b> Kentucky Underground Protection Inc. 1-800-752-6007	<b>New York</b> Dig Safely New York 1-800-862-7962 New York City- Long Island One Call Center 1-800-272-4480
<b>Arkansas</b> Arkansas One Call System, Inc. 1-800-482-8998	<b>Louisiana</b> Louisiana One Call System, Inc. 1-800-272-3020	<b>North Carolina</b> The North Carolina One-Call Center, Inc. 1-800-632-4949
<b>California</b> Underground Service Alert North 1-800-227-2600 Underground Service Alert of Southern California 1-800-227-2600	<b>Maine</b> Dig Safe System, Inc. 1-888-344-7233	<b>North Dakota</b> North Dakota One-Call 1-800-795-0555
<b>Colorado</b> Utility Notification Center of Colorado 1-800-922-1987	<b>Maryland</b> Miss Utility 1-800-257-7777 Miss Utility of Delmarva 1-800-282-8555	<b>Ohio</b> Ohio Utilities Protection Service 1-800-362-2764 Oil & Gas Producers Underground Protect'n Svc 1-800-925-0988
<b>Connecticut</b> Call Before You Dig 1-800-922-4455	<b>Massachusetts</b> Dig Safe System, Inc. 1-888-344-7233	<b>Oklahoma</b> Call Okie 1-800-522-6543
<b>Delaware</b> Miss Utility of Delmarva 1-800-282-8555	<b>Michigan</b> Miss Dig System, Inc. 1-800-482-7171	<b>Oregon</b> Oregon Utility Notification Center/One Call Concepts 1-800-332-2344
<b>Florida</b> Sunshine State One-Call of Florida, Inc. 1-800-432-4770	<b>Minnesota</b> Gopher State One Call 1-800-252-1168	<b>Pennsylvania</b> Pennsylvania One Call System, Inc. 1-800-242-1776
<b>Georgia</b> Underground Protection Center, Inc. 1-800-282-7411	<b>Mississippi</b> Mississippi One-Call System, Inc. 1-800-227-6477	<b>Rhode Island</b> Dig Safe System, Inc. 1-888-344-7233
<b>Hawaii</b> Underground Service Alert North 1-800-227-2600	<b>Missouri</b> Missouri One-Call System, Inc. 1-800-344-7483	<b>South Carolina</b> Palmetto Utility Protection Service Inc. 1-888-721-7877
<b>Idaho</b> Dig Line Inc. 1-800-342-1585 Kootenai County One-Call 1-800-428-4950 Shoshone - Benewah One-Call 1-800-398-3285	<b>Montana</b> Utilities Underground Protection Center 1-800-424-5555 Montana One Call Center 1-800-551-8344	<b>South Dakota</b> South Dakota One Call 1-800-781-7474
<b>Illinois</b> JULIE, Inc. 1-800-892-0123 Digger (Chicago Utility Alert Network) 312-744-7000	<b>Nebraska</b> Diggers Hotline of Nebraska 1-800-331-5666	<b>Tennessee</b> Tennessee One-Call System, Inc. 1-800-351-1111
<b>Indiana</b> Indiana Underground Plant Protection Service 1-800-382-5544	<b>Nevada</b> Underground Service Alert North 1-800-227-2600	
	<b>New Hampshire</b> Dig Safe System, Inc. 1-888-344-7233	

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**ATTACHMENT 1 (Continued)**

