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FINAL HEALTH AND SAFETY PLAN FOR SITE ASSESSMENT AT HARRY S TRUMAN  
ANIMAL IMPORT CENTER WITH TRANSMITTAL LETTER NAS KEY WEST FL  
1/29/2004  
TETRA TECH NUS



TETRA TECH NUS, INC.

AIK-04-0006

January 29, 2004

Project Number HK 4260

*via U.S. mail*

Byas Glover (Code 18410)  
Department of the Navy  
NAVFAC EFD SOUTH  
P.O. Box 190010  
North Charleston, South Carolina 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888  
Contract Task Order No. 0254

Subject: Final Health and Safety Plan for Site Assessment for Harry S. Truman Animal Import Center, Naval Air Station Key West, Florida

Dear Mr. Glover:

I have enclosed the PDF file for the final Health and Safety Plan for Site Assessment work (monitoring well abandonment) at the Harry S. Truman Animal Import Center, Naval Air Station (NAS) Key West, Florida. I am not expecting to receive any comments on this plan. The monitoring wells are scheduled for removal during the week of 2 February 2004.

Please call me at (803) 649-7963, extension 345, if you have any questions regarding the enclosed plan.

Sincerely,

C. M. Bryan  
Project Manager

CMB:spc

Enclosure

cc: Ms. Debbie Wroblewski (Cover Letter Only)  
Ms. T. Vaught, FDEP  
File: 4260-4.2

Mr. R. Courtright, NAS Key West  
Mr. A. Benson, USDA (hard copy and CD)  
Mr. M. Perry/File

**Final Health and Safety Plan  
For  
Site Assessment at  
Harry S. Truman Animal Import  
Center**

**Naval Air Station Key West  
Key West, Florida**



**Southern Division  
Naval Facilities Engineering Command  
Contract No. N62467-94-D-0888  
Contract Task Order 0254**

**January 2004**

**FINAL HEALTH AND SAFETY PLAN**  
**FOR**  
**SITE ASSESSMENT AT**  
**HARRY S. TRUMAN ANIMAL IMPORT CENTER**  
**NAVAL AIR FACILITY KEY WEST**  
**KEY WEST, FLORIDA**  
**COMPREHENSIVE LONG-TERM**  
**ENVIRONMENTAL ACTION NAVY CONTRACT**

**SUBMITTED TO:**

**SOUTHERN DIVISION**  
**NAVAL FACILITIES ENGINEERING COMMAND**  
**2155 EAGLE DRIVE**  
**NORTH CHARLESTON, SOUTH CAROLINA 29406**

**SUBMITTED BY:**

**TETRA TECH NUS**  
**661 ANDERSEN DRIVE**  
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**PITTSBURGH, PENNSYLVANIA 15220**

**CONTRACT NO. N62467-94-D-0888**  
**CONTRACT TASK ORDER 0254**

**January 2004**

**PREPARED UNDER**  
**THE SUPERVISION OF:**



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**CHUCK BRYAN**  
**TASK ORDER MANAGER**  
**TETRA TECH NUS**  
**AIKEN, SOUTH CAROLINA**

**APPROVED FOR SUBMITTAL BY:**



---

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

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## **1.0 INTRODUCTION**

This Health and Safety Plan (HASP) has been developed to provide minimum practices and procedures for Tetra Tech NUS, Inc. (TtNUS) and subcontractor personnel engaged in Site Contamination Assessment activities at the Harry S. Truman Animal Import Center at the Naval Air Station (NAS) Key West, Florida. This HASP is part of an overall effort conducted under Comprehensive Long-Term Environmental Action Navy (CLEAN III) administered through the U.S. Navy Southern Division Naval Facilities Engineering Command (NAVFAC EFD SOUTH), as defined under Contract Number N62467-94-D-0888. In addition to the HASP, a copy of the Tetra Tech NUS, Inc. (TtNUS) Environmental Health and Safety Guidance Manual must be present at the site during the performance of site activities. The Guidance Manual provides detailed information pertaining to the HASP, as well as TtNUS Standard Operating Procedures (SOP's). 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. The HASP will be modified if new information becomes available. All changes to the HASP will be made by the Project Health & Safety Officer (PHSO) and approved by the TtNUS Health and Safety Manager (HSM) and the Task Order Manager (TOM). The TOM will notify affected personnel of all changes.

The elements of this HASP are intended to be in compliance with the requirements established by OSHA 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response" (HAZWOPER), and sections of 29 CFR 1926, "Safety and Health Regulations for Construction".

### **1.1 KEY PROJECT PERSONNEL AND ORGANIZATION**

This section defines responsibility for site safety and health for TtNUS and subcontractor employees engaged in onsite activities. Personnel assigned to these positions will exercise the primary responsibility for all onsite 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, as specified in this document, for onsite activities.

- The TtNUS TOM is responsible for the overall direction of health and safety for this project.

- The PHSO is responsible for developing this 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 based on task and potential hazards.
  - 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.
  - vii. Modify this HASP, as it becomes necessary.
- The TtNUS Field Operations Leader (FOL) is responsible for implementation of the HASP with the assistance of an appointed SSO. The FOL manages field activities, executes the work plan, and enforces safety procedures as applicable to the work plan.
- The 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 in areas of operation.
  - iv. Implementing air monitoring program for onsite activities.
  - v. Verifying training and medical clearance of onsite personnel status in relation to site activities.
  - vi. Implementing Hazard Communication, Respiratory Protection Programs, and other associated health and safety programs as they may apply to site activities.
  - vii. Coordinating emergency services.
  - viii. Providing site-specific training for all onsite personnel.
  - ix. Investigating all accidents and injuries (see Attachment I - Illness/Injury Procedure and Report Form)
  - x. Providing input to the PHSO regarding the need to modify, this HASP, or applicable health and safety associated documents as per site-specific requirements.
- Compliance with the requirements stipulated in this HASP is monitored by the SSO and coordinated through the TtNUS CLEAN HSM.

## 1.2 SITE INFORMATION AND PERSONNEL ASSIGNMENTS

**Site Name:** Naval Air Station (NAS) Key West      **Address:** Key West, Florida

**Site Point of Contact:** Mr. Robert Courtright      **Phone Number:** (305) 293-2881

**Purpose of Site Visit:** TtNUS will conduct media sampling using a DPT rig, install monitoring wells, and sample groundwater to determine if petroleum contamination exists at Harry S. Truman Animal Import Center, NAS Key West. Revision 1 of this HASP includes well abandonment activities that were added to the scope of work. See Sections 3.0 and 4.0 for details concerning the site background and scope of work.

**Proposed Dates of Work:** July 2002 (well abandonment activities to be conducted in January of 2004.

### **Project Team:**

#### **Tetra Tech NUS Personnel:**

Chuck Bryan  
Emily McRee  
Matthew M. Soltis, CIH, CSP  
Lawson Bailey/Don Westerhoff, CSP  
Emily McRee, Gary Braganza, Skip Vaillancourt  
Emily McRee  
Gary Braganza

#### **Subcontractor Personnel:**

TBD  
TBD  
CH2M Hill Constructors, Inc.  
Katahdin Analytical  
TBD  
TBD

#### **Discipline/Tasks Assigned:**

Task Order Manager (TOM)  
Field Operations Leader (FOL)  
Health and Safety Manager (HSM)  
Project Health and Safety Officer (PHSO)  
Samplers  
Site Safety Officer (SSO)  
Geologist

#### **Discipline/Tasks Assigned:**

Drilling Subcontractor  
Direct Push Technology Subcontractor  
Remedial Action Contractor (RAC)  
Analytical Laboratory  
Mobile Laboratory  
Surveyor

Hazard Assessment (for purposes of 29 CFR 1910.132) for HASP preparation has been conducted by:

**Prepared by:** Lawson Bailey / Don Westerhoff, CSP (Revision 1)

## **2.0 EMERGENCY ACTION PLAN**

### **2.1 INTRODUCTION**

This section has been developed as part of a preplanning effort to direct and guide field personnel in the event of an emergency. However, given the nature of the work planned, significant emergencies are not anticipated. Also, because a majority of potential emergency situations will require assistance from outside emergency responders, TtNUS personnel will not provide emergency response support for emergency events beyond the capabilities of onsite personnel. In the event of emergencies that cannot be handled by personnel, an evacuation will be initiated. In an evacuation, site personnel will move to a safe place of refuge and the appropriate emergency response agencies will be notified. 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 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).

TtNUS personnel will, through the necessary actions, provide incidental response measures for incidents such as:

- Initial stage fire and spill prevention and response
- Removal of personnel from emergency situations
- Provision of initial medical support for injuries/illnesses requiring only first-aid level support
- Provision of site control and security measures, as necessary.

### **2.2 PRE-EMERGENCY PLANNING**

Through the initial hazard/risk assessment effort, there is very minor potential for injuries or illnesses resulting from exposure to chemical, physical, or other hazards and, subsequently, little likelihood of emergency situations. To further minimize or eliminate potential emergency situations, pre-emergency planning activities associated with this project shall be implemented. The FOL is responsible for:

- Coordinating response actions with NAS Key West Emergency Services personnel to ensure that TtNUS emergency action activities are compatible with existing facility emergency response procedures.

- Establishing and maintaining information at the project staging area (support zone) for easy access in the event of an emergency. This information will include the following:
  - Chemical Inventory (of chemicals used onsite), with Material Safety Data Sheets.
  - Onsite personnel medical records (Medical Data Sheets).
  - A log book identifying personnel onsite each day.
  - Hospital route maps with directions (these should also be placed in each site vehicle).
  - Emergency Notification - phone numbers.

The TtNUS FOL will be responsible for the following tasks:

- Educating site workers to the hazards and control measures associated with planned activities at the site, and providing early recognition and prevention, where possible.
- Periodically review of Emergency Action procedures during daily safety meetings to ensure site workers are familiar with incidental response measures.
- Providing the necessary equipment to safely accomplish identified tasks.
- The FOL and/or SSO will comprise the chain of command in the event of a potential emergency situation. This position will be maintained until relieved by arriving Emergency Response Support.

## **2.3 EMERGENCY RECOGNITION AND PREVENTION**

### **2.3.1 Recognition**

Emergency situations that may be encountered during site activities will generally be recognized by visual observation. Visual observation is primarily relevant for physical hazards that may be associated with the proposed scope of work. Visual observation will also play a role in detecting some chemical hazards. To adequately recognize chemical exposures, site personnel must have a clear knowledge of signs and symptoms of exposure associated with site contaminants. This information is provided in Table 6-1. Additionally, recognition and prevention may be supported through the review of tasks to be performed at the site, identification of potential hazards associated with those tasks and the recommended control methods as discussed in detail in Sections 5.0 and 6.0. Additionally, early recognition of hazards will be supported by daily site surveys to eliminate any situation predisposed to an emergency. The FOL and/or the SSO will be responsible for performing surveys of work areas prior to initiating site operations and periodically while operations are being conducted. Survey findings will be documented by the FOL and/or

the SSO in the Site Health and Safety and/or field operations logbook, however, all site personnel will be responsible for reporting hazardous situations. Where potential hazards exist, TtNUS will initiate control measures to prevent adverse effects to human health and the environment.

The above actions will provide early recognition for potential emergency situations, and allow TtNUS to instigate necessary control measures. However, if the FOL and the SSO determine that control measures are not sufficient to eliminate the hazard, TtNUS will withdraw from the site and notify the TOM, PHSO, and HSM for further instruction.

### **2.3.2     Prevention**

TtNUS and subcontractor personnel will minimize the potential for emergencies by ensuring compliance with the HASP, the Health and Safety Guidance Manual, applicable OSHA regulations. Daily site surveys of work areas, prior to the commencement of that day's activities, by the FOL and/or the SSO will also assist in prevention of illness/injuries when hazards are recognized early and control measures initiated.

## **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 a pre-determined safe place of refuge. The safe place of refuge may also serve as the telephone communication point, as communication with emergency response agencies may be necessary. Telephone communication points and safe places of refuge will be determined prior to the commencement of site activities for each site and will be conveyed to personnel as part of pre-site training and/or indicated on the Safe Work Permit (SWP). Upon reporting to the refuge location, personnel will remain there until directed otherwise by the TtNUS FOL or the On-Scene Incident Commander. The FOL will take a head count at this location to confirm the presence of all site personnel. Emergency response agencies will be notified of any unaccounted-for personnel.

## **2.5           EVACUATION ROUTES AND PROCEDURES**

Once an evacuation is initiated, personnel will terminate site activities and proceed immediately to the designated place of refuge, unless doing so would further jeopardize the welfare of workers. In such an event, personnel will proceed to a designated alternate location and remain there until further notification from the FOL. The use of these locations as assembly points provides communication and a direction point for emergency services, should they be needed.

### **2.5.1 Decontamination Procedures/Emergency Medical Treatment**

During any site evacuation, decontamination procedures will be performed only if doing so does not further jeopardize the welfare of site workers. Decontamination will be postponed, if the incident warrants immediate evacuation. However, the likelihood that an evacuation would occur which would require workers to evacuate the site without first performing the necessary decontamination procedures is limited. Decontamination procedures to be employed are specified in Table 5-1.

TtNUS personnel will perform rescue operations from emergency situations and may provide initial medical support for injury/illnesses requiring only "Basic First-Aid" level support, and only within the limits of training obtained by site personnel. Basic First Aid is considered treatment that can be rendered by a trained first aid provider at the injury location and not requiring follow-up treatment or examination by a physician (for example; minor cuts, bruises, stings, scrapes, and burns). Medical attention above First-Aid level support will require assistance from the designated emergency response agencies. Attachment I provide the procedure to follow when reporting an injury/illness, and the form to be used for this purpose. **If the emergency involves personnel exposures to chemicals, follow the steps provided in Figure 2-1.**

### **2.6 EMERGENCY CONTACTS**

Prior to initiating field activities, all personnel will be thoroughly briefed on the emergency procedures to be followed in the event of an accident. If emergency response personnel are required, the Base Officer of the Day should be notified to request support. Table 2-1 provides a list of emergency contacts and their telephone numbers. This table must be posted where it is readily available to all site personnel. Facility maps should also be posted showing potential evacuation routes and designated meeting areas. Hospital maps will be provided to the Lower Florida Keys Health System Hospital.

As soon as possible, Site Point of Contact Robert Courtright must be informed of any incident or accident. Notification steps are as follows:

1. Incident occurs
2. Notify FOL/SSO
3. Evaluate situation
4. Notify appropriate agency, if necessary
5. Notify TOM/HSM
6. Notify Site POC

## 2.7 EMERGENCY ALERTING AND ACTION/RESPONSE PROCEDURES

Because TtNUS personnel will be working in close proximity to each other, verbal notification will comprise the mechanisms to alert site personnel of an emergency. If an incident occurs, site personnel will initiate the following procedures:

- Initiate initial emergency response measures (i.e., fire extinguisher, spill response, etc.)
- Initiate incident alerting procedures (if needed) verbally.
- Describe to the FOL (who will serve as the Incident Coordinator) what has occurred and provide as many details as possible.
- If the FOL determines that the situation is beyond the capabilities of site personnel, emergency services will be contacted using the emergency reference information listed in Table 2-1. When the situation has been explained, the appropriate emergency services will be dispatched. The person making the call will stay on the phone and follow the instructions of the emergency contact. 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 filed onsite. If an exposure to hazardous materials has occurred, provide hazard information from Table 6-1 to medical service personnel.

