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HEALTH AND SAFETY PLAN FOR ABBREVIATED CONTAMINATION ASSESSMENT PLAN
FOR SITE A-824 AND HAWK MISSILE SITE G-01 AND MONITORED NATURAL
ATTENUATION SAMPLING OF HAWK MISSILE SITE B-01 WITH TRANSMITTAL LETTER
NAS KEY WEST FL
10/10/2003
TETRA TECH NUS



TETRA TECH NUS, INC.

AIK-03-0263

October 10, 2003

Project Number N4779

via U.S. Mail

Commander
Department of the Navy
SOUTHDIV NAVFACENGCOM
ATTN: Byas Glover (Code ES24)
P.O. Box 190010
North Charleston, South Carolina 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order No. 0318

Subject: Health and Safety Plan for Abbreviated Contamination Assessment Plan for Site A-824 and Geiger Key Hawk Missile Site G-01; Monitored Natural Attenuation Sampling Plan for Boca Chica Hawk Missile Site B-01, Rev. 0, Naval Air Station, Key West, Florida

Dear Mr. Glover:

TtNUS is pleased to submit the enclosed PDF file for the Health and Safety Plan for Abbreviated Contamination Assessment Plan for Site A-824 and Geiger Key Hawk Missile Site G-01; Monitored Natural Attenuation Sampling Plan for Boca Chica Hawk Missile Site B-01, Rev. 0, Naval Air Station, Key West, Florida. I am not expecting to receive any comments on this plan.

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

Sincerely,

C. M. Bryan
Project Manager

CMB:spc

Enclosure

c: Ms. Debbie Wroblewski (Cover Letter Only)
Mr. M. Perry/File
File N4779-4.2

Ms. T. Vaught, FDEP

**Health and Safety Plan
for
Abbreviated Contamination
Assessment
at
Building A-824 and Geiger Key Hawk Missile
Site G-01 and Monitored Natural Attenuation
Sampling for Boca Chica Hawk Missile Site B-01**

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



**Southern Division
Naval Facilities Engineering Command
Contract No. N62467-94-D-0888
Contract Task Order 0318**

October 2003

HEALTH AND SAFETY PLAN
FOR
ABBREVIATED CONTAMINATION ASSESSMENT
AT
BUILDING A-824 AND GEIGER KEY HAWK
MISSILE SITE G-01 AND MONITORED NATURAL ATTENUATION SAMPLING
FOR BOCA CHICA HAWK MISSILE SITE B-01
NAVAL AIR STATION KEY WEST
KEY WEST, FLORIDA

Submitted to:

Southern Division
Naval Facilities Engineering Command
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Submitted by:

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CONTRACT NO. N62467-94-D-0888
CONTRACT TASK ORDER 0318

October 2003

PREPARED UNDER THE SUPERVISION OF:

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1.0 INTRODUCTION

This Health and Safety Plan (HASP) has been developed to provide practices and procedures for Tetra Tech NUS, Inc. (TtNUS) personnel engaged in environmental studies at three sites at the Naval Air Station (NAS) Key West, located in Key West, Florida. This work is authorized under the Comprehensive Long - Term Environmental Action Navy (CLEAN) contract, administered through the U.S. Navy Southern Division Naval Facilities Engineering Command, as defined under Contract No. N62467-94-D-0888; Contract Task Order Number 0318. This HASP must be used in conjunction with the TtNUS Health and Safety Guidance Manual. Both of these documents must be present at the site during the performance of all site activities. The Guidance Manual provides detailed information pertaining to the HASP as well as applicable TtNUS Standard Operating Procedures (SOPs). This HASP and the contents of the Guidance Manual were developed to comply with the requirements stipulated in 29 CFR 1910.120 (OSHA's Hazardous Waste Operations and Emergency Response Standard).

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 at the sites of interest. The HASP will be modified if new information becomes available. All changes to the HASP will be made with the approval of the TtNUS Project Health and Safety Officer (PHSO) and the TtNUS Health and Safety Manager (HSM). Requests for modifications to the HASP will be directed to the PHSO, who will determine if the changes are necessary. The PHSO will notify the Task Order Manager (TOM), who will notify all affected personnel of changes.

1.1 KEY PROJECT PERSONNEL AND ORGANIZATION

This section defines responsibility for site safety and health for TtNUS 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 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:
 - Providing information regarding site contaminants and physical hazards associated with the site.
 - Establishing air monitoring and decontamination procedures.

- Assigning personal protective equipment based on task and potential hazards.
 - Determining emergency response procedures and emergency contacts.
 - Stipulating training requirements and reviewing appropriate training and medical surveillance certificates.
 - Providing standard work practices to minimize potential injuries and exposures associated with hazardous waste work.
 - Modifying 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:
 - Coordinating all health and safety activities with the FOL.
 - Selecting, inspecting, and maintaining personal protective equipment.
 - Establishing work zones and control points in areas of operation.
 - Implementing air monitoring program for onsite activities.
 - Verifying training and medical clearance of onsite personnel status in relation to site activities.
 - Implementing Hazard Communication, Respiratory Protection Programs, and other associated health and safety programs as they may apply to site activities.
 - Coordinating emergency services.
 - Providing site-specific training for all onsite personnel.
 - Investigating all accidents and injuries (see Attachment I - Illness/Injury Procedure and Report Form)
 - 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.

Note: In some cases one person may be designated responsibilities for more than one position. For example, at NAS Key West, the FOL may also be responsible for SSO duties. This action will be performed only as credentials or experience permits.

1.2 SITE INFORMATION AND PERSONNEL ASSIGNMENTS

Site Name: Naval Air Station Key West **Client Contact:** Mr. Robert Courtright
Key West, Florida **Phone Number:** (305) 293-2881

Scheduled Activities: TtNUS will conduct sampling at Building A-824 and Geiger Key Hawk Missile Site G-01. Monitored natural attenuation sampling will be performed at Boca Chica Hawk Missile Site B-01. See Section 3.0 and 4.0 for details concerning details site background and scope of work.

Dates of scheduled activities: Fall 2003

Project Team:

TtNUS Management Personnel:

Discipline/Tasks Assigned:

Chuck Bryan

Task Order Manager (TOM)

Emily Harrison McRee

Field Operations Leader (FOL)

Emily Harrison McRee

Site Safety Officer (SSO)

Matthew M. Soltis, CIH, CSP

CLEAN Health and Safety Manager

Donald J. Westerhoff, CSP

Project Health and Safety Officer (PHSO)

Other Potential TtNUS Project Personnel:

Hazard Assessment (for purpose of 29 CFR 1910.132) for HASP preparation has been conducted by:
Donald J. Westerhoff, CSP

2.0 EMERGENCY ACTION PLAN

2.1 INTRODUCTION

This section has been developed as part of a planning effort to direct and guide field personnel in the event of an emergency. All site activities will be coordinated with the client contact, Robert Courtright. In the event of an emergency which cannot be mitigated using onsite resources, personnel will evacuate to a safe place of refuge and the appropriate emergency response agencies will be notified. It has been determined that the majority of potential emergency situations would be better supported by outside emergency responders. Based on this determination, TtNUS personnel will not provide emergency response support beyond the capabilities of onsite response. Workers who are ill or who have suffered a non-serious injury may be transported by site personnel to nearby medical facilities, provided that such transport does not aggravate or further endanger the welfare of the injured/ill person. The emergency response agencies listed in this plan are capable of providing the most effective response, and as such, will be designated as the primary responders. These agencies are located within a reasonable distance from the area of site operations, which ensures adequate emergency response time. NAS Key West contact Robert Courtright will be notified anytime outside response agencies are contacted. This Emergency Action Plan conforms to the requirements of 29 CFR 1910.38(a), as allowed in 29 CFR 1910.120(I)(1)(ii).

TtNUS will, through necessary services, provide the following emergency action measures:

- Initial stage fire fighting support and prevention
- Initial spill control and containment measures and prevention
- Removal of personnel from emergency situations
- Initial medical support for injuries or illnesses requiring basic first-aid
- Site control and security measures as necessary

2.2 EMERGENCY PLANNING

Through the initial hazard/risk assessment effort, emergencies resulting from chemical, physical, or fire hazards are considered to be unlikely to be encountered during site activities. Nonetheless, to minimize and eliminate the potential for any emergency situations, emergency planning activities will include the following (which are the responsibility of the SSO and/or the FOL):

- Coordinating with local Emergency Response personnel to ensure that TtNUS emergency action activities are compatible with existing emergency response procedures. Base Fire Protection and

Emergency Services will be notified of scheduled events and activities. This is most imperative in situations where their services may be required.

- 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:

- Identifying a chain of command for emergency action.
- Educating site workers to the hazards and control measures associated with planned activities at the site, and providing early recognition and prevention, where possible.
- Periodically performing practice drills to ensure site workers are familiar with incidental response measures.
- Providing the necessary equipment to safely accomplish identified tasks.

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. 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. Tasks to be performed at the site, potential hazards associated with those tasks and the recommended control methods are 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 log book; 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 appropriate response agencies listed in Table 2-1.

2.3.2 Prevention

TtNUS personnel will minimize the potential for emergencies by following the Health and Safety Guidance Manual and ensuring compliance with the HASP and 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 EVACUATION ROUTES, PROCEDURES, AND PLACES OF REFUGE

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

In the event of an emergency requiring evacuation, all personnel will immediately stop activities and report to the designated safe place of refuge unless doing so would pose additional risks. When evacuation to the primary place of refuge is not possible, personnel will proceed to a designated alternate location and remain until further notification from the TtNUS FOL. Safe places of refuge will be identified prior to the commencement of site activities by the SSO and will be conveyed to personnel as part of the pre-activities training session. This information will be reiterated during daily safety meetings. Whenever possible, the safe place of refuge will also serve as the telephone communications point for that area. During an evacuation, personnel will remain at the refuge location until directed otherwise by the TtNUS FOL or the on-site Incident Commander of the Emergency Response Team. The FOL or the SSO will perform a head count at this location to account for and to confirm the location of all site personnel. Emergency response personnel will be immediately notified of any unaccounted personnel. The SSO will document the names of all personnel onsite (on a daily basis) in the site Health and Safety Logbook. This information will be utilized to perform the head count in the event of an emergency.

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

2.5 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 not be performed if the incident warrants immediate evacuation. However, it is unlikely that an evacuation would occur which would require workers to evacuate the site without first performing the necessary decontamination procedures.

TtNUS personnel will perform removal of personnel from emergency situations and may provide initial medical support for injury/illnesses requiring only first-aid level support. Medical attention above that level will require assistance and support 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. Table 2-1 provides a list of emergency contacts and their associated 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.

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

AGENCY	TELEPHONE
Key West Police/Rescue Services	(305) 293-2971
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
Poison Control Center	(800) 222-1222
Chemtrec	(800) 424-9300
National Response Center	(800) 424-8802
Task Order Manager, Chuck Bryan	(803) 649-7963 x345
Field Operations Leader, Emily McRee	(803) 649-7963 X 344
Site Safety Officer, Emily McRee	(803) 649-7963 X 344
Health and Safety Manager, Matthew M. Soltis, CIH, CSP	(412) 921-8912
Project Health and Safety Officer, Donald J. Westerhoff, CSP	(412) 921-7281

2.7 EMERGENCY ROUTE TO HOSPITAL

The closest hospital to NAS Key West is Lower Florida Keys Health System. Directions are as follows:

From Boca Chica, exit NAS Key West and get on U.S. 1 South. Go west across the bridge; pass Texaco and turn right on Junior College Road. Golf course will be on left; and on right, you will see hospital sign. Follow road to Hospital, which will be on the left. Hospital is located at 5900 College Road on Stock Island.

A map indicating the travel route from the site to the Hospital will be inserted as Figure 2-2.

Figure 2-1
Route to Hospital



2.8 EMERGENCY ALERTING AND ACTION/RESPONSE PROCEDURES

TtNUS personnel will be working in close proximity to each other at NAS Key West. As a result, hand signals, voice commands, and line of site communication will be sufficient to alert site personnel of an emergency. When project tasks are performed simultaneously on different sites, vehicle horns will be used to communicate emergency situations.

If an emergency warranting evacuation occurs, the following procedures are to be initiated:

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

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

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

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

Call the pertinent emergency contacts listed in Table 2-1 and report the incident. Give the emergency operator the location of the emergency, the type of emergency, the number of injured, and a brief description of the incident. Stay on the phone and follow the instructions given by the operator. The operator will then notify and dispatch the proper emergency response agencies.

2.9 PPE AND EMERGENCY EQUIPMENT

A first aid kit, eye wash units (or bottles of disposable eyewash solution) and fire extinguishers (strategically placed) will be maintained onsite and shall be immediately available for use in the event of an emergency. This equipment will be located in the field office as well as in each site vehicle. At least one first aid kit supplied with equipment to protect against bloodborne pathogens will also be available on site. Personnel identified within the field crew with bloodborne pathogen and first-aid training will be the only personnel permitted to offer first-aid assistance.

As soon as possible Navy contact Robert Courtright must be informed of any incident or accident that requires medical attention.

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 (see Attachment II of this HASP). If an exposure to hazardous materials has occurred, provide hazard information from Table 6-1 to medical service personnel.

Figure 2-2 Emergency Response Protocol

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

In the event of a personnel injury or accident:

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

As data is gathered and the scenario becomes more clearly defined, this information should be forwarded to WorkCare.

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

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

**FIGURE 2-2 (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 their skin contact? _____

Was the exposing agent inhaled? _____

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

III. Signs and Symptoms (check off appropriate symptoms)

Immediately With Exposure:

Burning of eyes, nose, or throat
Tearing
Headache
Cough
Shortness of Breath

Chest Tightness / Pressure
Nausea / Vomiting
Dizziness
Weakness

Delayed Symptoms:

Weakness
Nausea / Vomiting
Shortness of Breath
Cough

Loss of Appetite
Abdominal Pain
Headache
Numbness / Tingling

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

Burning of eyes, nose, or throat
Tearing
Headache
Cough
Shortness of Breath
Chest Tightness / Pressure
Cyanosis

Nausea / Vomiting
Dizziness
Weakness
Loss of Appetite
Abdominal Pain
Numbness / Tingling

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

Improved: _____ Worsened: _____ Remained Unchanged: _____

V. Treatment of Symptoms (check off appropriate response)

None: _____ Self-Medicating: _____ Physician Treated: _____

3.0 SITE BACKGROUND

3.1 SITE HISTORY

NAS Key West is in southern Monroe County, Florida. The U.S. Navy manages 6,323 acres of land divided into twenty separate tracts in the lower Florida Keys, concentrated around Key West and Boca Chica Key. The Naval Station at Key West was disestablished in 1974, resulting in the relocation of several units. At present, NAS Key West is proceeding with realignment of aviation operations, a research laboratory, communications intelligence, counternarcotics air surveillance operations, a weather service, and several other activities on Key West. In addition to the Naval activities and units, other DOD and Federal agencies at NAS Key West include the U.S. Air Force, U.S. Army, and U.S. Coast Guard.