**Texas**

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

**Utah**

Blue Stakes of Utah  
1-800-662-4111

**Vermont**

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

**Virginia**

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

**Washington**

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

**West Virginia**

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

**Wisconsin**

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

**Wyoming**

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

**District of Columbia**

Miss Utility  
1-800-257-7777

**Alberta**

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

**British Columbia**

BC One Call  
1-800-474-6886

**Ontario**

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

**Quebec**

Info-Excavation  
1-800-663-9228

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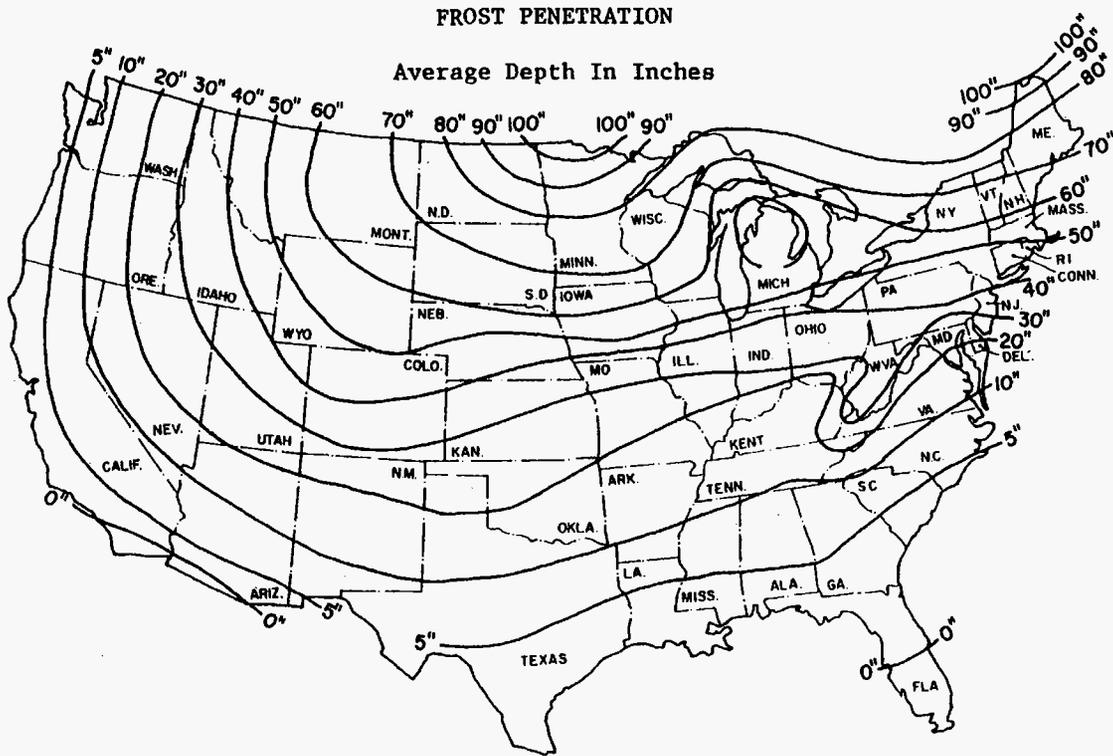
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### ATTACHMENT 2

### 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  
 Name \_\_\_\_\_ Telephone: \_\_\_\_\_ Date: \_\_\_\_\_
  - g) State One-Call agency called? yes no N/A  
 Caller: \_\_\_\_\_  
 Ticket Number: \_\_\_\_\_ Date: \_\_\_\_\_
  - h) Geophysical survey performed? yes no N/A  
 Survey performed by: \_\_\_\_\_  
 Method: \_\_\_\_\_ Date: \_\_\_\_\_
  - i) Hand excavation performed (with concurrent use of utility  
 detection device)? yes no N/A  
 Completed by: \_\_\_\_\_  
 Total depth: \_\_\_\_\_ feet Date: \_\_\_\_\_
  - j) Trench/excavation probed? yes no N/A  
 Probing completed by: \_\_\_\_\_  
 Depth/frequency: \_\_\_\_\_ Date: \_\_\_\_\_

2. Overhead Utilities Present Absent
- a) Determination of nominal voltage yes no N/A
  - b) Marked on site maps yes no N/A
  - c) Necessary to lockout/insulate/re-route yes no N/A
  - d) Document procedures used to lockout/insulate/re-route yes no N/A
  - e) Minimum acceptable clearance (SOP Section 5.2): \_\_\_\_\_

3. Notes:  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Approval:  
 \_\_\_\_\_  
 Site Manager/Field Operations Leader Date

c: PM/Project File  
 Program File

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**ATTACHMENT 4  
OSHA LETTER OF INTERPRETATION**

Mr. Joseph Caldwell  
Consultant  
Governmental Liaison  
Pipeline Safety Regulations  
211 Wilson Boulevard  
Suite 700  
Arlington, Virginia 22201

Re: Use of hydro-vacuum or non-conductive hand tools to locate underground utilities.

Dear Mr. Caldwell:

In a letter dated July 7, 2003, we responded to your inquiry of September 18, 2002, regarding the use of hydro-vacuum equipment to locate underground utilities by excavation. After our letter to you was posted on the OSHA website, we received numerous inquiries that make it apparent that aspects of our July 7 letter are being misunderstood. In addition, a number of industry stakeholders, including the National Utility Contractors Association (NUCA), have provided new information regarding equipment that is available for this work.

To clarify these issues, we are withdrawing our July 7 letter and issuing this replacement response to your inquiry.

***Question:** Section 1926.651 contains several requirements that relate to the safety of employees engaged in excavation work. Specifically, paragraphs (b)(2) and (b)(3) relate in part to the safety of the means used to locate underground utility installations that, if damaged during an uncovering operation, could pose serious hazards to employees.*

*Under these provisions, what constitutes an acceptable method of uncovering underground utility lines, and further, would the use of hydro-vacuum excavation be acceptable under the standard?*

**Answer**

Background

Two sections of 29 CFR 1926 Subpart P (Excavations), 1926.651 (Specific excavation requirements), govern methods for uncovering underground utility installations. Specifically, paragraph (b)(2) states:

When utility companies or owners cannot respond to a request to locate underground utility installations within 24 hours \* \* \* or cannot establish the exact location of these installations, the employer may proceed, provided the employer does so with caution, and provided detection equipment or other acceptable means to locate utility installations are used. (emphasis added).