**TABLE 2-1**  
**EMERGENCY REFERENCE**  
**NAVAL AIR STATION**  
**KEY WEST, FLORIDA**

AGENCY	TELEPHONE
Key West Police/Rescue Services	911 or (305) 294-2511 (emergency) or (305) 294-2514 (non-emergency).
NAS Key West Point of Contact Robert Courtright	(305) 293-2881
Base Police	(305) 293-2114
Base Fire Department Boca Chica	(305) 293-3333
Hospital: Lower Florida Keys Health System	(305) 294-5531
Base Officer of the Day (OOD)	(305) 293-2971
Sunshine State One-Call (utility clearance)	<b>1-800-432-4770</b>
Chemtrec National Response Center	(800) 424-9300 (800) 424-8802
TtNUS, Aiken Office	(803) 649-7963
Task Order Manager Chuck Bryan	(803) 649-7963 x345
Field Operations Leader Emily McRee	(305) 293-2043 x344
TtNUS, Pittsburgh Office	(800) 245-2730
Health and Safety Manager Matthew M. Soltis, CIH, CSP	(412) 921-8912
Project Health and Safety Officer Lawson Bailey / Don Westerhoff, CSP	(803) 649-7963 x308 (412) 921-7281

## FIGURE 2-1 Emergency Response Protocol

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

In the event of a personnel exposure to a hazardous substance or agent:

- Rescue, when necessary, employing proper equipment and methods.
- Give attention to emergency health problems -- breathing, cardiac function, bleeding, and shock.
- Transfer the victim to the medical facility designated in this HASP by suitable and appropriate conveyance (i.e., ambulance for serious events)
- Obtain as much exposure history as possible (a Potential Exposure report is attached).
- If the exposed person is a TtNUS employee, call the medical facility and advise 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 that may be appropriate. The care of the victim will be monitored by WorkCare physicians. 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 (enter Ext. 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 exposure.
  - 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 exposed TtNUS employee(s).
  - Name and phone number of an informed site officer who will be responsible for further investigations.
  - Fax appropriate information [e.g., Material Safety and Data Sheet (MSDS)] to WorkCare at (714) 456-2154.
- Contact Corporate Health and Safety Department (Matt Soltis) and the Human Resources Manager (Marilyn Duffy) at 1-800-245-2730. (M-F 0800 – 1700)

As environmental data is gathered and the exposure 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. This generalized summary will be accompanied by a personal letter describing the individual's findings/results. A copy of the personal letter will be filed in the continuing medical file maintained by WorkCare.

**FIGURE 2-1 (continued)  
POTENTIAL EXPOSURE REPORT**

Name: \_\_\_\_\_ Date of Exposure: \_\_\_\_\_

Social Security No.: \_\_\_\_\_ Age: \_\_\_\_\_ Sex: \_\_\_\_\_

Client Contact: \_\_\_\_\_ Phone No.: \_\_\_\_\_

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

**I. Exposing Agent**

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

Characteristics (if the name is not known)

Solid          Liquid          Gas          Fume          Mist          Vapor

**II. Dose Determinants**

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

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

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

Was there 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

The Harry S. Truman Animal Import Center (HSTAIC) is located at NAS Key West on Fleming Key, north of the island of Key West. The total area of the HSTAIC site is approximately 18.4 acres, and is located on Fleming Key North Landfill, Installation Restoration (IR) Site 7. The landfill covers approximately 30 acres and was used from 1952 to 1962 as a landfill for NAS Key West and the City of Key West. Approximately 4,000 to 5,000 tons of unknown wastes were disposed annually. In September 1995, an interim remedial action (IRA) was performed to minimize infiltration of rainwater through the former landfill waste. Clean topsoil was imported to fill low areas and promote runoff as part of the IRA based on the earlier remedial investigations (TtNUS, 2002).

The HSTAIC site consists of a concrete barn, an equipment storage building, a wastewater treatment plant, a steel water tank, a concrete truck/equipment washdown area, a gravel/grass parking area, asphalt drives, and an open grass area. The ground surface at the site consists of gravel fill material, grass, and weeds. The southwest, west, and northwest sides of the site are wooded with trees and brush (Hanson Engineers, 1999).

In May 1998, Hanson Engineers collected soil samples around three underground storage tank (USTs) located on the HSTAIC site. One 8,000-gallon UST was located west of the barn and south of the steel water tank and stored diesel fuel for the emergency electric generator. Two 4,000-gallon USTs were located between the wastewater treatment plant and the barn and stored diesel fuel for the boilers and incinerators. It was determined that one or both of the 4,000 gallon-tanks had impacted the site (Hanson Engineers, 1999).

In December 1998, the U.S. Navy removed the three USTs from the site. Impacted soil was removed from the excavations and stockpile on the east side of the concrete spill containment area and south of the steel water tank and transformer. The impacted soil was covered with plastic, and the plastic was held down with concrete blocks. Impacted groundwater was removed from the excavations and placed in a 55-gallon drum. Soil and groundwater samples collected indicated the presence of petroleum contamination under the asphalt drive north of the 4,000-gallon USTs (Hanson Engineers, 1999).

Sampling of the landfill area surrounding the site (IR 7) was performed in 1986, 1990, 1993, and 1996 during a series of remedial investigations at the site. Metals and pesticides were most consistently detected above action levels in surface soil at the north end of the site near building 1419. No PCBs were detected (BRE, 1998).

Sediment samples from the Gulf of Mexico to the north, east, and west of the site were sampled. VOCs were detected at concentrations that exceeded ARAR/SAL levels. SVOC exceedances were only detected during the 1990 sampling event. The pesticides 4,4'-DDT and its degradation products were detected in excess of ARAR/SAL levels as were several metals (BRE, 1998)

Limited contamination was found in surface water and groundwater samples. As in soil and sediment, inorganics were the most common class of contaminants detected in surface water. However, antimony was the only metal that consistently exceeded the screening level criteria. Groundwater sample results indicated metals in all investigations; however, in 1996 the frequency and magnitude of the detections were less than in previous investigations. A few VOCs and SVOCs were detected above ARAR/SAL levels during each investigation; however, the compounds detected differed from year to year. Pesticides were consistently found in 1996, but were detected infrequently in previous years (BRE, 1998).

Quarterly monitoring of groundwater at IR 7 was performed from April 2000 through January 2001. Additionally, groundwater sampling for metals was conducted annually. Concentrations of soil samples collected during a DPT investigation were below Soil Cleanup Target Levels (SCTLs) for residential direct exposure. No free product was observed during the investigation, and concentrations of petroleum contaminants of concern (COCs) in site groundwater were below Groundwater Cleanup Target Levels (GCTLs) for two consecutive sampling events. Based on the hydrological and chemical data presented in the Site Assessment Report (SAR), a No Further Action (NFA) status was requested from FDEP. FDEP issued a Site Rehabilitation Completion Order on September 19, 2003. As a result, applicable groundwater monitoring wells will be abandoned.

## 4.0 SCOPE OF WORK

This section of the HASP addresses all proposed site activities to be conducted while performing Contamination Assessment activities at NAS Key West. If tasks other than those identified are to be performed at this site, the HASP will be modified accordingly.

- Soil sampling (subsurface) using DPT rig
- Monitoring Well Installation by Hollow Stem Auger (HSA)
- Groundwater sampling, including well development
- Well abandonment activities
- Decontamination of sampling and heavy equipment
- Surveying
- Investigation-derived Waste (IDW) management

These activities will be performed to identify the nature and extent of actual or potential site contamination. Any tasks to be conducted outside of the elements listed here will be considered a change in scope, requiring modification of this document. All requested modifications to this document will be submitted to the HSM by the TOM or a designated representative.

## 5.0 TASKS/HAZARDS/ASSOCIATED CONTROL MEASURES SUMMARIZATION

Table 5-1 of this section serves as the primary portion of the site-specific HASP that identifies tasks that are to be performed as part of the scope of work. This table will be modified and incorporated into this document as new or additional tasks are performed at the site, if contaminants of concern change, or if new information becomes available. 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 changed if the scope of work, contaminants of concern, or other conditions change.

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

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

Safe Work Permits issued for all activities (See Attachment III) will use elements defined in Table 5-1 as their primary reference. The FOL and/or the SSO completing the Safe Work Permit will add additional site-specific information. In situations where the Safe Work Permit 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.

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TABLE 5-1

TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM FOR  
NAVAL AIR STATION KEY WEST, KEY WEST, FLORIDA  
PAGE 1 OF 7

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment <i>Italicize text represents optional equipment to be worn when conditions require.</i>	Decontamination Procedures
<p>Soil borings and installation of monitoring wells.</p> <p>Soil borings and monitoring installations will be performed using both Direct Push Technology (DPT) and Hollow Stem Augers (HSA).</p>	<p><b>Chemical Hazards:</b></p> <p>1) Air/particulate/water borne contaminants including the following:</p> <p>Various VOCs (primarily methylene chloride which is possibly a laboratory contaminant) and SVOCs which were previously detected in soils. Additionally a few pesticides (4,4 – DDD and 4,4 – DDT) and Total Petroleum Hydrocarbons (TPH in the form of diesel fuel) were previously detected but all were at concentrations that are not sufficient to present an inhalation exposure hazard to site personnel.</p> <p>Various metals (lead, chromium, cadmium, arsenic, beryllium, etc.) were previously detected in surface soil samples. However, given the previously detected concentrations of metals in soils, it is unlikely that any of these will present a significant exposure hazard to site personnel. Additionally, site activities are not likely to produce significant dusts which would be the most efficient method of exposure. Adequate decontamination and personal hygiene methods will be used to prevent potential exposure via other routes (i.e., ingestion).</p> <p>Further information on these 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) Pinch/compression points</p> <p>4) Noise</p> <p>5) Energized systems</p> <p>6) Lifting</p> <p>7) Natural Hazards (Insect/animal bites and stings)</p> <p>8) Inclement weather</p> <p>9) Heat Stress</p>	<p>1) For VOCs, 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 to the greatest extent possible to avoid exposure to non-VOCs present as particulates or bound to particulates. If airborne dusts are observed, area wetting methods will be used to reduce the generation of dusts created during DPT and HAS activities. If area wetting methods are not feasible termination of activities will be used to minimize exposure to observed airborne dusts.</p> <p>2) Decontaminate all equipment and supplies between boreholes and prior to leaving the site.</p> <p>3) 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 and documented as such using the Equipment Inspection Checklist (See Attachment II of this HASP or Section 10.0 of the TINUS Health and Safety Guidance Manual).</li> <li>- Operated by qualified operators, and knowledgeable ground crew.</li> <li>- Used within establish safe zones and routes of approach</li> <li>- Only manufacturer approved equipment may be used in conjunction with equipment repair procedures (i.e. pins, etc.).</li> </ul> <p>In addition, to equipment considerations the following safe operating procedures will be incorporated:</p> <ul style="list-style-type: none"> <li>- All personnel not directly supporting this operation will remain at least 40 feet from the point of operation.</li> <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 unless the exact location of the underground utility is known.</li> <li>- Hand signals will be established prior to the commencement of the operation.</li> <li>- Work areas will be kept clear of clutter.</li> <li>- Secure all loose articles to avoid possible entanglement.</li> <li>- All equipment shall be equipped with movement warning systems.</li> <li>- All personnel working in high equipment traffic areas are required to wear reflective vests for high visibility, and to establish unimpeded work areas around the operation. This activity may require areas of the building to be coordinated off during this operation.</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> <li>- Areas will be inspected prior to the movement of 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 floor openings, sidewalls, and excavations.</li> </ul> <p>4) Hearing protection will be used during all subsurface activities. (Rule of thumb – If you must raise your voice to someone an arm's length away from you hearing protection is necessary)</p> <p>5) All utility clearances shall be obtained prior to subsurface activities. Prior to any subsurface investigations, the locations of all underground utilities will be identified and marked. Obtain written permit clearance prior to all subsurface investigations. See Attachment IV Utility Locating And Excavation Clearance of this HASP.</p> <p>6) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques.</p> <p>7) Avoid nesting areas, use commercially available repellents, if deemed nonimpacting to the sample analysis profile. Report potential hazards to the SSO.</p> <p>8) Suspend or terminate operations until directed otherwise by SSO</p> <p>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.</p>	<p><b>It is anticipated that potential contaminant concentrations at outdoor locations will be dispersed via natural wind currents and dilution prior to reaching worker breathing zones.</b></p> <p>Photoionization Detector w/ 11.7 eV UV lamp source, or a Flame Ionization Detector, will be used to detect VOCs as follows:</p> <ul style="list-style-type: none"> <li>- Source (borehole and DPT Rig sampler) monitoring will be conducted at regular intervals determined by the SSO. The SSO will also monitor the breathing zone of all potentially affected employees, with the following guidance:</li> <li>- Any sustained reading above background in the BZ requires evacuation to a safe area until BZ reading return to background levels.</li> </ul> <p>Many of the contaminants of concern are solids, and are non-detectable using PID/FID direct reading instruments. Also, other site contaminants may adhere to or be part of airborne dusts or particulates generated during site activities. Generation of dusts should be minimized to the greatest extent possible to avoid inhalation of contaminated dusts or particulates. Evaluation of dust concentrations will be qualitative by observing work conditions for visible dust clouds or accumulations. 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.</p> <p>Where the utility clearance cannot be obtained in a reasonable period, or not located, intrusive activities shall proceed with extreme caution using a magnetometer for periodic downhole surveys every 2 feet to a depth of at least 6 feet. See Attachment IV Utility Locating And Excavation Clearance of this HASP.</p>	<p>All subsurface operations are to be initiated in Level D protection. Level D protection constitutes the following minimum protection</p> <ul style="list-style-type: none"> <li>- Standard field attire (Sleeved shirt; long pants)</li> <li>- Tyvek coveralls and disposable boot covers <i>if surface contamination is present or if the potential exists for soiling work attire.</i></li> <li>- Nitrile gloves or leather gloves with surgical style inner gloves</li> <li>- Steel toe safety shoes</li> <li>- Safety glasses</li> <li>- Hardhat</li> <li>- Hearing protection required under control measures.</li> <li>- Reflective vest for high traffic areas</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 (boots, gloves, PVC splash suits, etc.). This 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</li> <li>- Soap/water wash and rinse of the outer splash suit, as applicable</li> <li>- Outer suit, boot covers, outer glove removal</li> <li>- Wash hands and face, leave contamination reduction zone</li> </ul> <p><b>Equipment Decontamination</b> - All heavy equipment decontamination will take place at a centralized decontamination pad utilizing steam or pressure washers. Heavy equipment such as DPT Rig, 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 be restricted access to exclusion zones, or also have their wheels/tires sprayed off as not to track mud onto the roadways servicing this installation. Roadways shall be cleared of any debris resulting from the onsite activity.</p> <p>All equipment used in the exclusion zone will require a complete decontamination between locations and prior to removal from the site. The FOL or the SSO will be responsible for evaluating equipment arriving onsite and that which is to leave the site. 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>