Several installations in various parts of the lower Florida Keys comprise the Naval Complex at Key West. Most of these are on Key West and Boca Chica Key. Key West, one of the two westernmost major islands of the Florida Keys, is approximately 150 miles southwest of Miami and 90 miles north of Havana, Cuba. Key West connects to the mainland by the Overseas Highway (U.S. Highway No. 1). The topography at the NAS Key West is generally flat.

3.2 PROJECT SITE DESCRIPTION

3.2.1 Building A-824

Building A-824 stands on the north side of NAS Key West, on Boca Chica Key, Florida. Building A-824, known as Solid Waste Management Unit (SWMU) 7, was previously used to store supplies and small electrical transformers. It was also used for temporary staging of 55-gallon drums of hazardous waste. Although no reported release of petroleum hydrocarbons was recorded, fuel contamination identified to the east of the building during the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI)/Remedial Investigation (RI) suggested a possible roadside diesel spill. Fuel constituents were also discovered in the area between the access roads to the east of Building A-824 during the Supplemental RFI/RI.

3.2.2 Geiger Key Hawk Missile Site G-01

Geiger Key Hawk Missile Site G-01 is located south of State Road S-941 (Old Boca Chica Road) on the southwest end of Geiger Key. Two aboveground storage tanks (ASTs) used to store diesel fuel for emergency generators were located at the site. The tanks also reportedly stored jet propellant (JP-5) fuel on occasion. The 2,000-gallon and 500-gallon tanks were closed in place on April 27, 1996. The

Closure Report indicated that the groundwater in the vicinity of the 2,000-gallon AST showed signs of petroleum hydrocarbon contamination and recommended that a Contamination Assessment be performed.

A site assessment was conducted by BBL and a Site Assessment Report (SAR) was submitted to Florida Department of Environmental Protection (FDEP) in February 2002. Petroleum contamination was identified during the site assessment in soil and groundwater extending from the 2,000-gallon AST to the north end of the study area. The SAR concluded that the horizontal extent of contamination at the Geiger Key Hawk Missile Site G-01 was not fully defined. Monitored Natural Attenuation (MNA) was recommended for the site, following the installation of additional monitoring wells. For this reason, TtNUS will perform additional screening of soil and groundwater to determine the optimum location for three additional monitoring wells. The FDEP approved the SAR concurring with the recommendation to continue further field investigation to delineate the extent of the petroleum hydrocarbons.

3.2.3 Boca Chica Hawk Missile Site B-01

Boca Chica Hawk Missile Site B-01 is located on the northern end of Boca Chica Key. The site has been abandoned and no activities are conducted with the exception of a tower operated by the National Oceanic and Atmospheric Administration (NOAA) and an associated emergency generator with 1,000-gallon AST containing jet propellant fuel (JP-5), located approximately 250 feet from the study area.

A 2,000-gallon and a 500-gallon AST were removed from the site on April 14, 1996. These tanks were used to store diesel fuel for the site's emergency generators. They may have also been used to store JP-5 fuel on occasion. The Closure Report indicated that the soil and groundwater in the vicinity of the 2,000-gallon AST exhibited signs of petroleum contamination, and recommended that a Contamination Assessment be performed.

A site assessment was conducted by BBL and a SAR was submitted to FDEP in February 2002. Concentrations of contaminants of concern (COC) in soils were below soil cleanup target levels (SCTLs), and organic vapor analyzer (OVA) readings did not exceed 10 parts per million (ppm). Polynuclear aromatic hydrocarbons (PAHs) were detected above Groundwater Cleanup Target Levels (GCTLs) in groundwater from the Boca Chica Hawk Missile Site B-01. However, no other Kerosene Analytical Group (KAG) constituents were detected above GCTLs. BBL recommended that MNA take place at the site at two monitoring wells for one to two years and that groundwater from the site be analyzed for PAHs, only.

4.0 SCOPE OF WORK

This section describes the project tasks that will be performed at NAS Key West. Additionally, each task has been evaluated and the associated hazards and recommended control measures are listed in Table 5-1 of this HASP. If new tasks are to be performed at the site, Table 5-1 and this section will be modified accordingly. Specific tasks to be conducted include, but are not necessarily limited to, the following:

- Mobilization and demobilization
- Soil boring and installation of monitoring wells using Direct Push Technology (DPT)
- Multi-media sampling (groundwater and soils)
- Investigation derive waste (IDW) management
- Decontamination of equipment
- Surveying of new monitoring wells

The above listing represents a summarization of the tasks as they apply to the scope and application of this HASP. For more detailed description of the associated tasks refer to the Abbreviated Contamination Assessment Plan for Building A-824 and Geiger Key Hawk Missile Site G-01; Monitored Natural Attenuation Sampling Plan for Boca Chica Hawk Missile Site B-01. If additional tasks are determined to be necessary, this HASP will be amended and a hazard evaluation of the additional tasks performed.

5.0 TASKS/HAZARDS/ASSOCIATED CONTROL MEASURES SUMMARIZATION

Table 5-1 of this section serves as the primary portion of this HASP and identifies the tasks that are to be performed as part of the scope of work. This table may be modified if new or additional tasks become necessary. For each of the planned tasks, Table 5-1 specifies the anticipated hazards, recommended control measures, air monitoring recommendations, required Personal Protective Equipment (PPE), and decontamination measures.

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

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

Safe Work Permits issued for all exclusion zone activities (See Section 9.2) will use elements defined in Table 5-1 as its primary reference. The FOL and/or the SSO completing the Safe Work Permit (SWP) will be required to add certain task-specific information. The SWPs are to be used by the SSO as the outline for task-specific tailgate safety briefings, which are to be conducted prior to the initiation of each task, and at the beginning of each work shift.

5.1 GENERAL SAFE WORK PRACTICES

In addition to the task-specific work practices identified on Table 5-1, the following general safe work practices are to be followed when conducting work on-site. These safe work practices address a pattern of general precautions and measures for reducing risks associated with site operations. This list is not all-inclusive and may be amended as necessary.

- Eating, drinking, chewing gum or tobacco, taking medication, or smoking is prohibited in contaminated or potentially contaminated areas or where the possibility for the transfer of contamination exists.
- Wash hands and face thoroughly upon leaving a contaminated or suspected contaminated area. A thorough shower and washing must be conducted as soon as possible if excessive skin contamination occurs.
- Avoid contact with potentially contaminated substances. Avoid puddles, pools, mud, or other such areas. Avoid, whenever possible, kneeling on the ground or leaning or sitting on equipment. Keep monitoring equipment away from potentially contaminated surfaces.
- Obey all instructions in the site-specific HASP.
- Take note of the location of the nearest telephone and all emergency telephone numbers. See Section 2.0, Table 2-1.
- Attend briefings on anticipated hazards, equipment requirements, safe work permits, emergency procedures, and communication methods before going on site.
- Plan and mark entrance, exit, and emergency escape routes. See Section 2.0.
- Rehearse unfamiliar operations prior to implementation.
- Buddies should maintain visual contact with each other and with other on-site team members by remaining in close proximity to assist each other in case of emergency.
- Establish appropriate Safety Zones including Support, Contamination Reduction, and Exclusion Zones.
- Minimize the number of personnel and equipment in contaminated areas (such as the Exclusion Zone). Non-essential vehicles and equipment should remain within the Support Zone.
- Establish appropriate decontamination procedures for leaving the site.
- Immediately report all injuries, illnesses, and unsafe conditions, practices, and equipment to the Site Safety Officer (SSO).

- Matches and lighters are restricted from entering in the Exclusion Zone or Contamination Reduction Zone.
- Observe coworkers for signs of toxic exposure and heat or cold stress.
- Inform co-workers of potential symptoms of illness, such as headaches, dizziness, nausea, or blurred vision.

5.2 DRILLING/DPT OPERATIONS - SAFE WORK PRACTICES

The following Safe Work Practices are to be followed when working in or around drilling operations.

5.2.1 Before Drilling/DPT Operations

- Identify all underground utilities and buried structures before drilling. Use the Utility Locating and Excavation Clearance Standard Operating Procedure provided in Attachment V.
- A Competent Person (the SSO or designee) will inspect all drill/DPT rigs, prior to the acceptance of the equipment at the site and prior to the use of the equipment. All repairs or deficiencies identified will be corrected prior to use. The inspection will be accomplished using the Equipment Inspection Checklist provided in Attachment VI. Inspection frequencies will be once every 10-day shift or following repairs.
- The work area around the point of operation will be graded to the extent possible to remove any trip hazards near or surrounding operating equipment.
- An equipment staging and lay-down plan will be established. The purpose of this area is to keep the work area clear of clutter and slips, trips, and fall hazards.
- All potentially contaminated tooling will be wrapped in polyethylene sheeting for storage and transport to the centrally located decontamination unit.

5.2.2 During Drilling/DPT Operations

- Minimize contact to the extent possible with contaminated tooling and environmental media.

- Support functions (sampling and screening stations) will be maintained a minimum distance from the drilling rig of the height of the mast plus five feet to remove these activities from within physical hazard boundaries.
- Only qualified operators and knowledgeable ground crew personnel will participate in the operation of the drill/DPT rig.
- In order to minimize contact with potentially contaminated tooling and media and to minimize lifting hazards, multiple personnel should move heavy tooling, where necessary.
- Only personnel absolutely essential to the work activity will be allowed in the exclusion zone. Site visitors will be escorted at all times.