Paragraph (b)(3) provides:

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#### 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 IV**

# **EQUIPMENT INSPECTION CHECKLIST**

## Hand and Power Tool Checklist

Hand and Power Tool Checklist				
Yes	No	NA	Requirement	Comments
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are all tools and equipment (both company and employee owned) used by employees at their workplace in good condition?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Any loose parts?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Missing pins and/or bolts?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are broken or fractured handles on hammers, axes and similar equipment replaced promptly?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are hand tools such as chisels and punches, which develop mushroomed heads during use, reconditioned or replaced as necessary?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are worn or bent wrenches replaced regularly?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are appropriate handles used on files and similar tools?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are employees made aware of the hazards caused by faulty or improperly used hand tools?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are jacks checked periodically to ensure they are in good operating condition?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are tool handles wedged tightly in the head of all tools?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are tool cutting edges kept sharp so the tool will move smoothly without binding or skipping?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are tools stored in dry, secure locations where they won't be tampered with?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are appropriate safety glasses, face shields, etc. used while using hand tools or equipment which might produce flying materials or be subject to breakage?	
Power Tool Inspection Checklist				
Yes	No	NA	Requirement	Comments
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are grinders, saws and similar equipment provided with appropriate safety guards?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are power tools used with the correct shield, guard, or attachment, recommended by the manufacturer?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are portable circular saws equipped with guards above and below the base shoe? Are circular saw guards checked to assure they are not wedged up, thus leaving the lower portion of the blade unguarded?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are rotating or moving parts of equipment guarded to prevent physical contact?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are all cord-connected, electrically operated tools and equipment effectively grounded or of the approved double insulated type?	

## Hand and Power Tool Checklist

Yes	No	NA	Requirement	Comments
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are effective guards in place over belts, pulleys, chains, sprockets, on equipment such as concrete mixers, and air compressors?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are portable fans provided with full guards or screens having openings ½ inch or less?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is hoisting equipment available and used for lifting heavy objects, and are hoist ratings and characteristics appropriate for the task?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are ground-fault circuit interrupters provided on all temporary electrical 15 and 20 ampere circuits, used during periods of construction?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are pneumatic and hydraulic hoses on power operated tools checked regularly for deterioration or damage?	
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Air compressor: <ul style="list-style-type: none"> <li>• Is the air compressor equipped with a Surge Check Valve?</li> <li>• Pressure regulator gauge and valve?</li> <li>• Pressure relief valve?</li> <li>• Water trap and filter?</li> </ul>	
Chainsaws				
Yes	No	NA	Requirement	Comments
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is the chain sharp, well oiled, and properly adjusted (Chain tension)?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is the Bar straight? <ul style="list-style-type: none"> <li>• Are there indications of excessive wear?</li> </ul>	
<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	Does the chain brake lever move freely? Does chain brake stop the chain when applied?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Does the chain move when idling?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are the cans used to fuel the chainsaw safety cans?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Does the on/off switch function properly?	
<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	Does the throttle lock function properly? Is the chainsaw equipped with continuous pressure throttle control?	

## Hand and Power Tool Checklist

Yes	No	NA	Requirement	Comments
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	PPE: Is the following PPE in serviceable condition?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hardhat with mesh visor and ear muffs?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Safety glasses?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Chainsaw chaps?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Gloves with protection also on the back of the hands?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Emergency Equipment:	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is a Fire extinguisher (3A:B:C) available for immediate use?	
			Is a First-Aid Kit immediately available for use? Does it contain the minimum content as required in the HASP?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Communication – Is an acceptable means of communication available (Hand signals, radios, air horns, etc.) that will support communication over the engine noise? Type?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are MSDSs available for the fuels, fuel additives, and lubricating oils?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is the operator trained in proper operation of the chainsaw?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Does the operator demonstrate knowledgeable operation?	

### Equipment Inspection Checklist for Drill Rigs

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

Unit/Serial No#: \_\_\_\_\_

Inspection Date: \_\_\_\_ / \_\_\_\_ / \_\_\_\_ Time: \_\_\_\_ :

Equipment Type: \_\_\_\_\_  
(e.g, Drill Rigs Hollow Stem, Mud Rotary, Direct Push, HDD)