**TABLE 5-1  
TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM FOR  
NAVAL AIR STATION KEY WEST, KEY WEST, FLORIDA  
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Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment <i>Italicize text represents optional equipment to be worn when conditions require.</i>	Decontamination Procedures
<p>Monitoring well abandonment activities (filling casings with grout using a tremie pipe and breaking up concrete pads)</p>	<p><b>Chemical Hazards:</b></p> <p>1) Contact and potential exposure to site contaminants is unlikely to occur during this activity. Additionally, data from previous sampling activities indicated concentrations of site contaminants below levels that present a health concern. Wells to be abandoned have been selected based on information that shows contaminant concentrations are below groundwater cleanup target levels.</p> <p>Abandoned wells will be filled with grout. Grout mixtures consist of a cement mixture that may be caustic or contain caustic materials that are capable of causing injury to the skin (drying, caustic burns, irritation). Avoid contact with the skin.</p> <p><b>Physical hazards:</b></p> <p>2) Pinch/compression points associated with the use of heavy equipment or power tools</p> <p>3) Noise</p> <p>4) Flying projectiles</p> <p>5) Lifting</p> <p>6) Natural Hazards (Insect/animal bites and stings)</p> <p>7) Inclement weather</p> <p>8) Heat Stress</p>	<p>1) As precautionary measure avoid contact with groundwater. When handling grout use protective clothing (gloves, coveralls, etc.) to prevent direct contact with the skin. If contact with the skin occurs, wash the area with copious amounts of water and rinse until all visible grout is removed. Avoid inhalation of dusts that may be present if grout is not premixed. .</p> <p>2) 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 and documented as such using the Equipment Inspection Checklist (See Attachment II of this HASP or Section 10.0 of the TINUS Health and Safety Guidance Manual).</li> <li>- Operated by qualified operators, and knowledgeable ground crew.</li> <li>- Used within establish safe zones and routes of approach</li> <li>- Only manufacturer approved equipment may be used in conjunction with equipment repair procedures (i.e. pins, etc.).</li> </ul> <p>In addition, to equipment considerations the following safe operating procedures will be incorporated:</p> <ul style="list-style-type: none"> <li>- All personnel not directly supporting this operation will remain at least 20 feet from the point of operation.</li> <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 unless the exact location of the underground utility is known.</li> <li>- Hand signals will be established prior to the commencement of the operation.</li> <li>- Work areas will be kept clear of clutter.</li> <li>- Secure all loose articles to avoid possible entanglement.</li> <li>- All equipment shall be equipped with movement warning systems.</li> <li>- All personnel working in high equipment traffic areas are required to wear reflective vests for high visibility, and to establish unimpeded work areas around the operation. This activity may require areas of the building to be coordinated off during this operation.</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> <li>- Areas will be inspected prior to the movement of equipment and support vehicles to eliminate any physical hazards. This will be the responsibility of the FOL and/or SSO.</li> </ul> <p>3) Hearing protection will be used when elevated noise levels are experienced. Use the rule of thumb – If you must raise your voice to someone an arm's length away from you, hearing protection is necessary)</p> <p>4) When breaking up concrete pads using heavy equipment, jack/sledge hammers, use safety glasses with side shields.</p> <p>5) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques.</p> <p>6) Avoid nesting areas, use commercially available repellents. Report potential hazards to the SSO. Suspend or terminate operations until directed otherwise by SSO</p> <p>7&amp;8) 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.</p>	<p>Air monitoring is not necessary for this activity since previous site contaminant concentrations were below groundwater cleanup target levels.</p>	<p>All well abandonment activities will be initiated in Level D protection. Level D protection constitutes the following minimum protection</p> <ul style="list-style-type: none"> <li>- Standard field attire (Sleeved shirt, long pants)</li> <li>- Steel toe safety shoes</li> <li>- Safety glasses</li> <li>- Hardhat when working around heavy equipment</li> <li>- Hearing protection</li> <li>- Reflective vest for high traffic areas</li> <li>- Nitrile gloves or leather gloves to prevent contact with grout mixtures.</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>Not required however if site contaminants are suspected to be encountered, follow decontamination measures discussed in the soil boring and installation of monitoring wells task.</p>

TABLE 5-1

TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM FOR  
NAVAL AIR STATION KEY WEST, KEY WEST, FLORIDA  
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Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment <i>Italicize text represents optional equipment to be worn when conditions require.</i>	Decontamination Procedures
<p>Multi Media Sampling including groundwater, subsurface soils, and IDW.</p>	<p><b>Chemical Hazards:</b></p> <p>1) Air/particulate/water borne contaminants including the following:</p> <p>Various VOCs (primarily methylene chloride which is possibly a laboratory contaminant) and SVOCs which were previously detected in soils. Additionally a few pesticides (4,4 – DDD and 4,4 – DDT) and Total Petroleum Hydrocarbons (TPH in the form of diesel fuel) were previously detected but all were at concentrations that are not sufficient to present an inhalation exposure hazard to site personnel.</p> <p>Various metals (lead, chromium, cadmium, arsenic, beryllium, etc.) were previously detected in surface soil samples. However, given the previously detected concentrations of metals in soils, it is unlikely that any of these will present a significant exposure hazard to site personnel. Additionally, site activities are not likely to produce significant dusts which would be the most efficient method of exposure. Adequate decontamination and personal hygiene methods will be used to prevent potential exposure via other routes (i.e., ingestion).</p> <p>Further information on these 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</p> <p>4) Lifting (muscle strains and pulls)</p> <p>5) Pinches and compressions</p> <p>6) Slip, trips, and falls</p> <p>7) Natural hazards (Insect/animal bites and stings)</p> <p>8) Inclement weather</p> <p>9) Heat Stress</p>	<p>1) For VOCs, 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 to the greatest extent possible. If airborne dusts are observed, area wetting methods will be used to reduce the generation of dusts created during DPT and HSA activities. If area wetting methods are not feasible, upgraded levels of protection or termination of activities will be used to minimize exposure to observed airborne dusts.</p> <p>2) Decontaminate all equipment and supplies between sampling locations and prior to leaving the site.</p> <p>3) When performing DPT activities use hearing protection. The use of hearing protection to protect against excessive noise outside of 25 feet from the point of operations should be incorporated under the following condition:</p> <p>Hearing protection during sample acquisition outside of the boring sample will be determine on a case by case scenario. 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 becoming excessive.</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 remove hands from the point of operation.</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.</p> <p>7) Avoid nesting areas, use commercially available repellents, if deemed nonimpacting to the sample analysis profile. Report potential hazards to the SSO.</p> <p>8) Suspend or terminate operations until directed otherwise by SSO</p> <p>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.</p>	<p><b>It is anticipated that potential contaminant concentrations at outdoor locations will be dispersed via natural wind currents and dilution prior to reaching worker breathing zones.</b></p> <p>Photoionization Detector w/ 11.7 eV UV lamp source, or a Flame Ionization Detector, will be used to detect VOCs as follows:</p> <p>Source (borehole and DPT Rig sampler) monitoring will be conducted at regular intervals determined by the SSO. The SSO will also monitor the breathing zone of all potentially affected employees, with the following guidance:</p> <p>- Any sustained reading above background in the BZ requires evacuation to a safe area.</p> <p>Many of the contaminants of concern are solids, and are non-detectable using PID/FID direct reading instruments. Also, other site contaminants may adhere to or be part of airborne dusts or particulates generated during site activities. Generation of dusts should be minimized to the greatest extent possible to avoid inhalation of contaminated dusts or particulates. Evaluation of dust concentrations will be qualitative by observing work conditions for visible dust clouds or accumulations. 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.</p> <p>Where the utility clearance cannot be obtained in a reasonable period, or not located, intrusive activities shall proceed with extreme caution using a magnetometer for periodic downhole surveys every 2 feet to a depth of at least 6 feet. See Attachment IV Utility Locating And Excavation Clearance of this HASP.</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>- Tyvek coveralls and disposable boot covers if surface contamination is present or if the potential for soiling work attire exists.</li> <li>- Nitrile gloves with surgical style inner gloves for soil and groundwater sampling</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>- Hearing protection required under control measures.</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, PVC splash suits, etc.).</p> <p>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>

TABLE 5-1

TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM FOR  
NAVAL AIR STATION KEY WEST, KEY WEST, FLORIDA  
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Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment <i>Italicize text represents optional equipment to be worn when conditions require.</i>	Decontamination Procedures
Mobilization/ Demobilization	<p><b>Physical Hazards:</b></p> <ol style="list-style-type: none"> <li>1) Lifting (muscle strains and pulls)</li> <li>2) Pinches and compressions</li> <li>3) Slip, trips, and falls</li> <li>4) Moving machinery</li> <li>5) Natural hazards (insect/animal bites and stings)</li> <li>6) 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 avoid being caught in the machine point of operation.</li> <li>3) Preview work locations for unstable/uneven terrain. Barricade all excavations 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. (See Attachment II of this HASP or Section 10.0 of the TINUS Health and Safety Guidance Manual).</li> <li>- Operated by qualified operators, and knowledgeable ground crew.</li> </ul> </li> <li>5) Avoid nesting areas, use comerically available repellents. Report potential hazards to the SSO.</li> <li>6) Traffic and equipment considerations are to include the following:             <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 self-propelled equipment shall be equipped with movement warning systems.</li> <li>- Employ safety belts and follow the site traffic rules.</li> </ul> </li> </ol> <p>Traffic patterns will be required supporting onsite activities. However, regulated patterns in and about the work zones and support thereof will be established to safely control moving equipment, vehicles, and pedestrians around the area of operation.</p>	Not required	<p>Level D - (Minimum Requirements)</p> <ul style="list-style-type: none"> <li>- Standard field attire (Sleeved shirt; long pants)</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>- Hearing protection for high noise areas, or as required based on the noise level at each operation.</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>	Not required

TABLE 5-1

TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM FOR  
NAVAL AIR STATION KEY WEST, KEY WEST, FLORIDA  
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Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment <i>Italicize text represents optional equipment to be worn when conditions require.</i>	Decontamination Procedures
Decontamination of Sampling and Heavy Equipment	<p><b>Chemical Hazards:</b></p> <p>1) Air/particulate/water borne contaminants including the following:</p> <p>Various VOCs (primarily methylene chloride which is possibly a laboratory contaminant) and SVOCs which were previously detected in soils. Additionally a few pesticides (4,4 – DDD and 4,4 – DDT) and Total Petroleum Hydrocarbons (TPH in the form of diesel fuel) were previously detected but all were at concentrations that are not sufficient to present an inhalation exposure hazard to site personnel.</p> <p>Various metals (lead, chromium, cadmium, arsenic, beryllium, etc.) were previously detected in surface soil samples. However, given the previously detected concentrations of metals in soils, it is unlikely that any of these will present a significant exposure hazard to site personnel. Additionally, site activities are not likely to produce significant dusts which would be the most efficient method of exposure. Adequate decontamination and personal hygiene methods will be used to prevent potential exposure via other routes (i.e., ingestion).</p> <p>Further information on these contaminants is presented in Table 6-1.</p> <p>2) Decontamination fluids - Liquinox (detergent) and isopropanol</p> <p><b>Physical Hazards:</b></p> <p>3) Lifting (muscle strains and pulls)</p> <p>4) Pinches and compressions</p> <p>5) Inclement weather</p> <p>6) Heat Stress</p>	<p>1) and 2) Use protective equipment to minimize contact with site contaminants and hazardous decontamination fluids. Obtain manufacturer's MSDS for any decontamination solvents used onsite. Use appropriate PPE as identified on MSDS.</p> <p>3) Use multiple persons where necessary for lifting and handling sampling equipment for decontamination purposes.</p> <p>4) Provide stacking racks for air drying of decontaminated equipment to prevent unstable drying stacks of equipment from collapsing.</p> <p>5) Suspend or terminate operations until directed otherwise by SSO</p> <p>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.</p>	<p>Use visual observation, and real-time monitoring instrumentation to ensure all equipment has been properly cleaned of contamination and dried.</p>	<p><i>For Heavy Equipment</i></p> <p>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 (Steel toe/shank)</li> <li>- Chemical resistant boot covers</li> <li>- Nitrile outer gloves, cotton liners</li> <li>- PVC Rainsuits or PE or PVC coated Tyvek</li> <li>- Safety glasses underneath a splash shield</li> </ul> <p>Respiratory protection is not anticipated for this activity.</p> <p>For sampling equipment, the following PPE is required</p> <p>Level D Minimum requirements -</p> <ul style="list-style-type: none"> <li>- Standard field attire (Sleeved shirt; long pants)</li> <li>- Steel toe safety shoes</li> <li>- Nitrile outer gloves, cotton liners</li> <li>- Safety glasses underneath a splash shield</li> </ul> <p>In the event of overspray of chemical decontamination fluids use PVC Rainsuits or PE or PVC coated Tyvek as necessary.</p> <p><b>Note:</b> The Safe Work Permit(s) for this task (see Attachment IV) 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> This decontamination procedure for Level D protection will consist of:</p> <ul style="list-style-type: none"> <li>- Soap/water wash and rinse of outer gloves</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><b>Equipment Decontamination</b> - All heavy equipment decontamination will take place at a centralized decontamination pad utilizing steam or pressure washers. Heavy equipment will have the wheels and tires cleaned along with any loose debris removed, prior to transporting to the central decontamination area. All site vehicles will be restricted access to exclusion zones, or also have their wheels/tires sprayed off as not to track mud onto the roadways servicing this installation. Roadways shall be cleared of any debris resulting from the onsite activity.</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>Evaluation will consist of</p> <ul style="list-style-type: none"> <li>- Visual inspection</li> <li>- Scanning equipment with monitoring instruments</li> </ul> <p>Sampling equipment will be decontaminated as per the requirements in the Sampling and Analysis Plan and/or Work Plan.</p> <p>MSDS for any decon solutions (Alconox, methanol, isopropanol, hexane, etc.) will be obtained and used to determine proper handling / disposal methods and protective measures (PPE, first-aid, etc.).</p> <p>The FOL or the SSO will be responsible for evaluating equipment arriving onsite and that which is to leave the site. No equipment will be authorized access or exit without this evaluation</p>