5.2.3 After Drilling/DPT Operations

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

**TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES
NAS, KEY WEST, FLORIDA**

Task/Operation/Location	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring - Types and Action Levels	Personal Protective Equipment (Items in italics are deemed optional as conditions or the FOL or SSO dictate.)	Decontamination Procedures
<p>Mobilization/Demobilization</p> <p>This activity includes, but not limited to:</p> <ul style="list-style-type: none"> - Equipment Preparation and Evaluation - Resource acquisition and unpacking of supplies - Site clearance and preparation – Utility clearances, etc. - Establish and construct access routes to sample/work locations - Construct decontamination and IDW operation and storage facilities, as applicable. - Surveying activities 	<p>Chemical hazards:</p> <p>1) Site contaminants are not anticipated to be encountered during this activity. However, chemical hazards may be associated with chemicals that are brought on-site.</p> <p>Physical hazards:</p> <p>2) Lifting (strain/muscle pulls)</p> <p>3) Cuts and lacerations</p> <p>4) Pinches and compressions/Struck by</p> <p>5) Slips, trips, and falls</p> <p>6) Heavy equipment hazards (swinging booms, hydraulic lines, etc.)</p> <p>7) Vehicular and foot traffic</p> <p>Natural hazards:</p> <p>8) Ambient temperature extremes (heat stress)</p> <p>9) Insect and animal bites and poisonous plants</p> <p>10) Inclement weather</p>	<p>1) The on-site Hazard Communication Program (Section 5.0 TINUS Health and Safety Guidance Manual) will be followed. This effort shall include</p> <ul style="list-style-type: none"> - Accurate Chemical Inventory List (Entries will match chemicals brought on-site, as the names appear on the MSDS and the label) This list will also contain quantities and storage locations. - MSDS's will be maintained in a central location available to site personnel. - Containers will have labels specifying the following information: <ul style="list-style-type: none"> a) Chemical Identity (As it appears on the label, MSDS, and Chemical Inventory List) b) Appropriate Warning (i.e., Eye and skin irritation, flammable, etc.) c) Manufacturer's Name Address and Phone Number <p>The FOL and/or the SSO's is responsible to ensure that this is completed. Personnel will be required to review the appropriate MSDS's, prior to the use of a chemical substance.</p> <p>2) Lifting Hazards – During mobilization/demobilization personnel are required to handle equipment, supplies, and resources in preparation for site activities. This hazard becomes more predominant in the early morning hours (prior to muscles becoming limber) and later in the day (as a result of fatigue). The following provisions shall be instituted in order to minimize hazards of this nature:</p> <ul style="list-style-type: none"> - Use machinery or multiple personnel for heavy lifts. - Lift with your legs, not your back, bend your knees move as close to the load as possible, and ensure good hand holds are obtainable. - Minimize the horizontal distance to the center of the lift to your center of gravity. - Minimize turning and twisting when lifting as the lower back is especially vulnerable at this time. Ensure there is adequate room to lift and maneuver the load. Ensure the area of the lift is free of work place clutter, slippery surfaces, etc. - Break lifts into steps if the vertical distance (from the start point to the placement of the lift) is excessive. - Plan your lifts – Place heavy items on shelves between the waist and chest; lighter items on higher shelves. - Periods of high frequency lifts or extended duration lifts should provide sufficient breaks to guard against fatigue and injury. <p>3) Cuts and lacerations – To prevent cuts and lacerations associated with unpacking or packing equipment and supplies, during site preparation (clearing access routes):</p> <ul style="list-style-type: none"> - 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 blades as necessary to maintain a sharp cutting edge. Many accidents result from struggling with dull cutting attachments. <p>If hand tools (brush hooks, machetes, etc.) are used to gain access to sample locations, the following precautions are recommended:</p> <ul style="list-style-type: none"> - Ensure handles are of good construction (no cracks, splinters, loose heads/cutting apparatus). - Ensure cutting tools are maintained. Blades shall be sharp without nicks and gouges in the blade. - Hand tools (brush hooks, machetes, etc.) with cutting blades shall be provided with a sheath to protect individuals when not in use and when carrying these items over rough or slippery terrain. <p>4) Pinches/Compressions/Struck By - Do not modify tooling without manufacturer's expressed permission.</p> <ul style="list-style-type: none"> - Keep any machine guarding in place, avoid moving parts. - Use tools or equipment where necessary to avoid placing hands in areas vulnerable to pinch points. - Adjust machine guarding as necessary to minimize distance between guards and point of operation. - When staging equipment, ensure stacked loads, shelving, are adequately secure to avoid creating a hazard from falling objects. <p>5) Slips, trips, and falls - Preview work locations for unstable/uneven terrain.</p> <ul style="list-style-type: none"> - Cover, guard and barricade open pits, ditches, and openings to subsurface structures, as necessary. - The FOL and the SSO during site surveys and site preparation should identify these potential hazards. - Activities conducted greater than 6-feet above ground surface shall employ acceptable engineered fall protection (i.e. handrails and platforms) or accepted fall protection harnesses. <p>6) Heavy Equipment Hazards - Equipment will be:</p> <ul style="list-style-type: none"> - Inspected in accordance with OSHA and manufacturer's design. - Equipment inspection will be documented on a Equipment Inspection Checklist as provided in provided in Attachment III. - Operated by knowledgeable operators and ground crew. <p>7) Vehicular and Foot Traffic Hazards - As part of site preparation activities and zone construction, when preparing traffic and equipment considerations are to include the following:</p> <ul style="list-style-type: none"> - Self-propelled equipment shall be equipped with movement warning systems. - The FOL and/or the SSO as a precautionary measure to remove or demarcate physical hazards shall preview traffic routes (foot and vehicular) and work areas before the commitment of personnel and resources. <p>8) Ambient Temperature Extremes - Wear appropriate clothing for weather conditions. Additional information regarding heat and cold stress is provided in Section 4.0 of the TINUS Health and Safety Guidance Manual and Section 6.2.6 of this HASP.</p> <p>Care should be exercised when working outdoors due to harmful effects of the sun. To reduce the potential for sunburn and melanoma the following measures should be employed</p> <ul style="list-style-type: none"> - Wear a hat that shades the face, neck, and ears. - Apply sunscreen with a SPF of 15 or higher liberally on any exposed skin at least 15 minutes before going outside, then at least every two hours, more if you are sweating a lot. - Plan/provide suitable equipment to offer shade to avoid the midday sun since the sun's ultraviolet rays are most intense between 10 A.M. and 4 P.M. and can damage your skin even on hazy days. - Wear wrap-around sunglasses to protect the eyes and delicate skin around them. <p>9) Insect/Animal Bites and Stings and Poisonous Plants - To combat the potential impact of natural hazards, the following actions are recommended</p> <ul style="list-style-type: none"> - Avoid nesting areas – Activities are to take place within light industrial areas. Therefore, this hazard is not considered significant. However, mosquitoes, ticks, and fire ants are still anticipated to be problematic. See Section 6.3 of this HASP as well as Section 4.0 of the Health and Safety Guidance Manual. - Wear light color clothes. This will allow easier detection of ticks and insects crawling on your body. It will also assist in heat stress control. - Tape pant legs to work boots to block direct access. - Use repellents – Permanone should be applied liberally to the clothing, but not the skin as it may cause irritation. Concentrate on areas where ticks and other insects may access your body such as pant cuffs, shirt to pants, and collars. <p>10) Inclement Weather – In the event of electrical storms, high winds or other inclement weather, suspend or terminate operations until directed otherwise by SSO.</p>	<p>Visual observation of work practices by the FOL and/or the SSO to minimize potential physical hazards (i.e., improper lifting, unsecured loads, cutting practices, etc.).</p>	<p>Level D - (Minimum Requirements)</p> <ul style="list-style-type: none"> - Standard field attire (Sleeved shirt; long pants) - Safety shoes (Steel toe/shank) - <i>Safety glasses (when potential eye hazards exist)</i> - <i>Hardhat (when overhead hazards exists, or identified as a operation requirement)</i> - <i>Reflective vest for high traffic areas</i> - <i>Hearing protection for high noise areas (As directed on an operation by operation scenario or at the direction of the FOL and/or the SSO).</i> <p>As site conditions may change, the following equipment will be maintained during on-site activities as prescribed in Section 2.0 of this HASP</p> <ul style="list-style-type: none"> - Fire Extinguishers - First-aid kit <p>Note: The FOL and/or the SSO shall determine the number of fire extinguishers and first-aid kits to be made available based on the number of remote or separated operations to be conducted at any given time.</p>	<p>Not required.</p> <p>Good personal hygiene practices should be employed prior to lunch breaks or other periods when hand to mouth contact occurs. This will minimize potential ingestion exposures.</p>

**TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES
NAS, KEY WEST, FLORIDA**

Task/Operation/Location	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring - Type and Action Levels	Personal Protective Equipment <i>(Items in italics are deemed optional as conditions or the FOL or SSO dictate.)</i>	Decontamination Procedures
<p>Soil boring activities using DPT as well as soil boring and monitoring well installation activities using DPT or Hollow Stem Augering (if applicable).</p>	<p>Chemical hazards: 1) Contaminants of concern are related to petroleum products. Of primary concern are potential exposure to VOCs such as BTEX compounds during intrusive operations and when sampling. The VOCs identified in this HASP (specifically Table 6-1) have been selected based on an evaluation of historical sampling data. These contaminants pose the greatest potential for exposure due to their concentration in subsurface media; chemical and physical properties, and/or, toxicity.</p> <p>Further information on these contaminants and/or components of these contaminants are presented in Section 6.1 and Table 6-1.</p> <p>Sampling data from previous site investigations has identified other contaminants of concern including various metals, SVOCs, and PCBs. The predominant path of exposure to these contaminants is through incidental ingestion. Exposure via inhalation is unlikely unless significant airborne dusts are generated as a result of site activities.</p> <p>2) Transfer of contamination into clean areas or onto persons.</p> <p>Physical hazards:</p> <p>3) Heavy equipment hazards (pinch/compressions points, rotating equipment, hydraulic lines, etc.) 4) Noise in excess of 85 dBA 5) Energized systems (contact with underground or overhead utilities) 6) Lifting (strain/muscle pulls) 7) Slips, trips, and falls 8) Vehicular and foot traffic 9) Flying projectiles</p> <p>Natural hazards:</p> <p>10) Inclement weather 11) Animal and insect bites and encounters</p>	<p>1) Avoid contact with contaminated media (air, water, soils, etc.). Control measures to minimize potential exposures include good work and personal hygiene practices. Avoid hand-to-mouth contact, wash hands and face prior to breaks or lunch. Real time monitoring instruments and PPE will be used to support protective measures. Positive readings at source areas will require the SSO to monitor airborne concentrations in worker's breathing zone. Although unlikely to be present, airborne dusts/particulates will be avoided or otherwise controlled through the use of area wetting methods since site contaminants may be bound to particulates.</p> <p>2) Transfer of Contamination into clean areas or onto Persons will be minimized by restricting the use of equipment and supplies between locations without first going through a suitable decontamination. Work practices include: - A rigid decontamination procedure for all equipment between locations and between clean and potentially dirty work - Poly ethylene sheeting shall be used to place contaminated tooling for transport to the central decontamination unit as applicable. - Always have the spill kit accessible - The drilling systems use hydraulics that can leak and rupture. Rapid containment is the best control measure.</p> <p>3) Heavy Equipment Hazards - All equipment will be: - Inspected in accordance with Federal safety and transportation guidelines, OSHA (1926.600.601.602), and manufacturer's design, as applicable. See the Equipment Inspection Checklist found in Attachment III of this HASP. - Operated and supported by qualified operators and ground crew. - Used within safe work zones, with routes of approach clearly marked. All personnel not directly supporting this operation will remain a distance of at least the height of the mast + 5-feet but no less than 25-feet from the rig. See Section 9.1 for initial exclusion zone boundaries. In addition to equipment considerations, the following safe operating procedures will be incorporated: - Only manufacturer-approved equipment may be used in conjunction with equipment repair procedures (e.g., auger flight connectors, pressure fittings, etc.). - Work areas will be kept clear of clutter. - Self-propelled equipment shall be equipped with movement warning systems. - Personnel will be instructed in the location and operation of emergency shut-off device(s). These devices will be tested initially (and then periodically) to ensure proper operation. - Areas will be inspected prior to the movement of the drill/DPT rig and support vehicles to eliminate any physical hazards. This will be the responsibility of the FOL and/or SSO. - The drill rig and support vehicles will be moved no closer than 5-feet to unsupported side-walls of excavations and embankments. - See additional safe work procedures for drilling in Section 5.2 of this HASP.</p> <p>4) Noise in Excess of 85 dBA - Hearing protection will be used during all subsurface activities using the drilling/direct push rig or when noise levels are > 85 dBA. Use the rule of thumb: Excessive noise levels (>80dBA) are being approached when you have to raise your voice to talk to someone within 2 feet of your location. In these situations always use hearing protection. - Previous noise dosimetry data indicates an average 8-hour exposure working behind a Hollow Stem Auger Rig is ~87 to 92 dBA and a DPT - ~90-102 dBA. - Control noise hazards by establishing boundaries to limit the affect of the noise hazard (i.e. height of the mast + 5 feet or 25 feet). - Hearing protection will be used within the exclusion zone boundary or whenever excessive noise levels are present.</p> <p>5) Energized Systems - All drilling activities will proceed in accordance with the Utility Locating and Excavation Clearance SOP in Attachment V of this HASP. All utility clearances will be obtained, in writing, and locations identified and marked, prior to activities. If it is not available or you location infringes within 3-feet of an underground utility advancement must proceed by hand until past the utility. Hand-dug holes should represent the same diameter of the mechanized tooling. Overhead clearances shall be maintained at a minimum distance of 20-Feet from overhead power lines.</p> <p>6) Lifting Hazards - Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques as described in Section 6.2.2 and in the mobilization/demobilization entry for Table 5-1</p> <p>7) Slips, Trips, and Falls - Preview work locations for unstable/uneven terrain/Raised Platforms/Excavations. - Cover, guard and barricade all open pits, ditches, and openings of subsurface structures, as necessary. - Ruts, roots, and other tripping hazards should be eliminated near points of operation to minimize trips and falls when near rotating/operating equipment. - Maintain a clutter free work area. - Construct fences or other means of demarcation (i.e. signs and postings) to control traffic into the control zones, or staging area. - Raised work platforms greater than 4-feet surface require the use of a handrail and applicable toe-boards meeting specifications as defined in 29 CFR 1910.23.</p> <p>8) Vehicular and Foot Traffic Hazards - Use traffic-warning signs, flag persons, and high visibility vests as determined by the SSO when working along traffic thoroughfares. In addition, use physical barricades when working within normal traffic flow patterns/traffic lanes.</p> <p>9) Flying Projectiles - Cover or guard all high-pressure operating systems to deflect flying or pressurized media in the event of a leak. - Drill rigs have cable assisted lifting devices attached to a hoist. Failure of these items has resulted in fatalities within the drilling industry. To control these hazards: a. Complete Equipment Inspection Checklist - check the cable (size and condition), hooks (condition and size compared to that of the cable), and clamps (never saddle a dead horse - The base of the clamp should not be on the dead end of the cable, but the U-shaped should). b. Monitor operating pressure to restrict over pressurizing the lifting system. c. Restrict the number of personnel in the area around the drill rig.</p> <p>10) Inclement Weather - To minimize hazards of this nature, the following provisions shall be used: - Wear appropriate clothing for weather conditions. - Provide replacement liquids for field crews as relief from excessive ambient temperatures. - Electrical storms/high winds - Suspend or terminate operations until directed otherwise by SSO. Follow the provisions as specified in Section 4.0 of the Tetra Tech NUS, Inc. Health and Safety Guidance Manual regarding the identification and evaluation of heat/cold stress related conditions.</p> <p>11) Animal and Insect Bites and Encounters: - Avoid nesting - Preview routes, avoid nests, if at all possible. Check existing well casings for spider and bee nests. - Wear light color clothes. This will allow easier detection of ticks and insects crawling on your body. It will also assist in heat stress control. - Tape pant legs to work boots to block direct access. - Use repellents - Permethrin should be applied liberally to the clothing, but not the skin as it may cause irritation. Concentrate on areas where ticks and other insects may access your body such as pant cuffs, shirt to pants, and collars. - Upon exiting the high brush and wooded areas perform a close body inspection to remove any ticks or other insects that have attached to your clothing or skin.</p>	<p>A Photoionization Detector with a 10.2 eV lamp source will be used to detect the presence of VOCs.</p> <p>Action level - Sustained readings <1 ppm in the high risk worker's breathing zone; continue to work, continue to monitor. Sustained readings (> 5 minutes in duration) > 5 ppm in worker breathings zone - concentrations that exceed this action level require personnel to stop work, notify PHSO.</p> <p>Note: This action level was established based on the limited duration of DPT operations at each boring location. Although benzene is a contaminant of concern, it is typically present at very low concentrations in fuels and is not commonly observed at detectable concentrations in worker breathing zones.</p> <p>Monitoring shall be conducted at the prescribed depths as indicated on the boring logs at the source (borehole) and drillers/drillers helper/samplers breathing zone. At a minimum breathing zone measurements will be conducted at the following frequencies</p> <ul style="list-style-type: none"> - Initially, at each sampling interval, with a minimum breathing zone measurement every 4-feet. - Changes in lithological formation. - Indications of contaminant presence (staining, olfactory sensitization) <p>Monitoring for excessive noise levels will not be accomplished in support of this scope of work. Sufficient data exists to select the types of hearing protection required and suitable control measures.</p>	<p>All drilling operations will be initiated in Level D protection, including the following articles: Sampler/Oversight Personnel</p> <ul style="list-style-type: none"> - Standard field dress (long pants, Sleeved shirts) - Steel toe safety shoes or work boots - Hard hat - Safety Glasses - Layered nitrile surgeon style gloves for sampling - <i>Impermeable boot covers</i> - <i>Tyvek or washable cotton coveralls</i> - <i>Reflective vest for traffic areas</i> <p>Driller and Driller Helper</p> <ul style="list-style-type: none"> - Standard field attire including sleeved shirt and long pants - Safety shoes (Steel toe/shank) - Safety glasses - Nitrile outer gloves; Nitrile inner gloves - Hearing protection - Hard hat - <i>Impermeable boot covers</i> - <i>Impermeable outer garments such as PVC Rain-suit or Saranex[®], PE coated Tyvek[®] due to contact with contaminated tooling. An impermeable apron is an acceptable alternative and may also be used when conditions of heat stress are prevalent.</i> <p>As site conditions may change, the following equipment will be maintained during all on-site activities</p> <ul style="list-style-type: none"> - Fire Extinguishers - First-aid Kit <p>Note: The Safe Work Permit(s) for this task (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>Personnel Decontamination will consist of a soap/water wash and rinse for reusable and non-reusable outer protective equipment (boots, gloves, PVC splash suits, as applicable)</p> <p>For DPT or other drilling operations: The sequential procedure is as follows: Stage 1: Equipment drop, remove outer protective wrapping; Decontamination personnel will wipe down the outer shell and pass hand equipment through as necessary. Stage 2: Soap/water wash and rinse of outer boots and gloves Stage 3: Soap/water wash and rinse of the outer splash suit, as applicable. Stage 4: Disposable PPE will be removed and bagged. Stage 5: Wash face and hands or use hygienic wipes to remove associated contaminants. Note: For remote locations away from the centralized decontamination unit, hygienic wipes may be used for cleaning hands and face, as well as bagging all items for transport back to the centralized decontamination unit. Stage 6: If appropriate based on ambient conditions, levels of PPE, or signs and symptoms of heat/cold stress, perform medical evaluation. This evaluation consists of pulse, breathing rate, and oral temperature.</p> <p>Heavy/Sampling Equipment Decontamination - All heavy and sampling equipment decontamination will proceed in accordance with the directives provided in Table 5-1 for that task. Heavy equipment will have the wheels and tires cleaned along with any loose debris removed, prior to transporting to the central decontamination area. Roadways shall be cleared of any debris resulting from the onsite activity. Portable pieces will be wrapped in polyethylene sheeting for transport to a centrally located decontamination facility.</p> <p>The FOL or the SSO will be responsible for evaluating equipment arriving on-site, leaving the site, and between locations. No equipment will be authorized access, exit, or movement to another location without this evaluation.</p>

**TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES
NAS, KEY WEST, FLORIDA**

Task/Operation/ Location	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring - Type and Action Levels	Personal Protective Equipment <i>(Items in italics are deemed optional as conditions or the FOL or SSO dictate.)</i>	Decontamination Procedures
<p>Multi-media sampling, including subsurface soils, groundwater and IDW.</p> <p>Protective measures as recommended here shall also apply to other monitoring well related activities, water level measurements, well development, purging, tidal influence study, etc.</p>	<p>Chemical hazards: 1) Contaminants of concern are related to petroleum products. Of primary concern are potential exposure to VOCs such as BTEX compounds during intrusive operations and when sampling. The VOCs identified in this HASP (specifically Table 6-1) have been selected based on an evaluation of historical sampling data. These contaminants pose the greatest potential for exposure due to their concentration in subsurface media; chemical and physical properties, and/or toxicity.</p> <p>Further information on these contaminants and/or components of these contaminants are presented in Section 6.1 and Table 6-1.</p> <p>Sampling data from previous site investigations has identified other contaminants of concern including various metals, SVOCs, and PCBs. The predominant path of exposure to these contaminants is through incidental ingestion. Exposure via inhalation is unlikely unless significant airborne dusts are generated as a result of site activities.</p> <p>2) Transfer of contamination into clean areas.</p> <p>Physical hazards:</p> <p>3) Slip, trip, and fall hazards 4) Strain/muscle pulls from manual lifting 5) Cuts and Lacerations 6) Ambient temperature extremes (heat stress) 7) Site characterization</p> <p>Natural hazards:</p> <p>8) Animal and insect bites and encounters 9) Inclement weather</p>	<p>1) Avoid contact with contaminated media (air, water, soils, etc.). Control measures to minimize potential exposures include good work and personal hygiene practices. Avoid hand-to-mouth contact, wash hands and face prior to breaks or lunch. Real time monitoring instruments and PPE will be used to support protective measures. Positive readings at source areas will require the SSO to monitor airborne concentrations in worker's breathing zone. Airborne dusts/particulates will be avoided or otherwise controlled through the use of area wetting methods since site contaminants may be bound to particulates.</p> <p>2) Transfer of Contamination into Clean Areas or onto Persons - Restrict the cross use of equipment and supplies between locations and activities without first going through a suitable decontamination. Work practices including</p> <ul style="list-style-type: none"> - A rigid decontamination procedure will be conducted for equipment between locations and between clean and potentially dirty work. This provision will insure materials are not carried and deposited in unaffected areas. - Polyethylene sheeting shall be employed to place contaminated tooling for transport to the central decontamination unit, as applicable. - Always have the spill kit at the ready - Drilling systems operate using hydraulics which can leak and at times rupture. Rapid containment is the best control measure for controlling environmental contamination. <p>3) Slip, Trip, and Fall Hazards – These hazards shall be minimized by adherence to the practices indicated in Section 6.2.1 of this HASP. These include</p> <ul style="list-style-type: none"> - Maintain proper housekeeping in work areas. - Preview and inspect work areas to identify and eliminate slip, trip, or fall hazards. - Activities to be conducted from more than 6-feet above floor or ground level will require fall protection training and the use of 100% fall protection equipment. - Cover, guard, barricade, and/or place warning postings over/at holes or openings that personnel may fall or step into. - Use multiple persons and pack small loads to remote locations. <p>4) Strain/Muscle Pulls from Manual Lifting - Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques (See Lifting Mobilization/Demobilization, Page 1 of 6, Table 5-1).</p> <p>5) Cuts and Lacerations – Employ the following measures to reduce and/or eliminate the potential for cuts and lacerations</p> <ul style="list-style-type: none"> - Obtain and use the knife and acetate tube retention tub recommended by Geoprobe (Geoprobe Sampling Kit) to prevent potential cuts and lacerations when accessing samples within MacroCore acetate liners. These items have been engineered to allow sample acquisition without putting the sampler at risk. - Select and secure the most favorable route to monitoring wells and sampling locations. - Previewing pathways - Where possible, remove or demarcate the physical hazards. - Inspect cutting equipment to be used to clear access routes for defects. - When cutting items - always use a sharp knife and always cut away from your body. Do not place items to be cut in your opposite hand or on your knee. - Carry glassware and items that present a potential for cuts, lacerations, or impalement such as machetes or brush hooks in protective packaging or sheathed to avoid breakage or exposure in the event of a slip, trip, and/or fall. <p>6) Ambient Temperature Extremes (Heat Stress) - Wear appropriate clothing for weather conditions. Provide acceptable shelter, where possible, and liquids for field crews. Additional information regarding heat/cold stress is provided in Section 4.0 of the Health and Safety Guidance Manual. Care should be exercised when working outdoors due to harmful effects of the sun. To reduce the potential for sunburn and melanoma the following measures should be employed</p> <ul style="list-style-type: none"> - Wear a hat that shades the face, neck, and ears. - Apply sunscreen with a SPF of 15 or higher liberally on any exposed skin at least 15 minutes before going outside, then at least every two hours, more if you are sweating a lot. - Plan/provide suitable equipment to offer shade to avoid the midday sun since the sun's ultraviolet rays are most intense between 10 A.M. and 4 P.M. and can damage your skin even on hazy days. - Wear wrap-around sunglasses to protect the eyes and delicate skin around them. <p>7) Site Characterization - Work areas will be surveyed prior to committing personnel or resources. The survey will be conducted by the FOL and/or the SSO. The purpose is to identify physical and natural hazards that may impact the proposed work area. These hazards are to be identified, barricaded, or eliminated to the extent possible to minimize potential effect to field crew.</p> <p>8) Animal and Insect Bites and Encounters –</p> <ul style="list-style-type: none"> - Avoid nesting – Preview routes, avoid nests, if possible. Check existing well casings for spider and bee nests. - Wear light color clothes. This will allow easier detection of ticks and insects crawling on your body. It will also assist in heat stress control. - Tape pant legs to work boots to block direct access. - Use repellents – Permethrin should be applied liberally to the clothing, but not the skin as it may cause irritation. Concentrate on areas where ticks and other insects may access your body such as pant cuffs, shirt to pants, and collars. - Upon exiting the high brush and wooded areas perform a close body inspection to remove any ticks or other insects that have attached to your clothing or skin. - If you leave your work boots in the trailer during days off, always shake them out prior to putting them on. The purpose is to remove any insects/spiders who may have set up house. <p>9) Suspend or terminate operations until directed otherwise by the SSO.</p>	<p>A Photoionization Detector with a 10.2 eV lamp source will be used to detect the presence of VOCs.</p> <p>Action level –</p> <p>Sustained readings <1 ppm in the high risk worker's breathing zone; continue to work, continue to monitor.</p> <p>Sustained readings (> 5 minutes in duration) > 5 ppm in worker breathings zone – concentrations that exceed this action level require personnel to stop work, notify PHSO.</p> <p>Note: This action level was established based on the limited duration of DPT and sampling operations at each boring location. Although benzene is a contaminant of concern, it is typically present at very low concentrations in fuels and is not commonly observed at detectable concentrations in worker breathing zones.</p> <p>Monitoring shall be conducted at the prescribed depths as indicated on the boring logs at the source (borehole) and drillers/drillers helper/samplers breathing zone. At a minimum breathing zone measurements will be conducted at the following frequencies</p> <ul style="list-style-type: none"> - Initially, at each sampling interval, with a minimum breathing zone measurement every 4-feet. - Changes in lithological formation. - Indications of contaminant presence (staining, olfactory sensitization) <p>Monitoring for excessive noise levels will not be accomplished in support of this scope of work. Sufficient data exists to select the types of hearing protection required and suitable control measures.</p>	<p>Where possible, when sampling always position yourself upwind of the operating drill rig or discharge container to avoid airborne emissions.</p> <p>Level D protection will be utilized for the following sampling activities</p> <ul style="list-style-type: none"> - Groundwater, subsurface soils, and IDW. <p>Sampling Personnel</p> <p>Level D - (Minimum Requirements)</p> <ul style="list-style-type: none"> - Standard field attire (Sleeved shirt; long pants) - Safety shoes (steel toe/shank) - Safety glasses - Surgical style gloves – Nitrile (<i>double-layered, if necessary</i>) - Tyvek coveralls and disposable boot covers, if surface contamination is present or if the potential for soiling work attire exists. <p>Note: 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>Personnel Decontamination</p> <p>Sampling groundwater and subsurface soils the following provisions will apply</p> <ul style="list-style-type: none"> - Upon completion of the sampling dedicated trowels, tubing, etc. will be bagged for transport back to the central decontamination area. - PPE (gloves) will be removed and also bagged for disposal. - Handi-Wipes or similar product will be used to clean hands, prior to moving to the next location. <p>Equipment Decontamination</p> <p>Equipment used in remote sampling locations will be brought back to the central decontamination area for decontamination and re-use or disposal.</p> <p>Decontamination of equipment (sampling and hand tools) will proceed as indicated in the Work Plan and in Section 4.6.1 and 4.6.2 of this HASP.</p>

**TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES
NAS, KEY WEST, FLORIDA**

Tasks/Operation/Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring - Type and Action Levels	Personal Protective Equipment <i>(Items in italics are deemed optional as conditions or the FOL or SSO dictate.)</i>	Decontamination Procedures
<p>Decontamination of Sampling and Heavy Equipment</p> <p>It is anticipated that this activity will take place at centralized location. Gross contamination will be removed to the extent possible at the site. Contaminated tooling then will be wrapped in polyethylene sheeting for transport to the centralized location for a full decontamination and evaluation.</p>	<p>Chemical hazards:</p> <p>1) Contaminants of concern are related to petroleum products. Of primary concern are potential exposure to VOCs such as BTEX compounds during intrusive operations and when sampling. The VOCs identified in this HASP (specifically Table 6-1) have been selected based on an evaluation of historical sampling data. These contaminants pose the greatest potential for exposure due to their concentration in subsurface media; chemical and physical properties, and/or, toxicity.</p> <p>Further information on these contaminants and/or components of these contaminants are presented in Section 6.1 and Table 6-1.</p> <p>Sampling data from previous site investigations has identified other contaminants of concern including various metals, SVOCs, and PCBs. The predominant path of exposure to these contaminants is through incidental ingestion. Exposure via inhalation is unlikely unless significant airborne dusts are generated as a result of site activities.</p> <p>2) Decontamination fluids - Liquinox (detergent); isopropanol (decontamination solvent)</p> <p>Physical hazards:</p> <p>3) Lifting (strain/muscle pulls) 4) Noise in excess of 85 dBA 5) Flying projectiles 6) Falling objects/Struck by 7) Slips, trips, and falls</p> <p>Natural hazards:</p> <p>8) Inclement weather</p>	<p>1) and 2) Employ protective equipment to minimize contact with site contaminants and hazardous decontamination fluids. Control potential exposures through good work hygiene practices (i.e., avoid hand to mouth contact; wash hands and face before breaks and lunch; minimize contact with contaminated media). Obtain manufacturer's MSDS for any decontamination fluids used on-site. Solvents may only be used in well-ventilated areas, such as outdoors. Use appropriate PPE as identified on MSDS or within this HASP. All chemicals used must be listed on the Chemical Inventory for the site, and site activities must be consistent with the Hazard Communication Program provided in Section 5.0 of the TNUS Health and Safety Guidance Manual.</p> <p>3) Use multiple persons where necessary for lifting and handling heavy equipment such as auger flights for decontamination purposes.</p> <p>- Employ proper lifting techniques as described in Table 5-1, Mobilization/Demobilization.</p> <p>4) Wear hearing protection when operating the pressure washer. Sound pressure levels measured during the operation of similar pieces of equipment indicate a range of 87 to 93 dBA.</p> <p>5) Flying projectiles - Use eye and face protective equipment when operating the pressure washer and/or steam cleaner, due to flying projectiles. All other personnel must be restricted from the area. In addition to minimize hazards (flying projectiles, water lacerations and burns) associated with this operation, the following controls will be implemented</p> <ul style="list-style-type: none"> - A Fan Tip 25° or greater will be used on pressurized systems over 3,000 psi. This will reduce the possibility of water lacerations or punctures. - Conduct visual evaluations of hoses and fittings for structural defects. - Construct deflection screens as necessary to control overspray and to guard against dispersion of contaminants driven off by the spray. <p>6) Falling objects/Struck by – Ensure wash and drying racks are suitable construction to support heavier items such as push rod flights and will secure them against falling during this process.</p> <p>7) Slips, trips, and falls - The decontamination pad should be constructed to contain wash waters generated during decontamination procedures. Temporary decontamination pads are usually 10-30 mil polyethylene or polyvinyl chloride tarp construction. Although these items when used as a liner offer containment, they also present a slipping hazard. When these temporary liners are used, it is recommended that a light coating of sand be spread over the walking surface to provide traction.</p> <ul style="list-style-type: none"> - In addition, adequate slope should be provided to the pad to permit drainage away from the object being cleaned. The collection point for wash waters should be of adequate distance that the decontamination workers do not have to walk through the wash waters while completing their tasks. - Hoses should be gathered when not in use to eliminate potential tripping hazards. <p>8) Suspend or terminate operations until directed otherwise by SSO.</p>	<p>Use visual observation and real-time monitoring instrumentation (PID) to ensure all equipment has been properly cleaned of contamination and dried.</p> <p>Monitoring instrumentation will be used to determine if all of the decontamination solvent (isopropanol) has been removed through the rinse process. Any positive indication/results greater than background require the article that has been decontaminated to be re-rinsed and scanned again. If necessary this process should be repeated until no measurable indication of the decontamination solvent exists.</p> <p>Monitoring of the decontamination station for purposes of worker safety is not anticipated to be performed based on anticipated concentrations. Should concerns of elevated contaminant concentrations at this station occur, previous provided action levels shall be used, as well as, the protective measures used in response to achieving those action levels.</p>	<p>For Heavy Equipment</p> <p>This applies to pressure washing and/or steam cleaning operations and soap/water wash and rinse procedures.</p> <p>Level D Minimum requirements:</p> <ul style="list-style-type: none"> - Standard field attire (Long sleeve shirt; long pants) - Safety shoes (Steel toe/shank) - Chemical resistant boot covers - Nitrile outer gloves over nitrile inner gloves - Safety glasses underneath a splash shield - Hearing protection (plugs or muffs) - PVC Rain suit or coveralls - Impermeable aprons may be used instead of coveralls if they offer adequate protection against overspray and back splash. <p>For sampling equipment (trowels, bailers, etc.), the following PPE is required</p> <p>Note: Consult MSDS for PPE guidance. Otherwise, observe the following.</p> <p>Level D Minimum requirements -</p> <ul style="list-style-type: none"> - Standard field attire (Long sleeve shirt; long pants) - Safety shoes (Steel toe/shank) - Nitrile outer gloves over nitrile inner gloves - Safety glasses - Impermeable (butyl or neoprene) apron <p>In the event of overspray of chemical decontamination fluids cannot be controlled using aprons, employ PVC Rainsuits or PE or PVC coated Tyvek as necessary.</p> <p>Note: 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>Personnel Decontamination in support of this activity will consist of a soap/water wash and rinse for reusable and non-reusable outer protective equipment (boots, gloves, PVC splash suits, as applicable).</p> <p>The sequential procedure is as follows:</p> <p>Stage 1: Equipment drop, remove outer protective wrapping; personnel will wipe down the outer shell and pass hand equipment through as necessary.</p> <p>Stage 2: Soap/water wash and rinse of outer boots and gloves</p> <p>Stage 3: Soap/water wash and rinse of the outer splash suit, as applicable</p> <p>Stage 4: Disposable PPE will be removed and bagged.</p> <p>Stage 5: Wash face and hands</p> <p>The FOL or the SSO will be responsible for evaluating equipment arriving on-site, leaving the site, and between locations. No equipment will be authorized access, exit, or movement to another location without this evaluation.</p>

6.0 HAZARD ASSESSMENT

The following section provides information regarding the chemical, physical, and natural hazards associated with the sites of interest and the proposed site activities. Table 6-1 provides information related to primary contaminants of concern that have been identified through analysis and interpretation of available analytical data from previous site investigations. Although other contaminants may exist, the chemicals identified in Table 6-1 are those that are anticipated to pose the greatest exposure concern to site workers. Specifically, toxicological information, exposure limits, symptoms of exposure, physical properties, and air monitoring and sampling data are discussed in the table.

6.1 CHEMICAL HAZARDS

Based on historical information, site contaminants associated with possible releases of petroleum products (fuels) are known to exist at each of the three sites of interest. Analytical data from previous site investigations suggest the presence of various volatile organic compounds (VOCs) associated with petroleum products including BTEX (benzene, ethylbenzene, toluene, xylene) in soils and groundwater. Previous site investigations noted petroleum odors during some intrusive operations but no visible free product. In addition to these petroleum-related VOCs, various semi-volatile organic compounds (SVOCs) were also detected in groundwater. Analytical data from previous site investigations involving the collection of subsurface soil samples at SWMU 7 (Building A-824) indicated the presence of various inorganics (metals) including lead, chromium, and copper as well as polychlorinated biphenyls (Arochlor-1260) and assorted SVOCs.

Based on available data, contaminant concentrations in subsurface soils are higher than those associated with groundwater. A summary of organic vapor analysis (OVA) obtained directly from subsurface soils samples at the Former Hawk Missile Site G-01 and the Former Hawk Missile Site B-01 indicates that organic vapors were detected at concentrations ranging from 1.7 to 998.2 parts per million (ppm). The highest organic vapor readings appear to exist at the 2 to 6 foot sample depth (below land surface) at Former Hawk Missile Site G-01. Although elevated OVA readings have been associated with subsurface soils, it is anticipated that airborne concentrations in worker breathing zones will be substantially lower and unlikely to present a significant exposure concern.

The greatest potential for exposure to VOCs is anticipated to occur when performing DPT operations and when sampling soils. Given that these operations are performed outside, it is anticipated that VOC concentrations in subsurface soils will be adequately dispersed prior to reaching worker breathing zones. However, air monitoring and established action levels as described in Section 7.0 and Table 5-1 will be used to prevent potential exposure to site contaminants. Additionally, safe work practices including

standing upwind of potential source areas, minimizing contact with potentially contaminated media, using required personal protective equipment (PPE), and implementing appropriate decontamination measures will be used to further minimize the potential for exposure to site contaminants. SVOCs and inorganic compounds are unlikely to present a significant exposure concern. Based on the physical and chemical characteristics of these types of contaminants, the primary route of exposure is anticipated to occur through incidental ingestion or contact with the skin. These contaminants may also be bound to particulates and inhaled if airborne dusts are generated as a result of site activities. However, DPT operations typically do not generate any airborne dusts, and previous analytical data suggests that these contaminants are not present at concentrations that would pose an inhalation concern.

6.2 PHYSICAL HAZARDS

The physical hazards that may be present during the performance of site activities are summarized below:

- Slips, trips, and falls
- Lifting (strain/muscle pulls)
- Noise in excess of 85 decibels on the A-weighted scale (dBA)
- Heavy equipment hazards (pinch/compression points, rotating equipment, etc.).
- Energized systems (contact with underground or overhead utilities)
- Heat Stress (Ambient temperature extremes)

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 Slip, Trip and Fall Hazards

Various potential slip, trip and fall hazards may be encountered during the performance of planned site activities. These hazards are associated with working outdoors where uneven or wet terrain may be encountered. To minimize the potential for worker injury from these hazards, the following requirements must be observed:

- Maintain proper housekeeping in work areas. Stage DPT/drill tooling and equipment, wrap up hoses at the decontamination area when not in use, construct the decontamination pad to drain to one end to avoid standing water.

- Preview and inspect work areas to identify and eliminate slip, trip, or fall hazards. In outdoor locations, pay particular attention to sink holes or other depressions that may be encountered. Ensure steps leading to the trailer have non-skid coatings on the tread areas. When constructing temporary decontamination facilities, care should be taken when using polyethylene sheeting or tarps to contain wash waters. These surfaces can become extremely slippery. Where necessary, apply a light coating of sand to provide necessary traction.
- Any work that is to be done on structures that are more than 6-feet above floor or ground level will require fall protection training and the use of 100% fall protection equipment.
- Cover, guard, barricade, and or place warning postings over/at holes or openings that personnel may fall into or step into. Stairs leading to elevated structures (such as a trailer or elevated work platform greater than 4-feet shall be protected by handrails in accordance with OSHA 29 CFR 1910.23.
- Use footwear with adequate traction.
- Prepare work areas by removing tripping hazards (ruts, roots, debris). This is especially critical concerning approach pathways leading to or around rotating/advancing equipment. A fall into the rotating auger flights/apparatus could be life threatening.

6.2.2 Strains/Muscle Pulls

This hazard potential is greatest during mobilization/demobilization activities or when handling sampling coolers when most of the physical lifting is accomplished. Other activities which present this hazard include handling heavy objects and bags of Portland cement (~94 pounds) and bags of sand during well installation and construction.

Worker injuries resulting from improper manual material handling activities are easily prevented through observation of proper lifting and carrying methods. These types of injuries are not limited to merely the factor of the weight of the load. Other considerations include:

- How many lifts will be involved (i.e., repetitive lifting of even small loads),
- The size, shape, and/or configuration of the load to be lifted,
- Whether or not the load will need to be lifted to another height or carried to another location,

- The area available to maneuver the lift.

Workers involved with these types of activities are to be instructed by the SSO in the following manner:

- First estimate the weight and configuration of the load. This means determine if it is too bulky or hard to safely grasp/lift/control alone. If so, either use a mechanical lifting device or obtain help from another employee to lift the load. (Note: The use of mechanical lifting devices is **always** preferable over manual lifting).
- Bend at the knees (not at the waist) when attempting a lift.
- Ensure that a firm hold is obtained, and keep the load as close to the body as possible.
- Lift the load using your legs, and not the back.
- Avoid turning or twisting while holding a load.
- If the load is to be moved, preview the path of travel first to identify and eliminate any tripping hazards.
- Do not attempt to carry loads that obstruct the line of sight.
- When setting a load down, again use the leg muscles and do not bend at the waist.
- Take rest breaks as necessary to prevent fatigue and injury.

You are most vulnerable to hazards of this nature early in the day prior to limbering and stretching and late in the day due to fatigue. Additional care should be exercised during these periods.

6.2.3 Noise in Excess of 85 dBA

Worker exposure to noise that can approach hazardous levels is a common hazard on most project work sites. Workers who must work in areas or who must perform operations where noise levels can approach an 8-hour time weighted average of 85 decibels on the A-weighted scale (dBA) must have received hearing conservation training within the past 12 month period (this is normally provided as part of the 8-hour refresher training). If personnel have not had this training within the last twelve months they will

be provided such training by the SSO at the project site prior to participating in high noise level activities. On this project, high noise levels may be encountered when working near the DPT/drill rig, and during decontamination operations when using a pressure washer.

As a general rule-of-thumb to prevent worker exposure to high noise levels, workers will be informed to observe the following:

If ambient noise levels are loud enough that they have to raise their voice in order to communicate with another person who is less than 2 feet away, hearing protection will be required.

Also, if any existing base operations are posted as high noise areas or that hearing protection is required in that area, then hearing protection will be used.

Site boundaries for exclusion zone demarcation have included sufficient distances to accommodate potential noise hazards associated with the identified operations.

Hearing protection will be the primary control measure for personnel who must work within the vicinity of excessive noise levels. Those activities anticipated to have excessive noise levels have been identified in Table 5-1.

6.2.4 Exposure to Pinch or Compression Points and/or Entanglement or Contact With Moving or Rotating Equipment/Machinery

Moving and operating machinery present potential hazards of entanglement, caught in or between, and/or to be struck by machines or machine parts. Hazards of this nature are considered a predominant hazard associated with DPT/drilling operations. Many of the recorded fatalities within the drilling industry have been associated with entanglement within the spinning augers. The factors associated with this hazard include snag points on the rotating apparatus, as well as the existence of loose clothing, jewelry and long hair. This hazard is often compounded by inoperable emergency stop devices. Recognition and control shall focus on identification to minimize these risks. The following measures shall be instituted:

- Equipment that is to be operated must first be closely inspected to ensure that adequate machine guarding is in place.
- No maintenance or other activities are to be performed on operating machines. Also, employees whose duties places them in proximity to moving machinery items are to avoid wearing jewelry, or

have long (unrestricted) hair, or loose fitting clothing that could become entangled in rotating equipment.

- Also, the use of home-made or jury-rigged machine parts is strictly prohibited. Equipment parts must be manufacturer-provided or approved.

In addition, to further minimize hazards of this nature and as this activity shall take place within a light industrial area; the following additional precautions shall be employed:

Traffic Patterns in and around the DPT/drilling area – Traffic for heavy equipment and pedestrians shall be separated by flow patterns. Heavy equipment (DPT/drill rigs and support vehicles) shall be routed in a singular direction to minimize backing, U-turns, and other maneuvers that could result in an accident. A demarcation area shall be established in plain view, so personnel recognize the boundary of potential physical hazards. Boundaries established to control hazards of this nature are as follows:

- Drilling/DPT Operations – Establish an exclusion zone equal to the height of the mast plus five feet. Non-essential personnel will be restricted from being within this area.

The positioning of drill/DPT rig and support vehicles will utilize a ground spotter. Flag persons, barriers, and high visibility vests will be used in areas where operations may impede or impact vehicle and/or pedestrian traffic, to provide visual recognition and control of the work zone.

6.2.5 Contact with Energized Sources, Including Operating Processes and Utilities (Aboveground and Underground)

Contact with energized sources can result in severe injury and even death. There are two areas of concern with this potential hazard: contact with energized processing equipment and contact with energized utilities including underground utilities (including electrical transmission lines, gas lines, water lines, etc.) and overhead utilities (i.e., power lines).

To protect against the first concern, contact with energized processing equipment, any work on or near these types of items will be required to follow the Company Safe Work Practice on the Control of Hazardous Energy Sources (Lockout/Tag out).

Contact with Energized Systems – Much of the work to be done at the facility will be within light industrial areas that may be serviced by underground and overhead energy sources. Preliminary efforts to control hazards of this nature will include:

- Use and application of Attachment V, Standard Operating Procedure (SOP) for Utility Locating and Excavation Clearance. This procedure provides step by step instructions for clearance of underground utilities, as well as, avoidance techniques, and required documentation.
- Establishing a suitable clearance distance (20-feet) from overhead utilities will be the primary method to control hazards conveyed through contact with these power sources.