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

Project No#: \_\_\_\_\_

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

**Equipment Inspection Checklist for Drill Rigs**

Page 2

Unit/Serial No#: \_\_\_\_\_

Inspection Date: \_\_\_\_ / \_\_\_\_ / \_\_\_\_

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

**Equipment Inspection Checklist for Drill Rigs**  
**Page 3**

Unit/Serial No#: \_\_\_\_\_

Inspection Date: \_\_\_\_ / \_\_\_\_ / \_\_\_\_

Yes	No	NA	Requirement	Comments
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Power cable and/or hoist cable <ul style="list-style-type: none"> <li>Reduction in Rope diameter π                (5/16 wire rope &gt; 1/64 reduction nominal size -replace)                (3/8 to 1/2 wire rope &gt; 1/32 reduction nominal size-replace)                (9/16 to 3/4 wire rope &gt; 3/64 reduction nominal size-replace)</li> <li>Number of broken wires                (6 randomly broken wires in one rope lay)                (3 broken wires in one strand)</li> <li>Number of wire rope wraps left on the Running Drum at nominal use (≥3 required)               <ul style="list-style-type: none"> <li>Lead (primary) sheave is centered on the running drum</li> </ul> </li> <li>Lubrication of wire rope (adequate?)</li> <li>Kinks, bends – Flattened to &gt; 50% diameter</li> </ul>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hemp/Fiber rope (Cathead/Split Spoon Hammer) <ul style="list-style-type: none"> <li>Minimum 3/4; maximum 1 inch rope diameter (Inspect for physical damage)</li> <li>Rope to hammer is securely fastened</li> </ul>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Safety Guards – <ul style="list-style-type: none"> <li>Around rotating apparatus (belts, pulleys, sprockets, spindles, drums, flywheels, chains) all points of operations protected from accidental contact?</li> <li>Hot pipes and surfaces exposed to accidental contact?</li> <li>High pressure lines</li> <li>Nip/pinch points</li> </ul>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Operator Qualifications <ul style="list-style-type: none"> <li>Does the operator have proper licensing where applicable, (e.g., CDL)?</li> <li>Does the operator, understand the equipment's operating instructions?</li> <li>Is the operator experienced with this equipment?</li> <li>Is the operator 21 years of age or more?</li> </ul>	

**Equipment Inspection Checklist for Drill Rigs**  
**Page 4**

Unit/Serial No#: \_\_\_\_\_

Inspection Date: \_\_\_\_ / \_\_\_\_ / \_\_\_\_

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

Approved for Use     Yes     No     See Comments

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

\_\_\_\_\_  
 Operator

### Heavy Equipment Inspection Checklist

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

Unit/Serial No#: \_\_\_\_\_

Inspection Date: \_\_\_\_ / \_\_\_\_ / \_\_\_\_

Time: \_\_\_\_ : \_\_\_\_

Equipment Type: \_\_\_\_\_

(e.g, earthmoving equipment - tractors backhoes, bulldozers, etc.)

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

Project No#: \_\_\_\_\_

Yes	No	NA	Requirements	Comments
<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	Seat Belts <ul style="list-style-type: none"> <li>• Are available for intended operator and passengers (where applicable)</li> <li>• Seat Belts are operational?</li> </ul>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Roll-Over Protection (ROPS) <ul style="list-style-type: none"> <li>• Roll-over protection structures (ROPS) are provided on vehicles and heavy equipment (including scrapers, tractors, loaders, bulldozers, carryalls, etc.)</li> </ul>	
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Brakes <ul style="list-style-type: none"> <li>• Brake systems capable of stopping and holding fully loaded equipment</li> <li>• Parking Brake functions properly</li> <li>• Wheel Chocks available (where and as applicable)</li> </ul>	
<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	Access <ul style="list-style-type: none"> <li>• Non-slip steps</li> <li>• Grab Handles (3-Point Grab/Step Mounting Points)</li> </ul>	

**Heavy Equipment Inspection checklist**  
**Page 2**

Unit/Serial No#: \_\_\_\_\_

Inspection Date: \_\_\_\_ / \_\_\_\_ / \_\_\_\_

Yes	No	NA	Requirements	Comments
<input type="checkbox"/>   <input type="checkbox"/>   <input type="checkbox"/>	<input type="checkbox"/>   <input type="checkbox"/>   <input type="checkbox"/>	<input type="checkbox"/>   <input type="checkbox"/>   <input type="checkbox"/>	<p><b>Audible Alarms</b></p> <ul style="list-style-type: none"> <li>• Audible alarms – All bidirectional machines, such as rollers, compacters, front-end loaders, bulldozers, and similar equipment, shall be equipped with a horn, distinguishable from the surrounding noise level, which shall be operated as needed when the machine is moving in either direction.</li> <li>- Back up Alarms – All self propelled equipment with an obstructed view to the rear will be equipped with a reverse gear signal alarm distinguishable from the surrounding noise level.</li> <li>• Horn functioning properly</li> </ul>	
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>  <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p><b>Highway Use</b></p> <ul style="list-style-type: none"> <li>• Fenders for equipment that can exceed 15mph</li> <li>• Fire Extinguisher</li> <li>• Are exhaust emissions directed away from the Operator?</li> <li>• Cab <ul style="list-style-type: none"> <li>- Clean, free from debris, tools or equipment that can interfere with foot Control.</li> <li>- Free from storage of flammable material/solvents</li> </ul> </li> <li>• Mirrors,</li> <li>• Safety glass <ul style="list-style-type: none"> <li>- Equipped with defrosters</li> <li>- Windshield wipers</li> </ul> </li> <li>• Turn signals, lights, brake lights, etc. (front/rear) for equipment approved for highway use?</li> <li>• Gauges functioning properly</li> <li>• Tires (Tread) or tracks</li> <li>• Steering (standard and emergency)</li> <li>• Are tools and material secured to prevent movement during transport?</li> </ul>	