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Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment <i>Italicize text represents optional equipment to be worn when conditions require.</i>	Decontamination Procedures
<p>Monitoring well development and purging and IDW handling activities.</p>	<p><b>Chemical Hazards:</b></p> <p>1) Air/particulate/water borne contaminants including the following:</p> <p>Various VOCs (primarily methylene chloride which is possibly a laboratory contaminant) and SVOCs which were previously detected in soils. Additionally a few pesticides (4,4 – DDD and 4,4 – DDT) and Total Petroleum Hydrocarbons (TPH in the form of diesel fuel) were previously detected but all were at concentrations that are not sufficient to present an inhalation exposure hazard to site personnel.</p> <p>Various metals (lead, chromium, cadmium, arsenic, beryllium, etc.) were previously detected in surface soil samples. However, given the previously detected concentrations of metals in soils, it is unlikely that any of these will present a significant exposure hazard to site personnel. Additionally, site activities are not likely to produce significant dusts which would be the most efficient method of exposure. Adequate decontamination and personal hygiene methods will be used to prevent potential exposure via other routes (i.e., ingestion).</p> <p>Further information on these 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) Pinch/compression points</p> <p>4) Noise</p> <p>5) Energized systems</p>	<p>1) For VOCs, 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 to the greatest extent possible. If airborne dusts are observed, area wetting methods will be used to reduce the generation of dusts created during DPT and HSA activities. If area wetting methods are not feasible, upgraded levels of protection or termination of activities will be used to minimize exposure to observed airborne dusts.</p> <p>2) Decontaminate all equipment and supplies between boreholes and prior to leaving the site.</p> <p>3) 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. (See Attachment II of this HASP or Section 10.0 of the TINUS Health and Safety Guidance Manual).</li> <li>- Operated by qualified operators, and knowledgeable ground crew.</li> <li>- Used within establish safe zones and routes of approach</li> <li>- Only manufacturer approved equipment may be used in conjunction with equipment repair procedures (i.e. pins, etc.).</li> </ul> <p>In addition, to equipment considerations the following safe operating procedures will be incorporated:</p> <ul style="list-style-type: none"> <li>- All personnel not directly supporting this operation will remain at least 40 feet from the point of operation.</li> <li>- Hand signals will be established prior to the commencement of the operation.</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>- All personnel working in high equipment traffic areas are required to wear reflective vests for high visibility, and to establish unimpeded work areas around the operation.</li> <li>- Hearing protection during well development and IDW handling activities will be determine on a case by case scenario. 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 becoming excessive.</li> </ul> <p>5) All utility clearances shall be obtained prior to subsurface activities. Prior to any subsurface investigations, the locations of all underground utilities will be identified and marked. Obtain written permit clearance prior to all subsurface investigations.</p>	<p><b>It is anticipated that potential contaminant concentrations at outdoor locations will be dispersed via natural wind currents and dilution prior to reaching worker breathing zones.</b></p> <p>Photoionization Detector w/ 11.7 eV UV lamp source, or a Flame Ionization Detector, will be used to detect VOCs as follows:</p> <p>Source (borehole and DPT Rig sampler) monitoring will be conducted at regular intervals determined by the SSO. The SSO will also monitor the breathing zones of all potentially affected employees, with the following guidance:</p> <ul style="list-style-type: none"> <li>- Any sustained reading above background in the BZ requires evacuation to a safe area.</li> </ul> <p>Many contaminants of concern are solids, and are non-detectable using PID/FID direct reading instruments. Also, other site contaminants may adhere to or be part of airborne dusts or particulates generated during site activities. Generation of dusts should be minimized to the greatest extent possible to avoid inhalation of contaminated dusts or particulates. Evaluation of dust concentrations will be qualitative by observing work conditions for visible dust clouds or accumulations. 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.</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>- Nitrile gloves with surgical style inner gloves for sampling</li> <li>- Steel-toe safety shoes</li> <li>- Safety glasses</li> <li>- Hardhat (when overhead hazards exists, or when identified as a operation requirement)</li> <li>- Reflective vest for high traffic areas</li> <li>- Hearing protection under control measures.</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 (boots, gloves, PVC splash suits, etc.). This 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 applicable</li> <li>- Soap/water wash and rinse of the outer splash suit, as applicable</li> <li>- Outer suit, boot covers, outer glove removal</li> <li>- Wash hands and face, leave contamination reduction zone</li> </ul>

TABLE 5-1

**TASKS/HAZARDS/CONTROL MEASURES  
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Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring/Type and Action Levels	Personal Protective Equipment <i>Italicize text represents optional equipment to be worn when conditions require.</i>	Decontamination Procedures
Geographical surveying activities	<p><b>Chemical hazards:</b></p> <p><b>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.</b></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>

## 6.0 HAZARD ASSESSMENT AND CONTROLS

This section provides reference information regarding the chemical and physical hazards that may associate with activities to be conducted as part of the scope of work. Table 6-1 provides specific information related to various chemical hazards that may be present at the planned project areas within NAS Key West. Specifically, toxicological information, exposure limits, warning property ratings, symptoms of exposure, physical properties, and air monitoring and sampling data are discussed in the table.

### 6.1 CHEMICAL HAZARDS

Information provided regarding previous site activities and potential sources of contamination indicates the following primary contaminants of concern:

- VOCs - primarily Methylene Chloride, which may be present as a laboratory contaminant, and carbon disulfide
- Semi-volatile organic compounds (SVOCs) – primarily benzo(a)pyrene, anthracene, and chrysene
- Total petroleum hydrocarbons (TPH) – primarily as diesel fuel
- Metals – primarily arsenic, cadmium and lead
- Pesticides – primarily DDT and the major metabolites; DDD and DDE
- Exposure to chemical hazards while performing the elements identified within the scope of work is considered to be minimal, even though the activity is intrusive. This assessment is based on contaminant concentrations identified during prior sampling programs.

### 6.2 PHYSICAL HAZARDS

In addition to the chemical hazards discussed above, the following physical hazards may be present during the performance of the site activities.

- Heavy equipment hazards
- Cuts and Lacerations
- Slips, trips, and falls
- Energized systems (contact with underground or overhead utilities)
- Lifting (strain/muscle pulls)
- Noise in excess of 85 decibels (dBA)

TABLE 6-1

**CHEMICAL, PHYSICAL AND TOXICOLOGICAL DATA  
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Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
<b>VOCs</b>							
Methylene Chloride  Max. site conc: 69 µg/Kg (surf) 6.8 µg/L (GW)	75-09-2	FID: 90% relative response ratio with FID.	Air sample using charcoal tube (2); carbon disulfide desorption; Sampling and analytical protocol in accordance with NIOSH Method #1005.	OSHA: 25 ppm PEL 125 ppm (Ceiling)  ACGIH: 50 ppm  NIOSH: Lowest Feasible Concentration  IDLH: 2300 ppm	This substance has poor warning properties. If respiratory protection is indicated, for concentrations up to to 625 ppm (25 X PEL) a continuous flow supplied-air respirator, hood or helmet is required.  <b>Recommended gloves:</b> Nitrile - >1.00 hr; Viton - >4.00 hrs	<b>Boiling Pt:</b> 104°F; 40°C <b>Melting Pt:</b> -14365 °F; -97°C <b>Solubility:</b> 2.0% <b>Flash Pt:</b> ? <b>LEL/LFL:</b> 13% <b>UEL/UFL:</b> 23% <b>Vapor Density:</b> 2.9 <b>Vapor Pressure:</b> 350 mmHg <b>Specific Gravity:</b> 1.33 <b>Incompatibilities:</b> Strong oxidizers, strong caustics, plastics, rubber, nitric acid, water + heat, and chemically active metals, such as aluminum and magnesium powder, sodium, potassium, and lithium. <b>Appearance and Odor:</b> Clear, colorless liquid with Chloroform-like odor	Causes irritation to respiratory tract. Has a strong narcotic effect with symptoms of mental confusion, light-headedness, fatigue, nausea, vomiting and headache. Causes formation of carbon monoxide in blood which affects cardiovascular system and central nervous system. Continued exposure may cause increased light-headedness, staggering, unconsciousness, and even death. Exposure may make the symptoms of angina (chest pains) worse. Regulated as a suspected OSHA carcinogen
Diesel Fuel No.2-D  Max. site conc: 4700 mg/Kg (sub)	Mixture	Components of this substance will be detected readily however no documentation exists as to the relative response ratio of either PID or FID.	Air sampling use charcoal tube as a collection media; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol in accordance with NIOSH Method #1550.	OSHA/NIOSH/ACGIH: 5 mg/m3 as mineral oil mist. In addition NIOSH and ACGIH establish 10 mg/m3 as a STEL.	Kerosene odor  Recommended Air Purifying cartridges: Organic vapor  Recommended gloves: Nitrile	<b>Boiling Pt:</b> <170-400°F; 77-204°C <b>Melting Pt:</b> Not available <b>Solubility:</b> Negligible <b>Flash Pt:</b> 125°F; 52°C <b>LEL/LFL:</b> 0.6% <b>UEL/UFL:</b> 7.5% <b>Vapor Density:</b> >5 <b>Vapor Pressure:</b> <1 mmHg @ 70°F; 21°C <b>Specific Gravity:</b> 0.86 <b>Incompatibilities:</b> strong oxidizers, halogens, and hypochlorites <b>Appearance and odor:</b> Colorless to amber with a kerosene odor	Prolonged or repeated exposures to this product may cause skin and eye irritation. Due to the defatting capabilities this exposure may lead to a dermatitis condition. High vapor concentrations are irritating to the eyes and respiratory tract. Exposure to high airborne concentrations may result in narcotic effects including dizziness, headaches, and anesthetic to unconsciousness. High concentrations in a confined space may adequately displace oxygen thereby resulting in suffocation.

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Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
<b>VOCs)</b>							
Carbon Disulfide  Max. site conc: 3.0 µg/L (GW)	75-15-0	PID: I.P. 10.08 eV, 71% relative response with PID and 10.2 eV lamp.	Air sample using charcoal sorbent with drying tube; toluene desorption; gas chromatography-FPD; Sampling and analytical protocol shall proceed in accordance with NIOSH Method #1600	OSHA: 20.0 ppm PEL 30.0 ppm (Ceiling)  NIOSH: 1.0 ppm  IDLH: 500 ppm	This substance has poor warning properties. If respiratory protection is indicated, for concentration up to 10 ppm, a half-face respirator with OV/AC cartridges (MSA Advantage 200 with GME or equivalent) is indicated. Cartridge changeout at end of shift. <b>Recommended gloves:</b> Viton > 8 hrs	<b>Boiling Pt:</b> 115.7°F, 45.6°F <b>Melting Pt:</b> -169°F; -112°C <b>Solubility:</b> 0.3% <b>Flash Pt:</b> -22°F; -30°C <b>LEL/LFL:</b> 3.6% <b>UEL/UFL:</b> 33% <b>Vapor Density:</b> 2.64 <b>Vapor Pressure:</b> 297mm <b>Specific Gravity:</b> 1.26 <b>Incompatibilities:</b> Contact between carbon disulfide and rust, strong oxidizers, chemically active materials (such as sodium, potassium, and zinc), azides, halogens, and organic amines may cause fires and explosions <b>Appearance and Odor:</b> Carbon disulfide is a clear, colorless to faintly yellow liquid; it is almost colorless when pure. The technical grades have a strong, disagreeable odor similar to hydrogen sulfide. An odor threshold of part per million (ppm) parts of air has been reported.	Acute exposure: Acute exposure to carbon disulfide vapor is irritating to the eyes, skin, and mucous membranes. Contact with the liquid can result in second- and third-degree burns. Skin absorption may result in localized degeneration of peripheral nerves. Acute exposure can result in systemic symptoms of dizziness, headache, nausea, vomiting, euphoria, convulsions, muscle weakness, sleeplessness, fatigue, nervousness, anorexia, blind spots, dilated pupils, psychosis, coma, and death. Chronic exposure: Chronic exposure may result in headache, polyneuritis, emotional disturbances, psychosis, atherosclerosis, coronary heart disease, hypertension, central scotoma, red-green color blindness, anorexia, weight loss, Parkinson- like syndrome, fatigue, anemia, blood and protein in the urine, and liver damage.

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Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
<b>Metals</b>							
Arsenic  Max. site conc: 8.4 mg/Kg (sub)	7440-38-2	Particulate form - This substance is unable to be detected by PID/FID.	Air sample using a particulate filter; acid desorption; AAS detection. Sampling and analytical protocol shall proceed in accordance with NIOSH Method #7900.	OSHA: Organic compounds 0.5 mg/m <sup>3</sup> Inorganic compounds 0.01 mg/m <sup>3</sup>  NIOSH: (Ceiling) 0.002 mg/m <sup>3</sup>  ACGIH: 0.2 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> HEPA filter (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 NAFal 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.
Beryllium  Max. site conc: 0.3 mg/Kg (surf)	7440-41-7 as Be	Particulate form - This substance is unable to be detected by PID/FID.	Air sample using a particulate filter; acid desorption; AAS/GF detection. Sampling and analytical protocol shall proceed in accordance with NIOSH Method #7102.	OSHA: 0.002 mg/m <sup>3</sup> , (ceiling) 0.005 mg/m <sup>3</sup>  NIOSH: 0.0005 mg/m <sup>3</sup>  ACGIH: 0.002 mg/m <sup>3</sup>	No identifiable warning properties to indicate presence and thereby detection.  <b>Recommended APR Cartridge:</b> HEPA filter.  <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> 5378°F; 2970°C <b>Melting Pt:</b> 2332°F; 1278°C <b>Solubility:</b> Insoluble <b>Flash Pt:</b> Not available (Airborne dust may burn or explode when exposed to heat, flame, or incompatible chemicals) <b>LEL/LFL:</b> Not available <b>UEL/UFL:</b> Not available <b>Vapor Density:</b> Not available <b>Vapor Pressure:</b> 0 mmHg <b>Specific Gravity:</b> 1.85 <b>Incompatibilities:</b> Halocarbons, strong oxidizers, acids and caustics <b>Appearance and odor:</b> gray to white hard light metal, brittle	Overexposure to this substance may result in respiratory symptoms including difficulty in breathing, coughing, rales, chest pain, possibly pulmonary edema, weakness, fatigue, headache, weight loss. Direct contact may result in irritant action on the skin (dermatitis), eyes (conjunctivae), and mucous membranes. This substance has been identified as a potential human carcinogen.