**TABLE 6-1
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA
NAS KEY WEST, KEY WEST FLORIDA
PAGE 1 OF 3**

Substance	CAS No.	Air Monitoring/Sampling Information	Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Primary Contaminants Diesel Range Organics (represented as Diesel Fuel)	Mixture	Components of this substance will be detected readily however no documentation exists as to the relative response ratio of either PID or FID.	OSHA/NIOSH/ACG IH: 5 mg/m ³ as mineral oil mist. In addition NIOSH and ACGIH establish 10 mg/m ³ as a STEL.	Kerosene odor Recommended Air Purifying cartridges: Organic vapor Recommended gloves: Nitrile	Boiling Pt: <170-400°F; 77-204°C Melting Pt: Not available Solubility: Negligible Flash Pt: 125°F; 52°C LEL/LFL: 0.6% UEL/UFL: 7.5% Vapor Density: >5 Vapor Pressure: <1 mmHg @ 70°F; 21°C Specific Gravity: 0.86 Incompatibilities: strong oxidizers, halogens, and hypochlorites Appearance and odor: 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.
JP-5 (Jet Petroleum – 5) Components: Petroleum distillates, hydrotreated light (64742-47-8) (100%) and antioxidant and metal deactivator <100 ppm	64742-47-8	PID (10.6 eV Lamp Strength Correction factor = 0.6 FID = response unknown LEL Meter = 0.85	Manufacturer's Recommendation – 100 ppm (750 mg/m ³) for 8-Hour work day. No regulatory or advisory limits have been set.	Petroleum odor threshold ~ 800 ppm Rating - Poor to Adequate Recommended Air Purifying cartridges: Organic vapor Recommended gloves: NitrilSolve 727 (>480 minutes) or Neporene 6780 (287 minutes)	Boiling Pt: 338-554°F, 170-290°C Melting Pt: -51° F; -46°C Molecular Weight: ~185 Flash Pt: 140°F, 60°C LEL: 0.9% UEL: 7% Autoignition Temp.: 475°F; 246°C Vapor Density: >1 - 5 Vapor Pressure: <5 @ 20°C SG: 0.788 to 0.845 Solubility in water: Negligible (<0.1%) @ 77°F; 25°C Viscosity: 8.5 cSt @ -4°F -20°C Appearance and Odor: Clear water-white liquid with faint petroleum odor Avoid contact with heat, sparks and flame Avoid contact with strong oxidizing agents.	JP-5 is irritating to the eyes, skin, and respiratory tract (This through direct contact or reaching concentrations >700 ppm). Direct contact may result in mild irritation with a possible drying and defatting of the skin. Ingestion may result in gastrointestinal irritation, nausea, and vomiting and may be harmful or even fatal. Inhalation of vapors or mists of JP-5 may result in headache, nausea, confusion, narcotic effect, and drowsiness. Acute exposures to extreme airborne concentration can result in death. Chronic inhalation of jet fuel vapors may produce symptoms such as fatigue, anxiety, mood changes, liver and kidney damage, and memory difficulties in exposed workers. Repeated exposures to the skin may cause skin cancer.

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**TABLE 6-1
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA
NAS KEY WEST, KEY WEST FLORIDA
PAGE 2 OF 3**

Substance	CAS No.	Air Monitoring/Sampling Information	Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Benzene	71-43-2	PID: I.P.9.24 eV, 100% response with PID and 10.2 eV lamp. FID: 150% relative response ratio with FID.	OSHA: 1 ppm ACGIH: 10 ppm NIOSH: 0.1 ppm IDLH: 500 ppm	Inadequate - Odor threshold 34-199 ppm. OSHA accepts the use of air-purifying respirators with organic vapor cartridge up to 10 ppm despite the inadequate warning properties providing cartridges are changed at the beginning of each shift. Recommended gloves: Butyl/neoprene blend - >8.00 hrs; Silver shield as a liner - >8.00 hrs; Viton - >8.00 hrs	Boiling Pt: 176°F; 80°C Melting Pt: 42°F; 5.5°C Solubility: 0.07% Flash Pt: 12°F; -11°C LEL/LFL: 1.3% UEL/UFL: 7.9% Vapor Density: 2.77 Vapor Pressure: 75 mmHg Specific Gravity: 0.88 Incompatibilities: Strong oxidizers, fluorides, perchlorates, and acids Appearance and Odor: Colorless to a light yellow liquid with an aromatic odor	Overexposure may result in irritation to the eyes, nose, throat, and respiratory system. CNS effects include giddiness, lightheadedness, headaches, staggered gait, fatigue, and lassitude and depression. Additional effects may include nausea. Long duration exposures may result in respiratory collapse. Regulated as an OSHA carcinogen. May cause damage to the blood forming organs and may cause a form of cancer called leukemia.
Ethylbenzene	100-41-4	PID: I.P.8.76, High response with PID and 10.2 eV lamp. FID: 100% response with FID.	ACGIH & NIOSH: 100 ppm; 125 ppm STEL OSHA: 100 ppm IDLH: 800 ppm	Adequate - Can use air-purifying respirator with organic vapor cartridge up to 1,000 ppm. Recommended gloves: Neoprene or nitrile w/ silver shield when potential for saturation; Teflon >3.00 hrs	Boiling Pt: 277°F; 136°C Melting Pt: -139°F; -95°C Solubility: 0.01% Flash Pt: 55°F; 13°C LEL/LFL: 1.0% UEL/UFL: 6.7% Vapor Density: 3.66 Vapor Pressure: 10 mmHg @ 79°F; 26°C Specific Gravity: 0.87 Incompatibilities: Strong oxidizers Appearance and odor: Colorless liquid with an aromatic odor. Odor Threshold of 0.092-0.60.	Regulated primarily because of its potential to irritate the eyes and respiratory system. In addition, effects of overexposure may include headaches, narcotic effects, CNS changes (i.e., coordination impairment, impaired reflexes, tremoring) difficulty in breathing, possible chemical pneumonia, and potentially respiratory failure or coma.

**TABLE 6-1
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA
NAS KEY WEST, KEY WEST FLORIDA
PAGE 3 OF 3**

Substance	CAS No.	Air Monitoring/Sampling Information	Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Toluene	108-88-3	PID: I.P. 8.82 eV, High response with PID and 10.2 eV lamp. FID: 110% response with FID.	OSHA: 200 ppm 300 ppm (Ceiling) ACGIH: 50 ppm (skin) NIOSH: 100 ppm 150 ppm STEL IDLH: 500 ppm	Adequate - Odor threshold 1.6 ppm is considered good. Can use air-purifying respirator with organic vapor cartridge up to 1,000 ppm. Recommended gloves: Teflon >15.00 hrs; Viton >16.00 hrs; silver shield (>6.00 hrs; supported nitrile (Useable time limit 0.5 hr., complete submersion for the nitrile selection); PV alcohol >25.00 hrs	Boiling Pt: 232°F; 111°C Melting Pt: -139°F; -95°C Solubility: 0.05% (61°F; 16°C) Flash Pt: 40°F; 4°C LEL/LFL: 1.2% UEL/UFL: 7.1% Vapor Density: 3.14 Vapor Pressure: 20 mmHg @ 65°F; 18°C Specific Gravity: 0.87 Incompatibilities: Strong oxidizers Appearance and odor: Colorless liquid with a sweet pungent aromatic odor.	Overexposure to this substance may result in mild to moderate irritation at all points of contact, and CNS changes including euphoria, confusion, nervousness, and possibly paresthesia characterized by an abnormal burning sensation, pricking, or numbness. At 200-500 ppm exposure has resulted in headaches, nausea, eye irritation, loss of appetite, bad taste, impair coordination, fatigue, and weariness. Chronically, toluene overexposure may result in dermatitis, liver, and kidney damage. Effects may of overexposure include irritation at all points of contact, CNS changes (i.e. dizziness, excitement, drowsiness, incoherent, staggering gait), difficulty in breathing, pulmonary edema, and possibly respiratory failure. Chronic effects may include dermatitis and cornea vacuolization.
Xylene All isomers o-, m-, p-	1330-20-7	PID: I.P. 8.56 eV, High response with PID and 10.2 eV lamp. FID: 110% response with FID.	ACGIH, & NIOSH: 100 ppm, 150 ppm STEL OSHA: 100 ppm IDLH: 900 ppm	Adequate - Odor thresholds for the following isomers: 0.6 m; 5.4 p; 20 o- ppm. Can use air-purifying respirator with organic vapor cartridge up to 1,000 ppm concentrations. Recommended gloves: PV Alcohol >12.67 hrs; Viton >8.00 hrs; CPE >1.00 hr; Butyl 0.87 hrs; Nitrile is acceptable for limited operations and contact (>0.20 hrs)	Boiling Pt: 269-281°F; 132-138°C Melting Pt: -53°F; -47°C Solubility: 0.02 % Flash Pt: 81-90°F; 27-32°C LEL/LFL: 0.9% UEL/UFL: 7.0% Vapor Density: 3.66 Vapor Pressure: 7-9 mmHg @ 70°F; 21°C Specific Gravity: 0.86-0.88 Incompatibilities: Strong oxidizers and strong acids Appearance and odor: Colorless liquid with an aromatic odor.	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.
Lead	7439-92-1	Particulate form - Unable to be detected by either PID or FID.	OSHA: 0.05 mg/m ³ ACGIH: 0.05 mg/m ³ NIOSH: 0.10 mg/m ³ IDLH: 100 mg/m ³ as lead	The use of a air purifying, full-face respirator with high efficiency particulate air filter for up to 2.5 mg/m ³ . Recommended gloves: This is in the particulate form. Therefore any glove suitable to prevent skin contact (Nitrile has been the one most widely used for the other substances).	Boiling Pt: 3164°F; 1740°C Melting Pt: 621°F; 327°C Solubility: Insoluble Flash Pt: Not applicable (Airborne dust may burn or explode when exposed to heat, flame, or incompatible chemicals) LEL/LFL: Not applicable UEL/UFL: Not applicable Vapor Density: Not available Vapor Pressure: 0 mmHg Specific Gravity: 11.34 Incompatibilities: Strong oxidizers, peroxides, sodium acetylide, zirconium, and acids Appearance and Odor: 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.

6.3 NATURAL HAZARDS

Insect/animal bites and stings, inclement weather, and other natural hazards must be considered given the location of activities to be conducted. In general, avoidance of areas of known infestation or nesting will be the preferred exposure control. Use of additional PPE with joints (ankles and wrists) taped, such as long pants tucked into boots or coveralls, is also recommended. Specific discussion on principle hazards of concern follows:

6.3.1 Fire Ants

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 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.

6.3.2 Snakes, Insects, and Other Animals

The site is suspected of supporting a large population of eastern diamondback rattlesnakes. Given that areas to be investigated could be prime nesting and/or hiding locations for snakes and insects, precautions will be taken when opening manholes and other access doors. When possible, doors and manhole covers will be opened away from personnel to allow snakes or insects to escape. Personnel should avoid reaching into areas that are not visibly clear of snakes or insects. 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.

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. An Office of Natural Resources or similar entity on Base should be contacted for further direction on the hazards and precautions of naturally occurring wildlife and insects.

6.3.3 Inclement Weather

Project tasks under this Scope of Work will be performed outdoors. As a result, inclement weather may be encountered. In the event that adverse weather conditions arise (electrical storms, 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, PM, and the HSM.

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.

6.3.4 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.

Many of these physical hazards are discussed in detail in Section 4.0 of the Health and Safety Guidance Manual. Additional information regarding physical hazards associated with the site is provided in Table 5-1 of this HASP.

7.0 AIR MONITORING

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

7.1 INSTRUMENTS AND USE

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

7.1.1 Photoionization Detector or Flame Ionization Detector

In order to accurately monitor for any substances which may present an exposure potential to site personnel, a Photoionization Detector (PID) using a lamp energy of 10.2 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, the background levels of the site must be determined and noted. Daily background readings will be taken away from any areas of potential contamination. These readings, any influencing conditions (i.e., weather, temperature, and humidity) and site location must be documented in the field operations logbook or other site documentation (e.g., sample log sheet).

7.1.2 Hazard Monitoring Frequency

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

7.2 INSTRUMENT MAINTENANCE AND CALIBRATION

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

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

8.0 TRAINING/MEDICAL SURVEILLANCE REQUIREMENTS

8.1 INTRODUCTORY/REFRESHER/SUPERVISORY TRAINING

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

All TtNUS personnel must complete 40 hours of introductory hazardous waste site training prior to performing work at NAS Key West. Additionally, 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 project. Copies of certificates or other official documentation will be used to fulfill this requirement.

TtNUS will conduct a pre-activities training session prior to initiating site work. Additionally, a brief meeting will be held daily to discuss operations planned for that day. At the end of the workday, a short meeting will be held to discuss the operations completed and any problems encountered. This activity will be supported through the use of a Safe Work Permit System (See Section 9.2).

8.1.1 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 the 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 in the example letter provided 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 site personnel who will perform work on this project. Site-specific training will also be provided to all personnel [U.S. Department of Defense (DOD), EPA, etc.] who may enter the site to perform functions that may or may not be directly related to site operations. Site-specific training will include:

- Names of designated personnel and alternates responsible for site safety and health
- Safety, health, and other hazards present on site
- Use of personal protective equipment
- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- Contents of the Health and Safety Plan
- Emergency response procedures (evacuation and assembly points)
- Spill response procedures
- Review of the contents of relevant Material Safety Data Sheets

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

8.3 MEDICAL SURVEILLANCE

All TtNUS personnel participating in project field activities will have had a physical examination meeting the requirements of TtNUS's medical surveillance program and will be medically qualified to perform hazardous waste site work using respiratory protection. Documentation for medical clearances will be maintained in the TtNUS Pittsburgh and/or Aiken offices and made available as necessary.

Each field team member and visitor entering the Exclusion Zone(s) shall be required to complete and submit a copy of Medical Data Sheet presented in Figure 8-4. This shall be provided to the SSO prior to participating in site activities. The purpose of this document is to provide site personnel and emergency responders with additional information that may be necessary in order to administer medical attention.