**Heavy Equipment Inspection checklist**  
**Page 3**

Unit/Serial No#: \_\_\_\_\_

Inspection Date: \_\_\_\_ / \_\_\_\_ / \_\_\_\_

Yes	No	NA	Requirements	Comments
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>Fluid Levels:</p> <ul style="list-style-type: none"> <li>• Engine oil</li> <li>• Transmission fluid</li> <li>• Brake fluid</li> <li>• Cooling system fluid</li> <li>• Hoses and belts</li> <li>• Hydraulic oil</li> </ul>	
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>Fueling</p> <ul style="list-style-type: none"> <li>• Fueling of vehicles and heavy equipment is done with the engine off.</li> <li>• No smoking is permitted at or near the fuel storage or refueling area. A sign is posted stating: NO SMOKING WITHIN 50 FEET.</li> <li>• No sources of ignition are present near the fuel storage or refueling area.</li> <li>• A dry chemical or carbon dioxide fire extinguisher (rated 6:BC or larger) is in a location accessible to the fueling area, no closer than 50-feet.</li> <li>• Safety cans available?</li> </ul>	
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p>Safety Guards –</p> <ul style="list-style-type: none"> <li>• Around rotating apparatus (belts, pulleys, sprockets, spindles, drums, flywheels, chains) all points of operations protected from accidental contact?</li> <li>• Hot pipes and surfaces are protected from accidental contact?</li> <li>• High pressure pneumatic lines have safety cable to prevent thrashing should it become disconnected?</li> </ul>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<p>Attachments</p> <ul style="list-style-type: none"> <li>• Have the attachments designed for use (as per manufacturer's recommendation) with this equipment been inspected and are considered suitable for use?</li> </ul>	

**Heavy Equipment Inspection checklist**  
**Page 4**

Unit/Serial No#: \_\_\_\_\_

Inspection Date: \_\_\_\_ / \_\_\_\_ / \_\_\_\_

Yes	No	NA	Requirements	Comments
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Operator Qualifications <ul style="list-style-type: none"> <li>• Does the operator have proper licensing where applicable, (e.g., CDL)?</li> <li>• Does the operator, understand the equipment's operating instructions?</li> <li>• Is the operator experienced with this equipment?</li> <li>• Is the operator 21 years of age or more?</li> </ul>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	PPE Required <ul style="list-style-type: none"> <li>• Hardhat</li> <li>• Safety glasses</li> <li>• Work gloves</li> <li>• Chemical resistant gloves _____</li> <li>• Steel toed Work Boots</li> <li>• Chemical resistant Boot Covers</li> <li>• Apron</li> <li>• Coveralls Tyvek, Saranex, cotton) _____</li> </ul>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Key(s)? Operating Manual?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other Hazards <ul style="list-style-type: none"> <li>• Excessive Noise Levels _____ dBA</li> <li>• Chemical hazards (Drilling supplies - Sand, bentonite, grout, fuel, etc.)</li> <li>- MSDSs available?</li> </ul>	

Approved for Use     Yes     No     See Comments

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

\_\_\_\_\_  
 Operator

# **ATTACHMENT V**

## **SAFE WORK PERMITS**

**SAFE WORK PERMIT  
DECONTAMINATION ACTIVITIES  
NAS BRUNSWICK  
BRUNSWICK, MAINE**

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

**SECTION I: General Job Scope**

- I. **Work limited to the following (description, area, equipment used):** Decontamination of heavy equipment and machinery (i.e., Drill and DPT rigs and accessories) will occur using pressure washers and/or steam cleaning units. Sampling equipment will be decontaminated using buckets, brushes and spray bottles at the work site or designated location.
- II. **Primary Hazards:** Potential hazards associated with this task include lifting (strain/muscle pulls lifting heavy drilling equipment); Flying projectiles propelled by the force of the pressure washer/stream cleaner; noise; Burns/water lacerations; Stacked equipment - falling hazards; slips, trips, and falls – slippery surfaces.
- III. **Field Crew:** \_\_\_\_\_
- IV. **On-site Inspection conducted**  Yes  No Initials of Inspector \_\_\_\_\_ TtNUS  
**Equipment Inspection required**  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   
**Respiratory equipment required** Yes  Specify on the reverse  
 No
- Modifications/Exceptions: None anticipated

VI. Chemicals of Concern	Hazard Monitoring	Action Level(s)	Response Measures
<u>Arsenic, Chromium, lead,</u>	<u>PID with an 11.7 ev lamp</u>	<u>any reading above background</u>	<u>decontaminate equipment</u>
<u>General PAH's and</u>	<u>or FID</u>	<u>for &gt; than 1 minute in</u>	<u>again and re-screen</u>
<u>RDX, HMX</u>		<u>duration. Visible dust cloud.</u>	<u>Area wetting methods</u>

**Primary Route(s) of Exposure/Hazard:** Contact with contaminated media, incidental ingestion of dust. Airborne concentrations of site contaminants are unlikely to be present.