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Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
<b>Metals</b>							
Cadmium  Max. site conc: 3.5 mg/Kg (sub)	7440-43-9	Particulate Form - Unable to be easily detected by PID or FID.	Air sample using a mixed cellulose-ester filter / acid desorption and analysis by atomic absorption-flame. Sampling and analytical protocol shall proceed in accordance with NIOSH Method #7300 or #7048.	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> .  <b>Recommended Gloves:</b> 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> Metal: Silver-white, blue-tinged lustrous, odorless solid. Fume: 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.
Chromium Compounds  Max. site conc: 105 mg/Kg (surf)	7440-47-3 (Element)	Not detectable by PID. Not detectable by FID.	Air sample using mixed cellulose - ester filter; acid desorption and analysis by atomic absorption. Sampling and analytical protocol shall proceed in accordance with NIOSH Method #7024.	OSHA & NIOSH: (Chromium II, III) 0.5 mg/m <sup>3</sup> (Chromium VI) 0.1 mg/m <sup>3</sup> (Ceiling)  ACGIH: 0.5 mg/m <sup>3</sup> (Chromium II, III compounds), 0.05 mg/m <sup>3</sup> (Chromium VI compounds)  IDLH: 30 mg/m <sup>3</sup> (Chromium VI compounds)	The use of a air purifying, full face-piece respirator with a high efficiency particulate filter for concentrations up to 0.1 mg/m <sup>3</sup> .  <b>Recommended Gloves:</b> This is in particulate form. Therefore any glove suitable to prevent skin contact.	<b>Boiling Pt:</b> 4788°F; 2642°C <b>Melting Pt:</b> 3452°F; 1900°C <b>Solubility:</b> Insoluble <b>Flash Pt:</b> Not applicable (Airborne dust may burn or explode when exposed to heat, flame, or incompatible chemicals) <b>LEL/LFL:</b> Not applicable <b>UEL/UFL:</b> Not applicable <b>Vapor Density:</b> Not available <b>Vapor Pressure:</b> 0 mmHg <b>Specific Gravity:</b> 7.14 <b>Incompatibilities:</b> Strong oxidizers, peroxides, and alkalis <b>Appearance and Odor:</b> Appearance and odor vary depending upon the specific compound.	Health hazards are characterized normally through chronic exposure manifesting as histologic fibrosis of the lungs and ulceration of the NAFal septum and skin. IARC, NTP and ACGIH list various chromium compounds as possessing carcinogenic properties.

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Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
<b>Metals</b>							
Lead  Max. site conc: 337 mg/Kg (sub)	7439-92-1	Particulate form - Unable to be detected by either PID or FID.	Air sample using a mixed cellulose ester filter; or HNO <sub>3</sub> or H <sub>2</sub> O <sub>2</sub> desorption; or Atomic absorption detection. NIOSH Method #7082 or #7300.	OSHA: 0.05 mg/m <sup>3</sup>  ACGIH: 0.15 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.
Mercury  Max. site conc: 0.31 mg/Kg (surf) 50 µg/L (GW)	7439-97-6	Jerome Mercury Vapor Analyzer  This substance is unable to be detected by PID/FID.	Air sample using Hydrar® sorbent tube; acid desorption; AA cold detection. Sampling and analytical protocol shall proceed in accordance with NIOSH Method #6009.	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. MSA Mersorb P100 or equivalent  <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.

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Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
<b>Pesticides</b>							
DDT and the major metabolites; DDD and DDE.  Max. site conc: 1900 µg/Kg (surf)	50-29-3  72-54-8  72-55-9	Substance is not volatile, I.P. is unknown, detection by PID is unknown. Substance non-combustible, therefore a FID is anticipated to have reduced response to DDT.	Air sample using a binder free, glass fiber filter; isooctane desorption; gas chromatography-electron capture detector. Sampling and analytical protocol will proceed in accordance with NIOSH Method #3(S274).	OSHA; ACGIH: 1 mg/m <sup>3</sup>  NIOSH: 0.5 mg/m <sup>3</sup>	Adequate - Can use air purifying respirator with high efficiency particulate air filter (HEPA).  <b>Recommended glove:</b> Nitrile acceptable for incidental contact.	<b>Boiling Pt:</b> 230°F; 110°C <b>Melting Pt:</b> 226°F; 108°C <b>Solubility:</b> Insoluble <b>Flash Pt:</b> 162-171°F; 72-77°C <b>LEL/LFL:</b> Not available <b>UEL/UFL:</b> Not available <b>Vapor Density:</b> Not available <b>Vapor Pressure:</b> Low <b>Specific Gravity:</b> 0.99 <b>Incompatibilities:</b> Strong oxidizers and alkalis <b>Appearance and Odor:</b> Colorless crystals or off-white powder with a slight aromatic odor	Large doses are followed by vomiting due to gastric irritation, diarrhea may follow. Numbness and paresthesias of the lips tongue and face associated with malaise, headache, sorethroat, fatigue and weakness. Coarse tremors (usually first of the neck, head, and eyelids). This may be accompanied by confusion, apprehension, and depression. Convulsions may result and death may occur from respiratory failure. DDT is absorbed and retained in the fat of humans. Chronic exposure may result in damage to the liver, kidneys and Peripheral Nervous System. DDT is recognized as possessing carcinogenic properties by IARC and NTP.
<b>PAHs</b>							
Benzo(a)pyrene  Max. site conc: 540 µg/Kg (sed)	50-32-8	Particulate form - This substance is not detectable using a PID or FID.	Air sample using a glass fiber or silver membrane filter; analysis by gas chromatography/infrared or other spectrophotometric method or colorimeter. Sampling and analytical protocol shall proceed in accordance with NIOSH Method #1(186).	OSHA: 0.2 mg/m <sup>3</sup> NIOSH: 0.1 mg/m <sup>3</sup>	Adequate - use a full-face air-purifying respirator with dust/mist cartridge up to 10 mg/m <sup>3</sup> .  <b>Recommended glove:</b> Nitrile	<b>Boiling Pt:</b> 594°F; 312°C <b>Melting Pt:</b> 354°F; 179°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> 10 mmHg @ 594°F; 312°C <b>Specific Gravity:</b> Not available <b>Incompatibilities:</b> Not available <b>Appearance and Odor:</b> Yellow odorless crystals.	Regulated primarily as a result of potential carcinogenic properties. Listed by NTP, IARC, and ACGIH as carcinogenic.

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Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
<b>PAHs</b>							
Bis(2-ethylhexyl) phthalate  Max. site conc: 1125 µg/Kg (sub)	117-81-7	No information found This is a combustible liquid therefore the FID should detect it however the relative response ratio is unknown.	Particulate filter; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol shall proceed in accordance with NIOSH Method #5020.	NIOSH; ACGIH: 5 mg/m <sup>3</sup> , STEL 10 mg/m <sup>3</sup>  OSHA: 6 mg/m <sup>3</sup>  IDLH: 5000 mg/m <sup>3</sup>	Irritating, tingling sensation.  <b>Recommended APR Cartridge:</b> Organic vapor acid gases with HEPA filter.  <b>Recommended gloves:</b> Nitrile >6.00 hrs has been the one most widely used for the other substances and is acceptable for this substance. Other options include butyl rubber >8.00 hrs or neoprene >6.00 hrs	<b>Boiling Pt:</b> 680°F; 386°C <b>Melting Pt:</b> freezes 6.8°F; -14°C <b>Solubility:</b> Insoluble <b>Flash Pt:</b> 419°F; 215°C <b>LEL/LFL:</b> 0.3% @ 473°F; 245°C <b>UEL/UFL:</b> Not available <b>Vapor Density:</b> Not available <b>Vapor Pressure:</b> <0.01 mm <b>Specific Gravity:</b> 0.99 <b>Incompatibilities:</b> Nitrates, strong oxidizers, acids, and caustics. <b>Appearance and odor:</b> Colorless, oily liquid, odorless	This substance is a mild skin, eye, mucous membrane irritant, and mild gastric disturbance.  In test animals liver damage and teratogenic effects have been noted.
Creosote / cresol (Fluoranthene, pyrene)  Max. site conc: 630 µg/Kg (sed) 0.11 µg/L (gw)	8001-58-9 1319-77-3 (206-44-0)	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.	Air sampling for cresol (a major constituent of creosote) by silica gel or xad-7 sorbent tube; Acetone desorption and analysis by gas chromatography - flame ionization detector or high-pressure liquid chromatography. Sampling and analytical protocol shall be in accordance with NIOSH Method #2001, or OSHA Method #32	OSHA; ACGIH: 5 ppm  NIOSH: 2.3 ppm  IDLH: 80 mg/m <sup>3</sup>	Adequate - use a full-face air-purifying respirator with organic vapor / dust/mist cartridge up to 250 ppm. Odor Threshold of cresol is 0.00005-0.0079 ppm.  <b>Recommended gloves:</b> Viton >96.00 hrs; butyl rubber >90.00 hrs; neoprene >4.50 hrs	<b>Boiling Pt:</b> 376-397°F; 191-203°C <b>Melting Pt:</b> 52-96°F; 10.9-35.5°C <b>Solubility:</b> Insoluble <b>Flash Pt:</b> 178°F; 81°C <b>LEL/LFL:</b> Not available <b>UEL/UFL:</b> Not available <b>Vapor Density:</b> 3.72 <b>Vapor Pressure:</b> 1 mmHg @ 100-127°F; 38-53°C <b>Specific Gravity:</b> 1.030-1.038 <b>Incompatibilities:</b> Nitric acid, oleum, chlorosulfonic acid, oxidizers <b>Appearance and Odor:</b> Yellowish or colorless, flammable, oily liquid (often brownish because of impurities or oxidation)	Regulated based on effects on central nervous system, and respiratory system. Acute exposures may result in difficulty breathing, respiratory failure and skin and eye burns. Chronic exposure may damage the liver, kidneys, lungs and skin.

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- Flying projectiles
- Pinches and compressions
- Vehicular and foot traffic

These physical hazards are discussed in Table 5-1 as applicable to each site task. Further, many of these hazards are discussed in detail in Section 4.0 of the Health and Safety Guidance Manual. Specific discussions on some of these hazards are presented below.

### **6.2.1 Heavy Equipment Hazards**

Often the hazards associated with DPT operations such as pinch/compression points, rotating equipment, etc. are the most dangerous to be encountered during site activities. The SSO will discuss safe work procedures as part of site-specific training and/or during daily safety meetings using Safe Work Permits (Figure 9-1) presented in this HASP. The following rules will apply to all drilling operations:

- Site personnel will be aware of the location and operation of this equipment.
- Each drill rig must be equipped with emergency stop devices which will be tested daily to ensure that they are operational.
- Long handled shovels or equivalent shall be used to clear cuttings from the borehole and rotating equipment.

All equipment will be inspected daily, prior to use and inspection results entered on the Equipment Inspection Checklist (Attachment II). Additional requirements during drilling activities are discussed in Table 5-1. The SSO will thoroughly discuss safe drilling procedures during the pre-activities training session. All site personnel will sign the form in Figure 8-2 documenting that they received the training and understand the procedures.

### **6.2.2 Cuts**

A number of accidents have been reported in last few years when field personnel accidentally cut themselves while extracting soil samples from acetate sample tubes. The tubes are normally inserted in the Macro Core<sup>®</sup> Samplers or the dual tube samplers. Removing the soil sample requires cutting the tube and spooning the sample into a sample jar.

However, this activity has resulted in numerous cuts to the hands and legs. These injuries have occurred when field personnel open plastic liners improperly. To minimize this hazard, a liner cutter kit of some type should be used. The Geoprobe® Corporation markets a liner cutter kit that can be used. This liner cutter makes two simultaneous longitudinal cuts 1-3/8 in. wide the entire length of Macro Core® liners. The kit includes cutting tool, cutter holder, and hooked stationary blades. The liner cutter holder is 48-in. long and slips onto a flat surface. Also has center mount for securing in a vise. In addition, the following safe work practices will assist in the minimization of this hazard. These items have been engineered to allow sample acquisition without placing the sampler at risk.

- Always cut away from yourself and others, then, if a knife slips, you will not impale yourself or others.
- Do not place items to be cut in your hand or on your knee.
- Change out blades as necessary to maintain a sharp cutting edge. Many accidents result from struggling with dull cutting attachments.

### **6.2.3 Contact with Underground or Overhead Utilities**

Underground utilities such as pressurized lines, water lines, telephone lines, buried utility lines, and high voltage power lines may be present throughout the facility. **Therefore, all subsurface activities must be conducted following the requirements of the Tetra Tech NUS SOP for “Utility Locating and Excavation Clearance (HS-1.0)”**. A copy of this SOP is provided as Attachment IV. Clearance of underground and overhead utilities for each sample location will be coordinated with NAS Key West personnel. Robert Courtright is the point-of-contact for NAS Key West and can be reached at (305) 293-2881. Additionally, drilling operations will be conducted at a safe distance from overhead power lines as discussed in Attachment II. In certain cases, NAS Key West personnel may need to de-energize electrical cables using facility lockout/tagout procedures to insure electrical hazards are eliminated.

### **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. In general, avoidance of areas of known infestation or growth will be the preferred exposure control for insects/animals and poisonous plants. Specific discussion on principle hazards of concern follows:

### **6.3.1 Insect/Animal Bites and Stings**

#### **Fire Ants**

Various insects and animals may be present and should be considered. For example, fire ants present a unique situation when working outdoors in Florida. Their aggressive behavior and their ability to sting repeatedly can pose a unique health threat. The sting injects venom (formic acid) that causes an extreme burning sensation. Pustules form which can become infected if scratched. Allergic reactions of people sensitive to the venom include dizziness, swelling, shock and in extreme cases unconsciousness and death. People exhibiting such symptoms should see a physician. Fire ants can be identified by their habitat. They build mounds in open sunny areas sometimes supported by a wall or shrub. The mound has no external opening. The size of the mound can range from a few inches across to some which are in excess of two feet or more in height and diameter. When disturbed they defend it by swarming out and over the mound, even running up grass blades and sticks.

Also, areas to be investigated could be prime nesting and/or hiding locations for other insects and snakes. Personnel should avoid reaching into areas that are not visibly clear of snakes or insects. Bees and spiders can be found nesting in protective casings of monitoring wells. Care should be taken when accessing these areas to avoid bites or stings. Protective casings should be opened slowly. Do not place hands in areas that are not clearly visible. Snake chaps will be worn in areas of known or anticipated snake infestation.

All site personnel who are allergic to stinging insects such as bees, wasps, and hornets must be particularly careful since severe illness and death may result from allergic reactions. As with any medical condition or allergy, information regarding the condition must be listed on the Medical Data Sheet and the FOL and SSO notified.

#### **Alligators**

Alligators live in all Florida counties but are most common in the major river drainage basins and large lakes in the central and southern portions of the state. They also can be found in marshes, swamps, ponds, drainage canals, phosphate-mine settling ponds, and ditches. Alligators are tolerant of poor water-quality and occasionally inhabit brackish marshes along the coast. A few even venture into salt water.

Mature alligators seek open water areas during the April-to-May courtship and breeding season. After mating, the females move into marsh areas to nest in June and early July where they remain until the following spring. Males generally prefer open and deeper water year-round. Alligators less than four feet long typically inhabit the marshy areas of lakes and rivers. Dense vegetation in these habitats provides protective cover and many of the preferred foods of young alligators.