8.3.1 Medical Surveillance Requirements for Subcontractors

Identified subcontractors are required to obtain a certificate of their ability to perform hazardous waste site work and to wear respiratory protection. The "Subcontractor Medical Approval Form" provided in Figure 8-3 shall 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 8-3 of this HASP.

8.3.2 Requirements for All Field Personnel

Each field team member (including subcontractors) and visitors entering the Exclusion Zone(s) shall be required to complete and submit a copy of 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 necessary 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, and in this case the subcontractor was providing concrete coring services.

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. Charles Bryan
Task Order Manager
Tetra Tech NUS, Inc.
900 Tail Ridge Road
Aiken, South Carolina 29803

Subject: HAZWOPER Training for Naval Air Station 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 126.

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 requested by 29 CFR 1910.120(e) and have had 8 hours of refresher training as applicable and as required by 29 CFR 1910.120(e)(8) and that 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)

Figure 8-3
Subcontractor Medical Approval Form
Page 1 of 2

For employees of _____
Company Name

Participant Name: _____ Date of Exam: _____

Part A

The above-named individual has:

1. Undergone a physical examination in accordance with OSHA Standard 29 CFR 1910.120, paragraph (f) and found to be medically -

 qualified to perform work at the NAS Key West work site
 not qualified to perform work at the NAS Key West work site

and,
2. Undergone a physical examination as per OSHA 29 CFR 1910.134(b)(10) and found to be medically -

 qualified to wear respiratory protection
 not qualified to wear respiratory protection

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

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

Part B

I, _____, have examined _____
Physician's Name (print) Participant's Name (print)

and have determined the following information:

Figure 8-3
Subcontractor Medical Approval Form
Page 2 of 2

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

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

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

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

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

- may
 may not

perform his/her assigned task.

Physician's Signature: _____

Address: _____

Phone Number: _____

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

Address

9.0 SPILL CONTAINMENT PROGRAM

Site operations and control will be facilitated through the use of established work zones and security and control of those zones. These activities will minimize the impact and spread of contaminants brought to the surface through demolition and excavation methods as well as protect personnel and visitors within these zones during ongoing operations.

9.1 WORK ZONES

Tetra Tech NUS will delineate and use work zones in conjunction with decontamination procedures to prevent the spread of contaminants to other areas of the site. A three-zone approach will be used for work at this site; an Exclusion Zone, a Contamination Reduction Zone, and a Support Zone. These will be used to control access to the work areas, restricting the general public, avoiding potentials to spread any contaminants, and to protect individuals who are not cleared to enter by way of training and/or medical surveillance qualifications.

9.1.1 Exclusion Zone

An Exclusion Zone will be established at each location where intrusive site work will be performed. The purpose of an exclusion zone is to define an area where specified requirements and restrictions must be observed (such as PPE usage, restrictions against smoking/eating etc.). These are areas that could be adversely impacted by either chemical or physical hazards. Exclusion Zone sizes and dimensions can vary based on various factors, such as:

- The nature of planned activities and the size of the area needed to safely perform them
- Physical and topographical features of the site
- Weather conditions
- Field and analytical measurements of air and environmental contaminants
- Air dispersion calculations
- Physical, chemical and toxicological properties of the contaminants being investigated

The following dimensions are to be observed for establishing the initial size of Exclusion Zones for this project:

- Monitoring well sampling and subsurface soil sampling: The exclusion zone for this activity will be set at 10 feet surrounding the sampling point (boring or well head and discharge collection container).

- DPT operations and monitoring well installations: A distance equal to the height of the mast plus 5 feet or a distance no less than 25 feet surrounding the DPT operation.
- Decontamination operation. The exclusion zone for this activity will be set at 10 feet surrounding the personnel and sample equipment decontamination wash and rinse.
- Investigative Derived Waste (IDW) area will be constructed and barricaded. Only authorized personnel will be allowed access.

All exclusion zones shall remain marked until the SSO has evaluated the restoration effort and has authorized changing the zone status.

Exclusion zones will be marked using fencing, barrier tape, traffic cones and/or drive poles. Signs will be posted to inform and direct site personnel and site visitors.

9.1.2 Contamination Reduction Zone

The contamination reduction zone will be split to represent two separate functions. The first function will be a control/supply point for supporting exclusion zone activities. The second function, which may take place a sufficient distance from the exclusion zone, is the decontamination of personnel and sampling equipment.

In order to move from the exclusion zone to a separate location the following activities will be used:

- As samplers move from location to location during sampling activities, dedicated sampling devices and PPE will be washed of gross contamination, removed, separated, and bagged. Personnel will use hygienic wipes, such as Handy Wipes, as necessary for personnel decontamination until they can access the centralized decontamination unit. At the first available opportunity personnel will wash their face and hands. This is also true prior to breaks and lunch when contamination can be transferred to the mouth through hand to mouth contact. This route of exposure is estimated to have the greatest and most likely potential for exposure to the contaminants of concern.
- Muddy over-boots and gloves may be required to go through a gross contamination wash at the exclusion zone. These items will then be cleaned thoroughly at the centralized decontamination unit.
- Potentially contaminated tooling along with PPE will be wrapped, when necessary, for transport to the decontamination area.

- Upon completion of the assigned tasks all personnel will move through the central decontamination area to clean reusable PPE and field equipment. Based on ambient conditions medical evaluations may take place at the termination point of the decontamination line. These evaluations will include pulse rate, oral temperature, breathing rate to evaluate physiological demands on site personnel. As stated earlier, these evaluations will be based on ambient conditions and acclimation periods.

9.1.3 Support Zone

The Support Zone will consist of a field trailer, storage, lay-down areas, or some other uncontaminated, controlled point. The Support Zone for this project will include a staging area where site vehicles can be parked, equipment will be unloaded, and where food and drink containers will be maintained. In all cases, the support zones will be established in clean areas of the site.

9.2 SAFE WORK PERMITS

All Exclusion Zone work and certain support tasks 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. Partially completed Safe Work Permits have been prepared for each of the planned tasks and are included in Attachment III of this HASP. The SSO is responsible for completing the remaining portions of these permits, and for reviewing them with all task participants as part of daily task-specific tailgate meetings. A blank Safe Work Permit is included in Figure 9-1 as an example.

The use of these permits will ensure that site-specific considerations and changing conditions are incorporated and addressed into the field activities. All Safe Work Permits will require the signatures of either the FOL or the SSO, as well as the signature of a representative of any subcontractors that will participate in the task (when appropriate). All personnel that will be engaged in on-site activities must be made aware of the contents of the appropriate Safe Work Permits before participating in any of the covered tasks. If additional tasks become necessary, the PHSO is to be notified so that this HASP can be appropriately reviewed/modified and to help prepare the necessary Safe Work Permit(s).

The use of these permits will establish and provide 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 Safe Work Permit will take precedence over the HASP when more conservative measures are required based on specific site conditions.

Upon completion of the work for which the Safe Work Permit was assigned, the Safe Work Permit will be turned into the FOL or the SSO. Concerns, complaints, and suggestions may be made on the reverse of the Safe Work Permit for consideration by the FOL and/or the SSO. All permits turned in with suggestions, difficulties, or complaints are to be forwarded to the PHSO for review.

9.3 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. This map will be posted to illustrate up-to-date information of contaminants and adjustment of zones and access points. This map will be posted at the field support trailer or other centralized location. Figure 2-1 in the Work Plan will serve as the preliminary version until investigation reveals more information. A map of the base is included in this HASP in Figure 9-2.

9.4 BUDDY SYSTEM

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

9.5 MATERIAL SAFETY DATA SHEET (MSDS) REQUIREMENTS

Tetra Tech NUS and subcontractor personnel will provide MSDSs for all chemicals brought on-site. The contents of these documents will be reviewed by the SSO with the user(s) of the chemical substances prior to any actual use or application of the substances on-site. The MSDSs will be maintained in a central location (i.e., temporary office) and will be available for anyone to review upon request. The SSO will be responsible for implementing a site-specific Hazard Communication Program (See Section 5.0 of the TtNUS Health and Safety Guidance Manual). This includes collection of MSDSs, creation and maintenance of an accurate Chemical Inventory Listing, container labeling and personnel training issues, and other aspects of Hazard Communication.

**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. On-site Inspection conducted Yes No Initials of Inspector _____

TtNUS

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

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

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 suit/coveralls (Type: _____) | <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 |
| Chemical Protective Over-boots (Type: _____) | <input type="checkbox"/> Yes <input type="checkbox"/> No | | |

Modifications/Exceptions: _____

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

VII. Site Preparation Yes No

- | | | | |
|---|--------------------------|--------------------------|--------------------------|
| | NA | | |
| Utility Locating and Excavation Clearance completed | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Equipment 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"/> |

- VIII. Additional Permits required (Hot work, confined space entry, excavation, etc.). Yes No
If yes, See SSO for appropriate permit

IX. Special instructions, precautions: _____

Permit Issued by: _____ Permit Accepted by: _____

9.6 COMMUNICATION

It is anticipated that site personnel will be working in close proximity during proposed field activities. In the event that site personnel are in isolated areas or are separated by significant distances, a supported means of communication between field crews will be utilized. Two-way radio communication devices, if needed, will be used only with NAS Key West approval.

External communications may be accomplished utilizing telephones that have been/can be installed at predetermined and approved locations, or through cellular phones. External communication will primarily be used for the purpose of resource and emergency resource communications. Prior to the commencement of site activities, the FOL will determine and arrange for appropriate means to accomplish external communications.

Switch off the phone when in any area with a potentially explosive atmosphere and obey all signals and instructions. Most manufacturers advised users to switch off the phone when at a refueling point. Do not use near fuels or chemicals or where blasting is in progress. Also, any restrictions or regulations in force at the base related to cellular phone use must be observed.

9.7 SITE VISITORS

Potential site visitors that may be encountered during the performance of the fieldwork could include the following:

- Personnel invited to observe or participate in operations by Tetra Tech NUS.
- Regulatory personnel (i.e., DOD, FDEP, EPA, OSHA, etc.)
- US Naval 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 PM or designee and following established base access procedures.

Once access to the base is obtained, all personnel who require access to Tetra Tech NUS work sites (areas of ongoing operations) will be required to obtain permission from the FOL and the Base Contact. Upon gaining access to the work site, all site visitors wishing to observe operations in progress will be required to meet the minimum requirements as stipulated 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 individuals name (proper identification required), who they represent, and the purpose for the visit. **The FOL is responsible for ensuring that site visitors are escorted at all times.**
- All site visitors will be required to produce the necessary information supporting clearance on to the site. This includes information attesting to applicable training (40-hours of HAZWOPER, 8-Hour Refresher as applicable), and medical surveillance as stipulated in Section 8.4, of this document. In addition, to enter the sites operational zones during planned activities, all visitors will be required to first go through site-specific training covering the topics stipulated in Section 8.2 of this HASP.

Once the site visitors have completed the above items they will be permitted to enter the site and applicable operational areas. All visitors are required to observe the protective equipment and site restrictions in effect at the work areas visited. Any and all visitors not meeting the requirements as 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 all on-site activities to be terminated until that visitor can be removed. Removal of unauthorized visitors will be accomplished with support from the Base Contact, if necessary. At a minimum, the Base Contact will be notified of any unauthorized visitors.

9.8 SITE SECURITY

As this activity will take place at a United States Naval facility, the first line of security will be provided by the base gate restricting the general public. The second line of security will take place at the work site referring interested parties to the FOL and Base Contact.

Security at the work areas will be accomplished using field personnel. This is a multiple person operation, involving multiple operational zones. Tetra Tech NUS personnel will retain complete control over active operational zones.

The Base Contact will serve as the focal point for base personnel and interested parties and will serve as the primary enforcement contact.

9.9 SANITATION AND BREAK AREAS

This section will address the following items:

- Toilets
- Potable water
- Showers and change rooms
- Break Areas

9.9.1 Toilets

One toilet will be provided for every 20 people. All toilets will be unisex and will have locking doors. The toilet provided will either be a chemical toilet or a flush toilet associated with an existing location.

9.9.2 Potable Water

Potable water as well as electrolyte balance sports drinks such as Gatorade will be provided to the field crews for fluid replacement. Storage and dispensing will proceed as follows:

- All containers will be clean and replenished daily.
- All containers will clearly marked as to their contents (Potable Water – Drinking Water Only; Gatorade, etc.).
- Dispensing locations will be placed in identified break areas within the support zone. The most likely location will be a break trailer. This will serve as an area for cooling or warming as well as an identified food and drink consumption area.
- If larger containers are used, dispensing cups will be provided.
- The coolers used for storage of potable drinks and cups will be stored away from potentially contaminating materials. Coolers used for shipping samples are not acceptable to store food or drink.

Fluid intake recommendations will be made based on the medical evaluations conducted at the end of the decontamination process, as necessary based on ambient conditions.

9.9.3 Showers/Change Rooms and Break Areas

Based on this scope and duration of this project shower facilities and locker rooms will not be provided.

Suitable locations will be provided for field personnel for the following use:

- Break areas for food and drink consumption
- Areas suitable for warming and cooling regimens
- Areas suitable for Safety Meetings

This location will be either the project trailer, or its own separate trailer based on the crew size. This area will be climate control to provide suitable shelter to combat heat or cold stress.

10.0 SITE CONTROL

10.1 SCOPE AND APPLICATION

It is not anticipated that bulk hazardous materials (over 55-gallons) will be accumulated or handled as part of the scope of work. It is also not anticipated that spillage of stored materials would constitute a danger to human health or the environment. As intended in the project scope of work, potentially contaminated soil will be containerized in 55-gallon drums for transportation off-site and disposal. Disposal will be in accordance with Federal, State, and local regulations. Based on previous sampling activities, the wastes have already been characterized and identified. While this groundwater remains in the staging area, this spill containment program will be instituted.

10.2 POTENTIAL SPILL AREAS

Potential spill areas will be monitored in an ongoing attempt to prevent and control further potential contamination of the environment. Currently, there are several areas vulnerable to this hazard including the area used for central staging and decontamination.