**(Note to FOL and/or SHSO: Each item in Sections VII, VIII, and IX must be checked Yes or No)**

**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/Cellular Phone.....             | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Splash Shield.....               | <input checked="" type="checkbox"/> Yes <input 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 |
| Impermeable apron .....          | <input type="checkbox"/> Yes <input type="checkbox"/> No            | Work/rest regimen .....               | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Steel toe Work shoes or boots... | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | Chemical Resistant Boot Covers .....  | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| High Visibility vest.....        | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Tape up/use insect repellent .....    | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| First Aid Kit .....              | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | Fire Extinguisher.....                | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| Safety Shower/Eyewash.....       | <input type="checkbox"/> Yes <input type="checkbox"/> No            | Other .....                           | <input type="checkbox"/> Yes <input type="checkbox"/> No            |

Modifications/Exceptions: If contact with overspray is likely, Impermeable aprons may be used at SSO's discretion. Another option is to use rainsuit or PE coated Tyvek. Hard hat, splash shield, hearing protection will be worn for pressure washer/steam cleaner operation. Gloves – Nitrile (surgeons style) or outer for cleaning hand tools, nitrile supported for steam cleaner/pressure washer operation.

**VIII. Site Preparation**

- |   | Yes                      | No                       | NA                                  |
|---|--------------------------|--------------------------|-------------------------------------|
| Utility Locating and Excavation Clearance completed .....                                   | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| Physical Hazards Identified and Isolated (Splash and containment barriers) .....            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).....    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |

**IX. Additional Permits required (Hot work, confined space entry, excavation etc.).....**  Yes  No

*If yes, SHSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090*

- X. **Special instructions, precautions:** Suspend site activities in the event of inclement weather. Employ proper lifting techniques as described on Table 5-1 for this task. Use drying racks to secure heavy equipment to prevent items from falling during washing and drying. In addition, avoid pointing the wand at other people or place it against any part of your body. Accidental compression of the trigger can cause water lacerations or burns. All hoses and fittings will be inspected to insure structural integrity prior to use. For pressure washers or steam cleaners in excess of 3,000 psi, a fan tip of 25° or greater will be used to control potential for water cuts or lacerations. A light coating of sand should be applied to the plastic liner should the surface becomes to slippery to prevent slips. Keep hoses gathered to prevent trips and falls. A site control boundary for this activity is 35-feet surrounding the point of operation. Follow MSDS for any decontamination solutions/solvents used.

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

**SAFE WORK PERMIT  
MOBILIZATION/DEMobilIZATION ACTIVITIES  
NAS BRUNSWICK  
BRUNSWICK, MAINE**

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. These activities include site reconnaissance/site characterization, site preparation including the layout of sampling locations, securing the necessary utility clearances, and identifying/isolating physical hazards; Secure, construct, or equip decontamination and IDW storage facilities.
- II. **Primary Hazards:** Potential hazards associated with this task are primarily physical in nature including lifting, cuts and lacerations, pinches and compressions; flying projectiles; slips, trips, and falls; insect and animal bites.
- III. **Field Crew:** \_\_\_\_\_
- IV. **On-site Inspection conducted**  Yes  No Initials of Inspector \_\_\_\_\_ TtNUS  
**Equipment Inspection required**  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
- Respiratory equipment required** Yes  See Reverse  
 No

Modifications/Exceptions: None anticipated

VI. Chemicals of Concern	Hazard Monitoring	Action Level(s)	Response Measures
None anticipated	NA	NA	NA
<b>Primary Route of Exposure/Hazard:</b> <u>None</u>			

**(Note to FOL and/or SHSO: Each item in Sections VII, VIII, and IX must be checked Yes or No)**

**VII. Additional Safety Equipment/Procedures**

- |  |  |
|--|--|
| Hard-hat..... <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 checked="" type="checkbox"/> No             |
| Chemical/splash goggles..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No       | Radio/Cellular Phone..... <input type="checkbox"/> Yes <input type="checkbox"/> No                       |
| Splash Shield..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No                 | Barricades ..... <input type="checkbox"/> Yes <input type="checkbox"/> No                                |
| Splash suits/coveralls ..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No       | Gloves (Type – Leather/Cotton) ..... <input type="checkbox"/> Yes <input type="checkbox"/> No            |
| Impermeable apron ..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No            | Work/rest regimen ..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No              |
| Steel toe Work shoes or boots..... <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | Chemical Resistant Boot Covers ..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| High Visibility vest..... <input type="checkbox"/> Yes <input type="checkbox"/> No                     | Tape up/use insect repellent ..... <input type="checkbox"/> Yes <input type="checkbox"/> No              |
| First Aid Kit..... <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No                 | Fire Extinguisher..... <input type="checkbox"/> Yes <input type="checkbox"/> No                          |
| Safety Shower/Eyewash..... <input type="checkbox"/> Yes <input type="checkbox"/> No                    | Other ..... <input type="checkbox"/> Yes <input type="checkbox"/> No                                     |

Modifications/Exceptions: If there are Flying projectiles– Safety glasses and/or splash shield (i.e., hammering, power tool operation); If you have to raise your voice to be heard by someone within 2-feet of you hearing protection is required (i.e., equipment/power tool operation); If overhead hazards or bump hazards or you are working near operating equipment hard hats will be employed. If you are working in or near traffic patterns then wear High Visibility Vests. Use insect repellent and tape up to protect against insects and insect bites. Wear snake chaps in high brush areas.