- Most human attacks associated with alligators occur when they have been fed by humans or when defending their nests.
- Under no circumstances should you approach an alligator closely. They are quite agile, even on land. As with any wild animal, alligators merit a measure of respect.
- Alligators are classified as a threatened species and thus enjoy the protection of state and federal law. Only representatives of the Florida Game and Fresh Water Fish Commission are empowered to handle nuisance alligators.
- It is illegal to feed, tease, harass, molest, capture or kill alligators.
- If a serious problem does exist, contact the Florida Game and Fresh Water Fish Commission.

## **Ticks**

There are various areas throughout the U.S. where Lyme Disease is endemic. Fortunately, Florida is not one of these areas. Nonetheless, personnel should be aware of the hazards of tick bites and Lyme Disease. The longer a disease carrying tick remains attached to the body, the greater the potential for contracting the disease. Wearing long sleeved shirts and long pants (tucked into boots). As well as performing frequent body checks will prevent long term attachment. Site first aid kits should be equipped with medical forceps and rubbing alcohol to assist in tick removal. For information regarding tick removal procedures, and symptoms of exposure consult Section 4.0 of the Health and Safety Guidance Manual.

### **6.3.2 Inclement Weather**

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

## **Tropical Storms and Hurricanes**

As Florida is a tropical storm, hurricane prone area, the following information is supplied to explain the potential severity of these natural hazards. The decision to curtail operations and evacuate the area should be made by the FOL and/or the SSO.

During the early summer to late fall months, typically from the first of June through the end of November, disturbances migrating off the West Coast of Africa move into the Atlantic Ocean and develop into tropical cyclones known as tropical storms and hurricanes. Many of these cyclones become strong enough to threaten life and property along the Eastern Seaboard and Gulf Coast. There are three main threats associated with tropical storms and hurricanes:

- High winds
- Excessive rainfall
- Storm surge

The impacts of high winds and excessive rainfall occur hours, maybe days, before the tropical storm or hurricane makes landfall. However, the storm surge accompanies the storm or hurricane at the time that landfall occurs.

### **High Winds**

Sustained winds vary greatly from storm to storm, but can range from 39 to 73 miles per hour (wind speeds associated with a tropical storm) to greater than 74 miles per hour (minimal wind speed for a Category 1 hurricane). Table 6-2 compares the type of storm or hurricane and the corresponding wind speed.

**TABLE 6-2**  
**TROPICAL STORM/HURRICANE RATING SCALE**

TYPE	CATEGORY*	WINDS (MPH)
Tropical Depression	NA	>35-38
Tropical Storm	NA	39 – 73
Hurricane	1	74 – 95
Hurricane	2	96 – 110
Hurricane	3	111 – 130
Hurricane	4	131 – 155
Hurricane	5	>155

Based on the Saffir-Simpson scale  
NA – Not Applicable

In addition to strong winds, there is the threat of debris (i.e. building material, trees, etc.) becoming airborne projectiles as they are carried by the high winds. Thunderstorms and tornadoes embedded within the tropical storm or hurricane can further increase the wind speeds on a localized level.

### **Excessive Rainfall**

Heavy rains associated with tropical storms and hurricanes also vary greatly from storm to storm. On average, an inch of rainfall an hour is not uncommon with major hurricanes, somewhat lesser amounts with tropical storms. However, the primary threat is not the intensity of rain, but the duration of rainfall. Since many tropical storms and hurricanes are slow-movers, they are capable of producing sustained heavy rainfall over a long period of time. It is not uncommon for an area to receive nearly 20 inches of rain in 24 hours. Under these conditions, street; stream and creek flooding is inevitable only to be exacerbated by locally heavier rains from thunderstorms.

### **Storm Surge**

The storm surge is an abnormal rise in sea level accompanying a hurricane or tropical storm. The height of the storm surge (usually measured in feet) is the difference in sea level from the observed level (during the storm) and the level that would have occurred in the absence of the storm or hurricane. The more intense the storm or hurricane the higher the storm surge. Storm surges become even higher if they

occur during periods of high tide. Table 6-3 defines some of the terminology and possible calls to action regarding tropical cyclones:

**TABLE 6-3**  
**TROPICAL STORM/HURRICANE**  
**WATCH AND WARNING**

STORM DESCRIPTION	DEFINITION	CALL TO ACTION
Tropical Storm Watch	Tropical storm conditions are possible in the specified area of the watch, usually within 36 hours	Weather conditions should be monitored for further advisories. Prepare for possible evacuation by local officials
Tropical Storm Warning	Tropical storm conditions are expected in the specified area of the warning, usually within 24 hours.	Work should be suspended in areas where lightning, high winds and rainfall could pose a threat to life. Mandatory evacuations may be enforced by local officials.
Hurricane Watch	Hurricane conditions are possible in the specified area of the watch, usually within 36 hours.	Weather conditions should be monitored for further advisories. Prepare for possible evacuation by local officials
Hurricane Warning	Hurricane conditions are expected in the specified area of the warning, usually within 24 hours.	Mandatory evacuations will most likely be enforced by local officials.

A NOAA Weather Radio is the best means to receive watches and warnings from the National Weather Service. The National Weather Service continuously broadcasts updated hurricane advisories that can be received by widely available NOAA Weather Radios.

If notification of evacuation is received due to approaching weather systems, follow local directions for safe sheltering or area evacuation. Prior to evacuating the site, equipment should be placed in a safe condition and potential missiles should be secured. In the event of localized severe weather conditions, sheltering in a safe location should occur until the weather system has passed and it is determined that work can resume.

### 6.3.3 Heat Stress

Given the geographic location of the site and the project schedule, overexposure to high ambient temperatures (heat stress) may exist during performance of this work depending on the project schedule. (extremely cold temperatures are not expected to be encountered due to project location). Work performed when ambient temperatures exceed 70°F may result in varying levels of heat stress (heat rash, heat cramps, heat exhaustion, and/or heat stroke) depending on variables such as wind speed, humidity, and percent sunshine, as well as physiological factors such as metabolic rate and skin moisture content. Additionally, work load and level of protective equipment will affect the degree of exposure.

Site personnel will be encouraged to drink plenty of fluids to replace those lost through perspiration. Additional information such as Work-Rest Regimens and personnel monitoring may be found in Section 4.0 of the Health & Safety Guidance Manual.

## 7.0 AIR MONITORING

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

### 7.1 INSTRUMENTS AND USE

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

#### 7.1.1 Photo Ionization Detector or Flame Ionization Detector

In order to accurately monitor for any substances that may present an exposure potential to site personnel, a Photo Ionization 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 and to screen the breathing zones of employees during site activities. The PID has been selected because it is capable of detecting the organic vapors of concern (Note: A Flame Ionization Detector [FID] may be used as an alternative to the PID).

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

#### 7.1.2 Hazard Monitoring Frequency

Table 5-1 presents the frequencies at which 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 TtNUS Equipment Manager. Operational checks and field calibration will be performed on all instruments each day prior to their use. Field calibration will be performed on instruments according to manufacturers' recommendations (e.g., 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 manufacturers' recommendations, and with the applicable manufacturer standard operating procedure (copies of which can be found in the Health and Safety Guidance Manual, which will be maintained on site for reference). All calibration efforts must be documented. Figure 7-1 is provided for documenting these calibration efforts. This information may instead be recorded in a field operations logbook, provided that all 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 number, source concentration, supplier)
- Any relevant comments or remarks.



## **8.0 TRAINING/MEDICAL SURVEILLANCE REQUIREMENTS**

### **8.1 INTRODUCTORY/REFRESHER/SUPERVISORY TRAINING**

This section is included to specify health and safety training and medical surveillance requirements for TtNUS personnel participating in onsite activities.

#### **8.1.1 Requirements for TtNUS Personnel**

All TtNUS personnel must complete 40 hours of introductory hazardous waste site training prior to performing work at NAS Key West. TtNUS 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. In addition, 8-hour supervisory training in accordance with 29 CFR 1910.120(e)(4) will be required for site supervisory personnel.

Documentation of TtNUS introductory, supervisory, and refresher training, as well as site-specific training, will be maintained at the site. Copies of certificates or other official documentation will be used to fulfill this requirement.

#### **8.1.2 Requirements for Subcontractors**

Identified TtNUS subcontractor personnel must have completed introductory hazardous waste site training or equivalent work experience as defined in OSHA Standard 29 CFR 1910.120(e), and 8 hours of refresher training meeting the requirements of 29 CFR 1910.120(e)(8) prior to performing field work at NAS Key West. TtNUS subcontractors must certify that each employee has had such training by sending TtNUS a letter, on company letterhead, containing the information shown in the example letter in Figure 8-1. This letter will be accompanied by training certificates or some other form of official documentation for all subcontractor personnel participating in site activities.

### **8.2 SITE-SPECIFIC TRAINING**

TtNUS will provide site-specific training to all TtNUS personnel who will perform work on this project. Site-specific training will include:

- Names of designated personnel and alternates responsible for site safety and health
- Safety, health, and other hazards present on site

- Use of PPE
- Work practices to minimize risks from hazards
- Medical surveillance requirements
- Contents of the HASP
- Signs and symptoms of overexposure to site contaminants
- Emergency response procedures (evacuation and assembly points)
- Spill response procedures
- Review of the contents of relevant Material Safety Data Sheets(MSDS)
- Emergency response procedures (evacuation and assembly points)
- Associated hazards and restricted areas within NAS Key West.

Site-specific training will be documented as shown in Figure 8-2.

### **8.3 MEDICAL SURVEILLANCE**

All TtNUS personnel participating in project field activities will have had a physical examination that met the requirements of TtNUS' medical surveillance program. Medical clearance documentation will be maintained onsite and made available, as necessary.

#### **8.3.1 Medical Surveillance Requirements for Subcontractors**

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

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

#### **8.3.2 Requirements for All Field Personnel**

Each field team member, including subcontractors and visitors, entering the exclusion zone(s) will be required to complete and submit a copy of the Medical Data Sheet found in the TtNUS 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 needed in order to administer medical attention.

#### **8.4 SUBCONTRACTOR EXCEPTIONS**

**The use of the subcontractor exception is strictly limited to the authority of the CLEAN Health and Safety Manager.**

In situations in which the exclusion zone is not entered or when there is no potential for exposure to site contaminants, subcontractor personnel may be exempt from some of the training and medical surveillance requirements. All subcontractors and visiting personnel are required to receive site-specific training (as discussed in Section 8.2) regarding information provided in this HASP. Examples of subcontractors who may be exempt from training and medical surveillance requirements may include surveyors who perform surveying activities at the site perimeters or in areas where there is no potential for exposure to site contaminants.

### FIGURE 8-1. EXAMPLE TRAINING LETTER

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

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

Month, day, year

Mr. Chuck Bryan  
Task Order Manager  
Tetra Tech NUS  
900 Trail Ridge Road  
Aiken, South Carolina 29803

Subject: HAZWOPER Training for Naval Air Station Key West (NAS Key West), Key West, Florida

Dear Mr. Bryan:

As an officer of XYZ Corporation, I hereby state that I am aware of the potential hazardous nature of the subject project. I also understand that it is our responsibility to comply with all applicable occupational safety and health regulations, including those stipulated in Title 29 of the Code of Federal Regulations (CFR), Parts 1900 through 1910 and Part 1926.

I also understand that Title 29 CFR 1910.120, entitled "Hazardous Waste Operations and Emergency Response," requires an appropriate level of training for certain employees engaged in hazardous waste operations. In this regard, I hereby state that the following employees have had 40 hours of introductory hazardous waste site training or equivalent work experience as required by 29 CFR 1910.120(e) and have had 8 hours of refresher training as required by 29 CFR 1910.120(e)(8) and site supervisory personnel have had training in accordance with 29 CFR 1910.120(e)(4).

LIST FULL NAMES OF EMPLOYEES AND THEIR SOCIAL SECURITY NUMBERS HERE.

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

Sincerely,

(Name and Title of Company Officer)

Enclosed - Copies of Training Certificates



**FIGURE 8-3. SUBCONTRACTOR MEDICAL APPROVAL FORM**

For employees \_\_\_\_\_  
Company \_\_\_\_\_

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

**Part A**

The above-named individual

1. Undergone a physical examination in accordance with OSHA Standard 29 CFR 1910.120, (f), and was found to be  
 qualified to perform work at the Naval Air Station Key West; Key West,  
 not qualified to perform work at the Naval Air Station Key West; Key West,  
and,
2. Undergone a physical examination in accordance with OSHA 29 CFR 1910.134(b)(10) found to be medically  
 qualified to wear respiratory  
 not qualified to wear respiratory

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

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

**Part B**

I, \_\_\_\_\_, have examined \_\_\_\_\_  
Physician's Name Participant's Name

and have determined the following

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

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

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

2. Any detected medical conditions which would place the employee at increased risk of material the employee's

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

3. Recommended limitations upon the employee's assigned

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

I have informed this participant of the results of this medical examination and any medical conditions further examination of

Based on the information provided to me, and in view of the activities and hazard potentials involved at Air Station Key West; Key West, Florida, this

- may  
 may not

perform his/her assigned

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

Address \_\_\_\_\_

Phone \_\_\_\_\_

NOTE: Copies of test results are maintained and

\_\_\_\_\_  
Address

**FIGURE 8-4. EXAMPLE MEDICAL SURVEILLANCE LETTER**

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

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

Month, day, year

Mr. Chuck Bryan  
Task Order Manager  
Tetra Tech NUS  
900 Trail Ridge Road  
Aiken, South Carolina 29803

Subject: Medical Surveillance for Naval Air Station Key West (NAS Key West), Key West, Florida

Dear Mr. Bryan:

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

LIST FULL NAMES OF EMPLOYEES AND THEIR SOCIAL SECURITY NUMBERS HERE.

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

Sincerely,

(Name and Title of Company Officer)

## 9.0 SITE CONTROL

This section outlines the means by which TtNUS 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 fractured 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.

### 9.1 EXCLUSION ZONE

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

- Soil Borings and Monitoring Well Installation – The boundary perimeter will be established by determining the height of the mast, plus 5 feet. Therefore, a 35-foot mast plus 5 feet equals a 40-foot boundary surrounding the point of operation.
- Well Development – 10 feet surrounding the well head and discharge point.
- Well Abandonment – 10 feet surrounding the well head and associated work areas.
- Groundwater sampling – 10 feet surrounding the well head.
- Decontamination (heavy equipment – steam/pressure washers) – 35 feet surrounding the point of operation. This operation will take place at a centralized location.

Where appropriate and necessary to direct facility personnel, this area will be delineated using barrier tape, cones and/or drive poles, and postings.

### 9.2 CONTAMINATION REDUCTION ZONE

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

direct facility personnel. Decontamination will be conducted at a central location. All potentially contaminated equipment will be bagged and taken to that location for decontamination. Given this consideration, equipment required to complete this operation may include stainless steel bowls and spatulas for each location.