**VIII. Site Preparation**

- |   | Yes                      | No                       | NA                       |
|---|--------------------------|--------------------------|--------------------------|
| Utility Locating and Excavation Clearance completed .....                                   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Physical Hazards Identified and Isolated .....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc.).....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

- IX. **Additional Permits required** (Hot work, confined space entry, excavation etc.).....  Yes  No  
*If yes, SHSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090*

- X. **Special instructions, precautions:** Suspend site activities in the event of inclement weather. Employ proper lifting techniques as described on Table 5-1 for this task. Caution should be exercised if working along the water. The potential for natural hazards including snakes, alligators may exist given the region.

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





**SAFE WORK PERMIT  
TOPOGRAPHIC SURVEYING  
NAS BRUNSWICK  
BRUNSWICK, MAINE**

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

**SECTION I: General Job Scope**

- I. **Work limited to the following (description, area, equipment used):** Topographic surveying and associated activities such as site reconnaissance and site preparation including the layout of control station and shooting vertical and horizontal control lines and fixed features such as intersections
- II. **Primary Hazards:** Potential hazards associated with this task are primarily physical in nature including lifting, cuts and lacerations, pinches and compressions; flying projectiles; slips, trips, and falls; insect and animal bites
- IV. **Field Crew:** \_\_\_\_\_
- IV. **On-site Inspection conducted**  Yes  No Initials of Inspector \_\_\_\_\_ TtNUS
- Equipment Inspection required**  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  Level B  Yes  See Reverse
- Level C  Level A  No
- Modifications/Exceptions: None anticipated

VI. Chemicals of Concern	Hazard Monitoring	Action Level(s)	Response Measures
None anticipated	NA	NA	NA

**Primary Route of Exposure/Hazard:** None

**(Note to FOL and/or SHSO: Each item in Sections VII, VIII, and IX must be checked Yes or No)**

**VII. Additional Safety Equipment/Procedures**

- |                                   |   |                                       |   |
|-----------------------------------|---|---------------------------------------|---|
| Hard-hat .....                    | <input type="checkbox"/> Yes <input 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/Cellular Phone.....             | <input type="checkbox"/> Yes <input 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 – Leather/Cotton) .....  | <input type="checkbox"/> Yes <input type="checkbox"/> No            |
| Impermeable apron .....           | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Work/rest regimen .....               | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Steel toe Work shoes or boots ... | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | Chemical Resistant Boot Covers .....  | <input type="checkbox"/> Yes <input type="checkbox"/> No            |
| High Visibility vest.....         | <input type="checkbox"/> Yes <input type="checkbox"/> No            | Tape up/use insect repellent .....    | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| First Aid Kit .....               | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | Fire Extinguisher .....               | <input type="checkbox"/> Yes <input type="checkbox"/> No            |
| Safety Shower/Eyewash.....        | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Other .....                           | <input type="checkbox"/> Yes <input type="checkbox"/> No            |

Modifications/Exceptions: Pant legs are to be taped to work boots to prevent entry under the clothing by ticks and other insects when working in heavy brush and wooded areas. Use insect repellants according to manufacturers recommendations. Tyvek coveralls may be used in heavy brush to protect against natural hazards (e.g., ticks) and also to make identification easier. If working in areas where snakes may be a threat, wear snake chaps. Surveyors working along highways and traffic pathways shall wear high visibility vests to increase visual recognition. Safety glasses and Hard Hats should be worn when cutting sight lines; leather or cotton work gloves when cutting brush.

- VIII. Site Preparation**
- |  | Yes                      | No                       | NA                       |
|--|--------------------------|--------------------------|--------------------------|
| Utility Locating and Excavation Clearance completed .....                                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Physical Hazards Identified and Isolated.....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

- IX. **Additional Permits required** (Hot work, confined space entry, excavation etc.) .....  Yes  No  
*If yes, SHSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090*

- X. **Special instructions, precautions:** Suspend site activities in the event of inclement weather. Employ proper lifting techniques as described on Table 5-1 for this task. Employ sharp tools for cutting brush, when not in use keep the sheath on the blade. All subsurface locations at the following sites: Site 12, Former Munitions Bunker West, and the Quarry will be cleared to a depth of 10 feet by an on-site EOD technician.

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

**SAFE WORK PERMIT  
IDW MANAGEMENT ACTIVITIES  
NAS BRUNSWICK  
BRUNSWICK, MAINE**

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

**SECTION I: General Job Scope**

- I. **Work limited to the following (description, area, equipment used):** IDW management activities includes containerization, staging, monitoring for leaks of IDW accumulated wastes. Waste types include soil cutting, purge and decontamination wash waters.
- II. **Primary Hazards:** Potential hazards associated with this task are primarily physical in nature including lifting, pinches and compressions; flying projectiles; slips, trips, and falls. Potential radiological contamination from monazite sand.
- V. **Field Crew:** \_\_\_\_\_
- IV. **On-site Inspection conducted**  Yes  No Initials of Inspector \_\_\_\_\_ TtNUS  
**Equipment Inspection required**  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  Level B  Yes  See Reverse  
 Level C  Level A  No
- Modifications/Exceptions: None anticipated

VI. Chemicals of Concern	Hazard Monitoring	Action Level(s)	Response Measures
<u>Arsenic, Chromium, lead,</u>	<u>PID with an 11.7 ev lamp</u>	<u>any reading above background</u>	<u>decontaminate equipment</u>
<u>General PAH's and</u>	<u>or FID</u>	<u>for &gt; than 1 minute in</u>	<u>again and re-screen</u>
<u>RDX, HMX</u>		<u>duration. Visible dust cloud.</u>	<u>Area wetting methods</u>

**Primary Route(s) of Exposure/Hazard:** Contact with contaminated media, incidental ingestion of dust. Airborne concentrations of site contaminants are unlikely to be present.

**(Note to FOL and/or SHSO: Each item in Sections VII, VIII, and IX must be checked Yes or No)**

**VII. Additional Safety Equipment/Procedures**

- |   |   |
|---|---|
| Hard-hat ..... <input type="checkbox"/> Yes <input type="checkbox"/> No                               | Hearing Protection (Plugs/Muffs)... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Safety Glasses ..... <input 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 type="checkbox"/> No                 | Radio/Cellular Phone..... <input type="checkbox"/> Yes <input type="checkbox"/> No                      |
| Splash Shield ..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No               | Barricades ..... <input type="checkbox"/> Yes <input type="checkbox"/> No                               |
| Splash suits/coveralls..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No       | Gloves (Type – Leather/Cotton) .... <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| Impermeable apron ..... <input type="checkbox"/> Yes <input type="checkbox"/> No                      | Work/rest regimen ..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No             |
| Steel toe Work shoes or boots ... <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | Chemical Resistant Boot Covers... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No   |
| High Visibility vest..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No         | Tape up/use insect repellent ..... <input type="checkbox"/> Yes <input type="checkbox"/> No             |
| First Aid Kit..... <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No                | Fire Extinguisher ..... <input type="checkbox"/> Yes <input type="checkbox"/> No                        |
| Safety Shower/Eyewash..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No        | Other ..... <input type="checkbox"/> Yes <input type="checkbox"/> No                                    |

Modifications/Exceptions: If you are using pneumatic/electric power to open drums – Safety glasses are required; If power equipment is employed to move drums or you are working near operating equipment hard hats will be employed.

**VIII. Site Preparation**

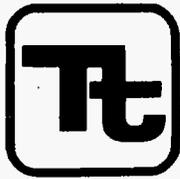
- |  | Yes                      | No                       | NA                                  |
|--|--------------------------|--------------------------|-------------------------------------|
| Utility Locating and Excavation Clearance completed .....                                  | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Vehicle and Foot Traffic Routes Established/Traffic Control Barricades/Signs in Place..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| Physical Hazards Identified and Isolated .....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| Emergency Equipment Staged (Spill control, fire extinguishers, first aid kits, etc).....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |

- IX. **Additional Permits required** (Hot work, confined space entry, excavation etc.) .....  Yes  No  
*If yes, SHSO to complete or contact Health Sciences, Pittsburgh Office (412)921-7090*

- X. **Special instructions, precautions:** Suspend site activities in the event of inclement weather. Employ proper lifting techniques as described on Table 5-1. When/where possible use heavy equipment to move and place containers. When placing drums – Place the label and retention ring nut on the outside where it is readily visible. Place 4-drums to a pallet. Maintain a minimum distance of 4-feet between pallet rows. An IDW inventory shall be generated to provide the number of drums, contents, and volumes. This inventory should be provided to the facility contact

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

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



TETRA TECH NUS, INC.

# STANDARD OPERATING PROCEDURES

Number HS-2.0	Page 1 of 14
Effective Date 09/03	Revision 1
Applicability Tetra Tech NUS, Inc.	
Prepared Earth Sciences Department	

Subject  
UNEXPLODED ORDNANCE AND CHEMICAL  
WARFARE AGENTS ACTIVITIES

Approved  
D. Senovich *DS*

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## 1.0 GENERAL

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

## 2.0 PURPOSE

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

## 3.0 APPLICABILITY

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

## 4.0 RESPONSIBILITIES

### Project Manager

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

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

### UXO Technician

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

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

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

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

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

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

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

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

### **5.0 LOCATION OF OPERATIONS**

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

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

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

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

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

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

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

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

## 7.0 PERSONNEL LIMITS

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

7.1 Personnel Limits for UXO Operations:

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

## 8.0 MATERIAL LIMITS

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

## 9.0 SAFETY REQUIREMENTS

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

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

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

9.2 Specific Safety Requirements:

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

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

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

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## 10.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

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

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

## 11.0 EMERGENCY RESPONSE AND CONTINGENCY PLANS

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

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

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

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

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

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

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

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

## 12.0 TYPICAL CLIENT/FACILITY SAFETY POINTS OF CONTACT

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

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

## 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 TtNUS to dispose of according to applicable regulations. Disposal will normally be offsite.

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

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

## 15.0 UXO/CWM PROCEDURES FOR FIELD OPERATIONS

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

- a. Initial entry into suspect areas
- 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.