### **9.3 SUPPORT ZONE**

The support zone for this project will include a staging area where site vehicles will be parked, equipment will be unloaded, and where food and drink containers will be maintained. 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.

### **9.4 SAFE WORK PERMITS**

All Exclusion Zone work conducted in support of this project will be performed using Safe Work Permits to guide and direct field crews on a task by task basis. An example of the Safe Work Permit to be used is illustrated in Figure 9-1. Partially completed Permits for the work to be performed are included in Attachment III. The daily meetings conducted at the site will further support these work permits. 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 the SSO. 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 work permit will take precedence over the HASP when more conservative measures are required based on specific site conditions. All permits will be turned into the FOL and/or the SSO upon reaching their termination period or upon completion of the task for which the permit was issued.

**FIGURE 9-1. SAFE WORK PERMIT**

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

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

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

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

- IV. Protective equipment required      Respiratory equipment required
 

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

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

- VI. Additional Safety Equipment/Procedures
 

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

- VII. Procedure review with permit acceptors      Yes      NA      Yes      NA
 

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

- VIII. Site Preparation      Yes      No      NA
 

Utility Locating and Excavation Clearance completed..... <input type="checkbox"/>	Yes	No	NA
Vehicle and Foot Traffic Routes Cleared and Established..... <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Physical Hazards Barricaded and Isolated..... <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emergency Equipment Staged ..... <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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

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

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

## 9.5 SITE VISITORS

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

- Personnel invited by TtNUS to observe or participate in operations
- Regulatory personnel (i.e., DOD, U.S. Environmental Protection Agency [EPA], OSHA)
- Southern Division Navy personnel
- Other authorized visitors.

All non-DOD personnel working on this project are required to gain initial access to the Base by coordinating with the TtNUS FOL or designee and following established Base access procedures.

Once access to the base is obtained, all personnel who require site access into areas of ongoing operations will be required to obtain permission from the FOL and the Base Contact. Upon gaining access to the site, all site visitors wishing to observe operations in progress will be escorted by a TtNUS representative and be required to meet the minimum requirements 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 represented, 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 and medical surveillance, as stipulated in Section 8.0 of this document. In addition, to enter 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 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. All visitors entering the exclusion zones during ongoing operations will be accompanied by a TtNUS representative. Any and all visitors not meeting the requirements stipulated in this plan for site clearance will not be permitted to enter the site operational zones during planned activities. Any incidence of unauthorized site visitation will cause termination of all onsite activities until the unauthorized visitor is removed from the premises. Removal of unauthorized visitors will be accomplished with support from the Base Contact, who will be notified of any unauthorized visitors.

## **9.6 SITE SECURITY**

Site security will be maintained by TtNUS field personnel. TtNUS will retain complete control over active operational areas. Because these activities take place at a Navy facility open to public access, the first line of security will be exclusion zone barriers, site work permits, and any existing barriers at the sites to restrict the general public. The second line of security, at the work site, will refer interested parties to the Base Contact. The Base Contact will serve as a focal point for Base personnel, interested parties, and serve as the final line of security and the primary enforcement contact.

## **9.7 SITE MAP**

Once the areas of contamination, access routes, topography, and dispersion routes are determined, a site map will be generated and adjusted as site conditions change. These maps will be posted to illustrate up-to-date collection of contaminants and adjustment of zones and access points.

## **9.8 BUDDY SYSTEM**

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

## **9.9 MSDS REQUIREMENTS**

TtNUS and subcontractor personnel will provide MSDSs for all chemicals brought onsite. The contents of these documents will be reviewed by the SSO with the user(s) of the chemical substances prior to any actual onsite use or application of the substances. A chemical inventory of all chemicals used on site will be developed using the Health and Safety Guidance Manual. The MSDSs will then be maintained in a central location (i.e., temporary office) and will be available for anyone to review upon request.

## **9.10 COMMUNICATION**

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

External communication will be accomplished by using the telephones at predetermined and approved locations. External communication will primarily be used for the purpose of resource and emergency resource communications. Prior to the commencement of activities at NAS Key West, the FOL will arrange for appropriate telephone communications.

## **10.0 SPILL CONTAINMENT PROGRAM**

### **10.1 SCOPE AND APPLICATION**

It is anticipated that bulk quantities of potentially hazardous materials (greater than 55 gallons) will not be handled during site activities. However, it is possible that, as the job progresses, disposable PPE and other non-reusable items may be generated. As needed, 55-gallon drums will be used to contain unwanted items generated during sampling activities. The drum(s) will be labeled with the site name and address, the type of contents, and the date the container was filled, as well as an identified contact person. As warranted, samples will be collected and analyzed to characterize the material and determine appropriate disposal measures. Once characterized the drum(s) will be removed from the staging area and disposed in accordance with Federal, State and local regulations. Given the likely solid nature of drum contents, a comprehensive Spill Containment Program is not necessary. The following discussion is provided as contingency information only.

### **10.2 POTENTIAL SPILL AREAS**

Should drums contain liquid wastes, potential spill areas will be monitored in an ongoing attempt to prevent and control potential further contamination of the environment. Areas designated for handling, loading, and unloading of potentially contaminated water and debris present limited potential for leaks or spills.

#### **10.2.1 Site Drums/Containers**

All drums/containers used for containing liquids will be sealed, labeled, and staged within a centralized area to await shipment or disposal.

### **10.3 LEAK AND SPILL DETECTION**

To establish early detection of potential spills or leaks, periodic inspections 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. In most instances, leaks will be collected and contained by using absorbents such as Oil-dry, vermiculite, and/or sand, which may be stored at the staging area in a conspicuously marked drum. This

material will also be containerized for disposal, pending analyses. All inspections will be documented in the Project Logbook.

#### **10.4 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.

#### **10.5 SPILL PREVENTION AND CONTAINMENT EQUIPMENT**

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

- Sand, clean fill, vermiculite, or other noncombustible absorbent (oil-dry);
- Drums (55-gallon U.S. Department of Transportation [DOT] 17-E or 17-H; UN1A2)
- Shovels, rakes, and brooms
- Labels.
- PPE

#### **10.6 SPILL CONTROL PLAN**

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

1. Notify the SSO or FOL immediately upon detection of a leak or spill. Evaluate the situation and (a) Initiate emergency action countermeasures or (b) Activate emergency alerting procedures for that area to remove all non-essential personnel.
2. Employ the personal protective equipment stored at the staging area. Take immediate actions to stop the leak or spill by plugging or patching the container or raising the leak to the highest point in the vessel. Spread the absorbent material in the area of the spill, covering it completely.
3. Transfer the material to a new vessel; collect and containerize the absorbent material. Label the new container appropriately. Await analyses for treatment and disposal options.

4. Recontainerize spills, including 2-inch of top cover impacted by the spill. Await test results for treatment or disposal options.

It is not anticipated that a spill will occur that the field crew cannot handle. Should this occur, notification of the appropriate Emergency Response agencies will be carried out by the FOL or SSO in accordance with the procedures discussed in Section 2.0 of this HASP.

## 11.0 CONFINED-SPACE ENTRY

It is not anticipated, under the proposed scope of work, that confined space and permit-required confined space activities will be conducted. Therefore, personnel under the provisions of this HASP are not allowed, under any circumstances, to enter confined spaces. A confined space is defined as an area which has one or more of the following characteristics:

- Is large enough and so configured that an employee can bodily enter and perform assigned work.
- Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry)
- Is not designed for continuous employee occupancy.
- A Permit-Required Confined Space is a space that meets the criteria above and in addition has one or more of the following conditions:
  - 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 which 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 PHSO. If confined space operations are to be performed as part of the scope of work, detailed procedures and training requirements will have to be addressed.

## 12.0 MATERIALS AND DOCUMENTATION

The TtNUS FOL shall ensure that the following materials/documents are taken to the project site and used when required:

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

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

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

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

**MSDS (maintained)** - The MSDSs should also be in a central area, accessible to all site personnel. These documents should match all items on the chemical inventory list for all substances employed onsite. It is acceptable to have these documents in a central folder with the chemical inventory as the table of contents.

**The OSHA Job Safety and 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 deface, altered, or covered by other material.

**Site Clearance (maintained)** - This list is within the training section of the HASP (See Figure 8-2 and 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 personnel are engaged in site activities.

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

**Medical Data Sheets/Cards (maintained)** - Medical Data Sheets will be filled out by onsite 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 his/her person.

**Hearing Conservation Standard (29 CFR 1910.95) (posted)** - This standard will be posted any time 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 locations and methods of presentation are acceptable, provided that the objection is accomplished.

## 13.0 GLOSSARY

### LIST OF ACRONYMS AND ABBREVIATIONS

AIMD	Aircraft Intermediate Maintenance Department
AOC	area of concern
ARAR	Applicable or Relevant and Appropriate Requirement
AST	Aboveground Storage Tank
BRE	Brown & Root Environmental
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
CLEAN	Comprehensive Long Term Environmental Action Navy
CRZ	Contamination Reduction Zone
CSP	Certified Safety Professional
CTO	Contract Task Order
dBA	Decibel
DOD	U.S. Department of Defense
DOT	Department of Transportation
DPT	Direct Push Technology
EPA	Environmental Protection Agency
FID	Flame Ionization Detector
FOL	Field Operations Leader
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HSA	Hollow stem auger
HSM	Health and Safety Manager
IDW	Investigation-derived Waste
MSDS	Material Safety Data Sheet
NAS	Naval Air Station
NAVFAC EFD SOUTH	U.S. Navy Southern Division Naval Facilities Engineering Command
OOD	Officer of the Day
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor)
PAH	Polynuclear Aromatic Hydrocarbon
PID	Photo Ionization Detector
PHSO	Project Health and Safety Officer
PPE	Personal Protective Equipment

RAC	Remedial Action Contractor
RCRA	Resource Conservation & Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RI	Remedial Investigation
SAL	Screening Action Levels
SMWU	Solid Waste Management Unit
SOP	Standard Operating Procedures
SSO	Site Safety Officer
SVOCs	Semi-Volatile Organic Compounds
TBD	To be determined
TOM	Task Order Manager
TPH	total petroleum hydrocarbons
TtNUS	Tetra Tech NUS
VOCs	Volatile Organic Compounds

**ATTACHMENT I**

**INJURY/ILLNESS PROCEDURE  
AND REPORT FORM**

**TETRA TECH NUS, INC.****INJURY/ILLNESS PROCEDURE  
WORKER'S COMPENSATION PROGRAM**

---

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

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

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

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

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



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

**WHO IS COVERED:**

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

**WHAT IS COVERED:**

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



TETRA TECH, INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT

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

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

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

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

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

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

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

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

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

**Information Regarding Injured or Ill Employee**

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

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

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

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

\_\_\_\_\_

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

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

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

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

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

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

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

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

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

Check if time cannot be determined

**Location of Incident**

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

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

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

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

**Information About the Incident**

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

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

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



TETRA TECH, INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT (Continued)

Information About the Incident (Continued)

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

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

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

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

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

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

Witness (Attach additional sheets for other witnesses.)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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



TETRA TECH, INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT (Continued)

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

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

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

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

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

\_\_\_\_\_  
Printed Name of Injured Employee

\_\_\_\_\_  
Telephone Number

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

\_\_\_\_\_  
Date

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

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

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



TETRA TECH, INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT (Continued)

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

**Classification of Incident:**  
 Injury     Illness

**Result of Incident:**  
 First aid only  
 Days away from work  
 Remained at work but incident resulted in job transfer or work restriction  
 Incident involved days away and job transfer or work restriction  
 Medical treatment only

No. of days away from work \_\_\_\_\_  
Date employee left work \_\_\_\_\_  
Date employee returned to work \_\_\_\_\_  
No. of days placed on restriction or job transfer: \_\_\_\_\_

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

**To Be Completed by Human Resources**

Social security number: \_\_\_\_\_  
Date of hire: \_\_\_\_\_ Hire date for current job: \_\_\_\_\_  
Wage information: \$ \_\_\_\_\_ per  Hour  Day  Week  Month  
Position at time of hire: \_\_\_\_\_  
Current position: \_\_\_\_\_ Shift hours: \_\_\_\_\_  
State in which employee was hired: \_\_\_\_\_  
Status:  Full-time     Part-time    Hours per week: \_\_\_\_\_    Days per week: \_\_\_\_\_  
Temporary job end date: \_\_\_\_\_

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

Date reported: \_\_\_\_\_ Reported by: \_\_\_\_\_  
Confirmation number: \_\_\_\_\_  
Name of contact: \_\_\_\_\_  
Field office of claims adjuster: \_\_\_\_\_

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

**ATTACHMENT II**

**EQUIPMENT INSPECTION CHECKLIST**

# EQUIPMENT INSPECTION

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

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

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

(e.g., bulldozer)

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

**Safety Guards:**

**Yes No**

- Around rotating apparatus (belts, pulleys, sprockets, spindles, drums, flywheels, chains) all points of operations protected from accidental contact? \_\_\_\_\_
- Hot pipes and surfaces exposed to accidental contact? \_\_\_\_\_
- All emergency shut offs have been identified and communicated to the field crew? \_\_\_\_\_
- Have emergency shutoffs been field tested? \_\_\_\_\_
- Results? \_\_\_\_\_
- Are any structural members bent, rusted, or otherwise show signs of damage? \_\_\_\_\_

- Are fueling cans used with this equipment approved type safety cans? \_\_\_\_\_
- Have the attachments designed for use (as per manufacturer's recommendation) with this equipment been inspected and are considered suitable for use? \_\_\_\_\_

**Portable Power Tools:**

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

**Cleanliness:**

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

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

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

**Identification:**

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

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

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

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

**ATTACHMENT III**  
**SAFE WORK PERMIT**

**SAFE WORK PERMIT FOR  
WELL ABANDONMENT ACTIVITIES  
NAVAL AIR STATION KEY WEST, KEY WEST, FLORIDA**

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

**SECTION I: General Job Scope**

- I. Work limited to the following (description, area, equipment used): Well abandonment activities (flush mount wells).
- II. Required Monitoring Instruments: None necessary
- III. Field Crew: \_\_\_\_\_
- IV. On-site Inspection conducted  Yes  No Initials of Inspector DJW

TtNUS

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

- IV. Protective equipment required
- |   |                                  |  |  |  |  |
|---|----------------------------------|--|--|--|--|
| Level D <input checked="" type="checkbox"/> | Level B <input type="checkbox"/> |  | Respiratory equipment required         |  |  |
| Level C <input type="checkbox"/>            | Level A <input type="checkbox"/> |  | Full face APR <input type="checkbox"/> | None <input checked="" type="checkbox"/> |  |
|   |                                  |  | Half face APR <input type="checkbox"/> |  |  |

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

V. Chemicals of Concern	Action Level(s)	Response Measures
<u>None anticipated to be present</u>	_____	_____
_____	_____	_____
_____	_____	_____

VI. 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 checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Safety belt/harness	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Chemical/splash goggles .....	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Radio	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Splash Shield.....	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Barricades	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Splash suits/coveralls .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Gloves (Nitrile/leather)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Steel toe Work shoes or boots	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Work/rest regimen	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

Modifications/Exceptions: Hearing protection when working near noise producing equipment. Reflective vests for work performed on or near road. Nitrile, cotton or leather work gloves. Hard hat when working near operating equipment.

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

IX. 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 Cleared and Established.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Physical Hazards Barricaded and Isolated .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Emergency Equipment Staged .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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

X. Special instructions, precautions: Use safe lifting practices when handling heavy/awkward equipment. Prevent access of unauthorized personnel into exclusion zone. Skin contact with grout mixtures may cause injury or irritation of the skin (redness, drying and/or caustic burns). Avoid contact through the use of gloves. During pad removal activities be aware of the potential for beware of flying projectiles and use safety glasses.

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

**ATTACHMENT IV**

**STANDARD OPERATING PROCEDURE  
FOR  
UTILITY LOCATING AND EXCAVATION  
CLEARANCE**



TETRA TECH NUS, INC.

# STANDARD OPERATING PROCEDURES

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

Subject  
UTILITY LOCATING AND EXCAVATION CLEARANCE

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## 1.0 PURPOSE

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

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

## 2.0 SCOPE

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

## 3.0 GLOSSARY

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

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

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

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

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

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

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#### 4.0 RESPONSIBILITIES

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

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

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

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

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

#### 5.0 PROCEDURES

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

##### 5.1 Buried Utilities

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

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

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

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

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

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

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**5.2            Overhead Power Lines**

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

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

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

**6.0            UNDERGROUND LOCATING TECHNIQUES**

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

**6.1            Geophysical Methods**

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

**Electromagnetic Induction**

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

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

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

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## **Magnetics**

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

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

## **Ground Penetrating Radar**

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

### **6.2 Passive Detection Surveys**

#### **Acoustic Surveys**

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

#### **Thermal Imaging**

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

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

### **6.3 Intrusive Detection Surveys**

#### **Vacuum Excavation**

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

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

### Hand Excavation

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

### Tile Probe Surveys

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

## 7.0 INTRUSIVE ACTIVITIES SUMMARY

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

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

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

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

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

## 8.0 REFERENCES

OSHA Letter of Interpretation, Mr. Joseph Caldwell, Attachment 4  
 OSHA 29 CFR 1926(b)(2)  
 OSHA 29 CFR 1926(b)(3)  
 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 1-800-962-7962 New York City- Long Island One Call Center 1-800-272-4480
<b>Arkansas</b> Arkansas One Call System, Inc. 1-800-482-8998	<b>Louisiana</b> Louisiana One Call System, Inc. 1-800-272-3020	<b>North Carolina</b> The North Carolina One-Call Center, Inc. 1-800-632-4949
<b>California</b> Underground Service Alert North 1-800-227-2600 Underground Service Alert of Southern California 1-800-227-2600	<b>Maine</b> Dig Safe System, Inc. 1-888-344-7233	<b>North Dakota</b> North Dakota One-Call 1-800-795-0555
<b>Colorado</b> Utility Notification Center of Colorado 1-800-922-1987	<b>Maryland</b> Miss Utility 1-800-257-7777 Miss Utility of Delmarva 1-800-282-8555	<b>Ohio</b> Ohio Utilities Protection Service 1-800-362-2764 Oil & Gas Producers Underground Protect'n Svc 1-800-925-0988
<b>Connecticut</b> Call Before You Dig 1-800-922-4455	<b>Massachusetts</b> Dig Safe System, Inc. 1-888-344-7233	<b>Oklahoma</b> Call Okie 1-800-522-6543
<b>Delaware</b> Miss Utility of Delmarva 1-800-282-8555	<b>Michigan</b> Miss Dig System, Inc. 1-800-482-7171	<b>Oregon</b> Oregon Utility Notification Center/One Call Concepts 1-800-332-2344
<b>Florida</b> Sunshine State One-Call of Florida, Inc. 1-800-432-4770	<b>Minnesota</b> Gopher State One Call 1-800-252-1166	<b>Pennsylvania</b> Pennsylvania One Call System, Inc. 1-800-242-1776
<b>Georgia</b> Underground Protection Center, Inc. 1-800-282-7411	<b>Mississippi</b> Mississippi One-Call System, Inc 1-800-227-6477	<b>Rhode Island</b> Dig Safe System, Inc. 1-888-344-7233
<b>Hawaii</b> Underground Service Alert North 1-800-227-2600	<b>Missouri</b> Missouri One-Call System, Inc. 1-800-344-7483	<b>South Carolina</b> Palmetto Utility Protection Service Inc. 1-888-721-7877
<b>Idaho</b> Dig Line Inc. 1-800-342-1585 Kootenai County One-Call 1-800-428-4950 Shoshone - Benewah One-Call 1-800-398-3285	<b>Montana</b> Utilities Underground Protection Center 1-800-424-5555 Montana One Call Center 1-800-551-8344	<b>South Dakota</b> South Dakota One Call 1-800-781-7474
<b>Illinois</b> JULIE, Inc. 1-800-892-0123 Digger (Chicago Utility Alert Network) 312-744-7000	<b>Nebraska</b> Diggers Hotline of Nebraska 1-800-331-5666	<b>Tennessee</b> Tennessee One-Call System, Inc. 1-800-351-1111
<b>Indiana</b> Indiana Underground Plant Protection Service 1-800-382-5544	<b>Nevada</b> Underground Service Alert North 1-800-227-2600	
	<b>New Hampshire</b> Dig Safe System, Inc. 1-888-344-7233	

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**Texas**

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

**Utah**

Blue Stakes of Utah  
1-800-662-4111

**Vermont**

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

**Virginia**

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

**Washington**

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

**West Virginia**

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

**Wisconsin**

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

**Wyoming**

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

**District of Columbia**

Miss Utility  
1-800-257-7777

**Alberta**

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

**British Columbia**

BC One Call  
1-800-474-6886

**Ontario**

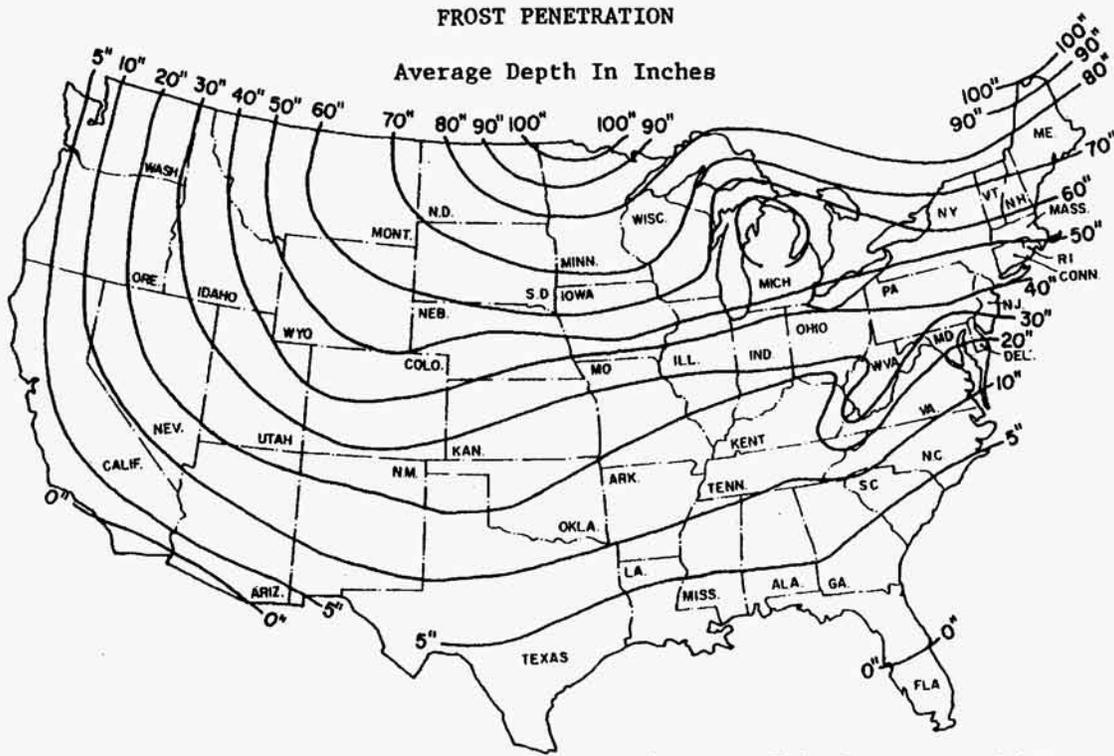
Ontario One-Call System  
1-800-400-2255

**Quebec**

Info-Excavation  
1-800-663-9228

**ATTACHMENT 2**

**FROST LINE PENETRATION DEPTHS BY GEOGRAPHIC LOCATION**



Courtesy U.S. Department Of Commerce

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**ATTACHMENT 3  
UTILITY CLEARANCE FORM**

Client: \_\_\_\_\_ Project Name: \_\_\_\_\_  
 Project No.: \_\_\_\_\_ Completed By: \_\_\_\_\_  
 Location Name: \_\_\_\_\_ Work Date: \_\_\_\_\_  
 Excavation Method/Overhead Equipment: \_\_\_\_\_

1. **Underground Utilities** Circle One
- a) Review of existing maps? yes no N/A
  - b) Interview local personnel? yes no N/A
  - c) Site visit and inspection? yes no N/A
  - d) Excavation areas marked in the field? yes no N/A
  - e) Utilities located in the field? yes no N/A
  - f) Located utilities marked/added to site maps? yes no N/A
  - g) Client contact notified yes no N/A  
 Name \_\_\_\_\_ Telephone: \_\_\_\_\_ Date: \_\_\_\_\_
  - g) State One-Call agency called? yes no N/A  
 Caller: \_\_\_\_\_  
 Ticket Number: \_\_\_\_\_ Date: \_\_\_\_\_
  - h) Geophysical survey performed? yes no N/A  
 Survey performed by: \_\_\_\_\_  
 Method: \_\_\_\_\_ Date: \_\_\_\_\_
  - i) Hand excavation performed (with concurrent use of utility  
 detection device)? yes no N/A  
 Completed by: \_\_\_\_\_  
 Total depth: \_\_\_\_\_ feet Date: \_\_\_\_\_
  - j) Trench/excavation probed? yes no N/A  
 Probing completed by: \_\_\_\_\_  
 Depth/frequency: \_\_\_\_\_ Date: \_\_\_\_\_

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

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

Approval:  
 \_\_\_\_\_  
 Site Manager/Field Operations Leader Date  
c: PM/Project File  
Program File

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**ATTACHMENT 4  
OSHA LETTER OF INTERPRETATION**

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

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

Dear Mr. Caldwell:

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

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

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

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

**Answer**

Background

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

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

Paragraph (b)(3) provides:

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When excavation operations approach the estimated location of underground installations, the exact location of the installations shall be determined by safe and acceptable means. (emphasis added).

Therefore, "acceptable means" must be used where the location of the underground utilities have not been identified by the utility companies and detection equipment is not used.

Subpart P does not contain a definition of either "other acceptable means" or "safe and acceptable means." The preambles to both the proposed rule and the final rule discussed the rationale behind the wording at issue. For example, the preamble to the proposed rule, 52 Fed. Reg. 12301 (April 15, 1987), noted that a 1972 version of this standard contained language that specified "careful probing or hand digging" as the means to uncover utilities. The preamble then noted that an amendment to the 1972 standard later deleted that language "to allow other, *equally effective means* of locating such installations." The preamble continued that in the 1987 proposed rule, OSHA again proposed using language in section (b)(3) that would provide another example of an acceptable method of uncovering utilities that could be used where the utilities have not been marked and detection equipment is not being used – "probing with hand-held tools." This method was rejected in the final version of 29 CFR 1926. As OSHA explained in the preamble to the final rule, 54 Fed. Reg. 45916 (October 31, 1989):

OSHA received two comments \*\*\* and input from ACCSH [OSHA's Advisory Committee on Construction Safety and Health] \*\*\* on this provision. All commenters recommended dropping 'such as probing with hand-held tools' from the proposed provision, because this could create a hazard to employees by damaging the installation or its insulation.

In other words, the commenters objected to the use of hand tools being used unless detection equipment was used in conjunction with them. OSHA then concluded its discussion relative to this provision by agreeing with the commentators and ultimately not including any examples of "acceptable means" in the final provision.

Non-conductive hand tools are permitted

This raises the question of whether the standard permits the use of hand tools alone -- without also using detection equipment. NUCA and other industry stakeholders have recently informed us that non-conductive hand tools that are appropriate to be used to locate underground utilities are now commonly available.

Such tools, such as a "shooter" (which has a non-conductive handle and a snub nose) and non-conductive or insulated probes were not discussed in the rulemaking. Since they were not considered at that time, they were not part of the class of equipment that was thought to be unsafe for this purpose. Therefore, we conclude that the use of these types of hand tools, when used with appropriate caution, is an "acceptable means" for locating underground utilities.

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**ATTACHMENT 4 (Continued)**

Hydro-vacuum excavation

It is our understanding that some hydro-vacuum excavation equipment can be adjusted to use a minimum amount of water and suction pressure. When appropriately adjusted so that the equipment will not damage underground utilities (especially utilities that are particularly vulnerable to damage, such as electrical lines), use of such equipment would be considered a "acceptable means" of locating underground utilities. However, if the equipment cannot be sufficiently adjusted, then this method would not be acceptable under the standard.

Other technologies

We are not suggesting that these are the only devices that would be "acceptable means" under the standard. Industry stakeholders have informed us that there are other types of special excavation equipment designed for safely locating utilities as well.

We apologize for any confusion our July 7 letter may have caused. If you have further concerns or questions, please feel free to contact us again by fax at: U.S. Department of Labor, OSHA, Directorate of Construction, Office of Construction Standards and Compliance Assistance, fax # 202-693-1689. You can also contact us by mail at the above office, Room N3468, 200 Constitution Avenue, N.W., Washington, D.C. 20210, although there will be a delay in our receiving correspondence by mail.

Sincerely,

Russell B. Swanson, Director  
Directorate of Construction

*NOTE:* OSHA requirements are set by statute, standards and regulations. Our interpretation letters explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. This letter constitutes OSHA's interpretation of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at <http://www.osha.gov>.

**ATTACHMENT V**

**MEDICAL DATA SHEET**

## MEDICAL DATA SHEET

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

Project \_\_\_\_\_

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

Address \_\_\_\_\_

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

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

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

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

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

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

\_\_\_\_\_

\_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

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

\_\_\_\_\_

\_\_\_\_\_

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

\_\_\_\_\_

Signature

\_\_\_\_\_

Date