10.3 LEAK AND SPILL DETECTION

To establish an early detection of potential spills or leaks, a periodic walk-around by personnel staging or disposing of containers will be conducted at least once each week while site activities are underway. These inspections are to be performed during working hours, to visually determine that containers are not leaking. Any leaks identified will be collected and contained using absorbents such as Oil-dry, vermiculite, or sand, stored at the staging area in a drum conspicuously marked. This material too, will be containerized for disposal pending analyses. All inspections are to 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 or SSO will serve as the Spill Response Coordinator for this operation should the need arise.

10.5 SPILL PREVENTION AND CONTAINMENT EQUIPMENT

The following represents examples of the equipment that may be maintained at the staging area for the purpose of supporting this Spill Prevention/Containment Program.

- Sand, clean fill, vermiculite, or other noncombustible absorbent (Oil-dry);
- 55-gallon U.S. DOT 17-E or 17-H drums
- Shovels, rakes, and brooms
- Labels

10.6 SPILL CONTROL PLAN

It is not anticipated that a spill will occur which the field crews cannot handle. Should one occur, however, the FOL or SSO will carry out notification of appropriate emergency response agencies. The following describes the steps field personnel will implement upon detecting a spill or leak.

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

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 any 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 one that:

- Contains or has a potential to contain a hazardous atmosphere.
- Contains a material that has the potential to engulf an entrant.
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross-section.
- Contains any other recognized, serious, safety or health hazard.

For further information on confined space, consult the Health and Safety Guidance Manual or call the 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 the following materials/documents are taken to the project site and used when required.

- A complete copy of this HASP
- Health and Safety Guidance Manual
- Incident Reports
- Medical Data Sheets
- Material Safety Data Sheets for all chemicals brought on site, including decon solution, fuels, sample preservations, calibration gases, etc.
- A full size OSHA Job Safety and Health Poster
- Training/Medical Surveillance Documentation Form (blank)
- Emergency Reference Form (Section 2.0, extra copy for posting)
- A copy of the confined space entry program with extra copies of permits

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 specified documents is not feasible, (such as no office trailer), these documents should be separated and immediately accessible.

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

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

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

Site Clearance Posting (maintained) - This list is found within the training section of the HASP (See Figure 8-2). This list identifies all site personnel, dates of training (including site-specific training), and medical surveillance. The list indicates not only clearance but also status. If personnel do not meet these requirements, they do not enter the site while site personnel are engaged in activities.

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

Medical Data Sheets/Cards (maintained) - Medical Data Sheets will be filled out by on site personnel and filed in a central location. The Medical Data Sheet will accompany any injury or illness requiring medical attention to the medical facility. A copy of this sheet or a wallet card will be given to all personnel to be carried on their person.

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

13.0 GLOSSARY

ACGIH	American Conference of Governmental Industrial Hygienists
APR	Air Purifying Respirators
AST	Aboveground Storage Tank
CAS	Chemical Abstract Service
CFR	Code of Federal Regulations
CNS	Central Nervous System
CRZ	Contamination Reduction Zone
DOD	Department of Defense
DOT	Department of Transportation
EPA	Environmental Protection Agency
eV	electron Volts
FID	Flame Ionization Detector
FOL	Field Operations Leader
GCTL	Groundwater Cleanup Target Levels
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HEPA	High Efficiency Particulate Air
I.P.	Ionization Potential
LEL/O ₂	Lower Explosive Limit/Oxygen
N/A	Not Available
NIOSH	National Institute Occupational Safety and Health
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor)
PAH	Polycyclic Aromatic Hydrocarbons
PEL	Permissible Exposure Limit
PHSO	Project Health and Safety Officer
PID	Photo Ionization Detector
PPE	Personal Protective Equipment
PVC	Poly Vinyl Chloride
SAP	Sampling and Analysis Plan
SCBA	Self Contained Breathing Apparatus
SSO	Site Safety Officer
STEL	Short Term Exposure Limit
SWMU	Solid Waste Management Unit
TOM	Task Order Manager
TPH	Total Petroleum Hydrocarbons

TWA	Time Weighted Average
UV	Ultraviolet
WP	Work Plan

ATTACHMENT I

**INJURY/ILLNESS PROCEDURE
AND REPORT FORM**



CASE NO. _____

TETRA TECH NUS, INC.

INJURY/ILLNESS PROCEDURE WORKER'S COMPENSATION PROGRAM

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

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

ADDITIONAL QUESTIONS REGARDING WORKER'S COMPENSATION:

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

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



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.



CASE NO. _____

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

To: Corporate Health and Safety Manager
Human Resource Administrator

Prepared by: _____

Position: _____

Project Name: _____

Office: _____

Project No. _____

Telephone: _____

Information Regarding Injured or Ill Employee:

Name: _____

Office: _____

Home address: _____

Gender: M F No. of dependents: _____

Marital status: _____

Home telephone: _____

Date of birth: _____

Occupation (regular job title): _____

Social Security No.: _____

Department: _____

Date of Accident: _____

Time of Accident: _____

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

Street address: _____

City, state, and zip code: _____

County: _____

Narrative Description of How Accident Occurred: (Be specific. Explain what the employee was doing and how the accident occurred.)

Blank area for narrative description of the accident.



TETRA TECH, INC.
INJURY/ILLNESS REPORT

Did employee die? Yes No

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 accident report.

Witness(es):

Name:

Address:

Telephone:

Describe the Illness or Injury and Part of Body Affected:

Name the Object or Substance which Directly Injured the Employee:

Medical Treatment Required:

No Yes First Aid Only

Physician's Name: _____

Address: _____

Hospital or Office Name: _____

Address: _____

Telephone No.: _____

Lost Work Days:

No. of Lost Work Days _____

Last Date Worked _____

Time Employee Left Work _____

Date Employee Returned to Work _____

No. of Restricted Work Days _____

None

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:

	Printed Name	Signature	Telephone No.	Date
Project or Office Manager				
Site Safety Coordinator				
Injured Employee				

To be completed by Human Resources:

Date of hire:

Hire date in current job:

Wage information: \$ _____ per _____ (hour, day, week, or month)

Position at time of hire:

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 insurance carrier:

Date reported:

Reported by:

TeleClaim phone number:

TeleClaim account number:

Location code:

Confirmation number:

Name of contact:

Field office of claims adjuster:

ATTACHMENT II

MEDICAL DATA SHEET

MEDICAL DATA SHEET

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

Project _____

Name _____ Home Telephone _____

Address _____

Age _____ Height _____ Weight _____

Name of Next Kin _____

Drug or other Allergies _____

Particular Sensitivities _____

Do You Wear Contacts? _____

Provide a Checklist of Previous Illnesses or Exposure to Hazardous Chemicals _____

What medications are you presently using? _____

Do you have any medical restrictions? _____

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

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

Signature

Date

ATTACHMENT III

SAFE WORK PERMITS

**SAFE WORK PERMIT
DECONTAMINATION ACTIVITIES
NAS KEY WEST FLORIDA**

Permit No. _____ Date: _____ Time: From _____ to _____

SECTION I: General Job Scope

- I. Work limited to the following (description, area, equipment used): Decontamination of sampling equipment and machinery (i.e., DPT rigs.). Brushes and spray bottles will be used to decon small sampling equipment. Pressure washers or steam cleaning units may be used to decon the drilling equipment.
- II. Required Monitoring Instrument(s): PID with 10.2 eV or higher lamp source (used to screen equipment)
- III. Field Crew: _____
- IV. On-site Inspection conducted Yes No Initials of Inspector _____

TtNUS

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

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

Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, safety glasses, safety footwear, and nitrile gloves. When using pressure washers, field crews will also wear hearing protection, and face shields. Coveralls and boot covers are at the SSO's discretion.

- | | | |
|---|--|--|
| V. Chemicals of Concern | Action Level(s) | Response Measures |
| <u>Diesel range organics and associated VOCs (BTEX)</u> | <u>Any sustained readings above 5 ppm in worker breathing zones.</u> | <u>Suspend site activities and report to an unaffected area.</u> |
| <u>PAHs and metals</u> | | |

- | | |
|--|--|
| VI. Additional Safety Equipment/Procedures | |
| Hard-hat..... <input checked="" 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 type="checkbox"/> No | Barricades <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Splash suits/coveralls <input type="checkbox"/> Yes <input type="checkbox"/> No | Gloves (Type - <u>Nitrile</u>)..... <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| Steel toe Work shoes or boots..... <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | Work/rest regimen <input type="checkbox"/> Yes <input type="checkbox"/> No |

Modifications/Exceptions: PVC rain suits or PE or PVC coated Tyvek may be required (at the SSO's discretion) for protection against splashes and overspray. Chemical resistant boot covers if excessive liquids are generated or to protected footwear.

- | | | | | | |
|--|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|
| VII. Procedure review with permit acceptors | Yes | NA | | Yes | NA |
| Safety shower/eyewash (Location & Use)..... | <input 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"/> |

- | | | | |
|--|--------------------------|--------------------------|-------------------------------------|
| VIII. Site Preparation | Yes | No | NA |
| Utility Locating and Excavation Clearance completed | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Vehicle and Foot Traffic Routes 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: If decontamination solvents are used (such as isopropyl alcohol, methanol, etc.), consult appropriate MSDS and container labels. To minimize the potential for exposure, site personnel will use PPE and prevent contact with potentially contaminated equipment.

Permit Issued by: _____ Permit Accepted by: _____

**SAFE WORK PERMIT FOR
DPT SOIL BORING AND INSTALLATION OF MONITORING WELLS
NAS KEY WEST FLORIDA**

Permit No. _____ Date: _____ Time: From _____ to _____

SECTION I: General Job Scope

- I. Work limited to the following (description, area, equipment used): DPT operations and installation of monitoring wells.
- II. Required Monitoring Instrument(s): FID or PID with 10.2 eV lamp (or higher) lamp source
- III. Field Crew: _____
- IV. On-site Inspection conducted Yes No Initials of Inspector TtNUS

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

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

Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, steel toe safety shoes, safety glasses, hardhat, and hearing protection. Nitrile or leather gloves with surgical-style inner gloves; Tyvek coveralls, and; boot covers will be worn as directed by the SSO whenever contaminants may be contacted.

V. Chemicals of Concern Measures	Action Level(s)	Response
<u>Diesel range organics and PAHs and metals ⁽¹⁾</u>	<u>Any sustained readings associated VOCs (BTEX) breathing zones*.</u>	<u>Suspend site activities and above 5 ppm in worker</u>
	<u>*See Special Instructions</u>	

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

Modifications/Exceptions: Reflective vests for high traffic areas. Tyvek coverall and impermeable boots if there is a potential for soiling work clothes.

- | | | | | |
|--|--------------------------|--------------------------|-------------------------|--------------------------|
| 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"/> |
| Procedure for safe job completion | <input type="checkbox"/> | <input type="checkbox"/> | Evacuation routes | <input type="checkbox"/> |
| Contractor tools/equipment/PPE inspected | <input type="checkbox"/> | <input type="checkbox"/> | Assembly points..... | <input type="checkbox"/> |

- | | | | |
|--|--------------------------|--------------------------|--------------------------|
| VIII. Site Preparation | Yes | No | NA |
| Utility Locating and Excavation Clearance completed | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Vehicle and Foot Traffic Routes 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: Excavation/Utility Clearance Yes
 No
If yes, complete permit required or contact Health Sciences, Pittsburgh Office

X. Special instructions, precautions: * Work may resume if PID/FID readings in worker breathing zone return to background levels. If sustained readings are observed in worker breathing zone, contact PHSO for additional guidance on air monitoring procedures. Elevated PID readings at source areas are anticipated. Avoid or control airborne dusts. (1) PAHs and metals have also been identified as site contaminants however, these compounds are unlikely to present a significant exposure concern.

Permit Issued by: _____ Permit Accepted by: _____

**SAFE WORK PERMIT
MOBILIZATION AND DEMOBILIZATION ACTIVITIES NA
KEY WEST FLORIDA**

Permit No. _____ Date: _____ Time: From _____ to _____

SECTION I: General Job Scope

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

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

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

Modifications/Exceptions: Minimum requirement include sleeved shirt, long pants and safety footwear. Safety glasses are required if any potential eye hazards are noted. Hard hats and hearing protection will be worn when working near operating equipment. Reflective vests required in high traffic areas.

V. Chemicals of Concern Measures	Action Level(s)	Response
<u>None anticipated given the nature of surveying activities and limited contact w/ media.</u>	<u>None</u>	<u>Not Applicable</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 type="checkbox"/> Yes <input type="checkbox"/> No	Safety belt/harness <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Chemical/splash goggles <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Radio..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Splash Shield..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Barricades..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Splash suits/coveralls <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Gloves (Type - _____)..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Steel toe Work shoes or boots... <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Work/rest regimen..... <input type="checkbox"/> Yes <input type="checkbox"/> No

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

- VII. Procedure review with permit acceptors

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

- VIII. Site Preparation

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

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

If yes, complete permit required or contact Health Sciences, Pittsburgh Office

- X. Special instructions, precautions: Preview work locations to identify potential hazards (slips, trips, and falls, natural hazards, etc.) Avoid potential nesting areas. Minimize contact with potentially contaminated media. Suspend site activities in the event of inclement weather.

Permit Issued by: _____ Permit Accepted by: _____

**SAFE WORK PERMIT FOR
MULTI-MEDIA SAMPLING
NAS KEY WEST FLORIDA**

Permit No. _____ Date: _____ Time: From _____ to _____

SECTION I: General Job Scope

I. Work limited to the following (description, area, equipment used): Multi-media sampling including subsurface soils and groundwater. IDW sampling is also included in this task.

II. Required Monitoring Instrument(s): FID or PID with 10.2 eV lamp (or higher) lamp source

III. Field Crew: _____

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

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

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

Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, safety shoes, surgical style gloves, and safety glasses. Hard hats and hearing protection will be worn when working near operating equipment or when required by the SSO.

V. Chemicals of Concern	Action Level(s)	Response Measures
<u>Diesel range organics and associated VOCs (BTEX)</u>	<u>Any sustained readings above 5 ppm in worker breathing zones*.</u>	<u>Suspend site activities and report to an unaffected area.</u>
<u>PAHs and metals ⁽¹⁾</u>		

*See Special Instructions

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

Modifications/Exceptions: Reflective vests for high traffic areas. Tyvek coverall if there is a potential for soiling work clothes. Hard hat and hearing protection if work is conducted near operating rigs.

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

VIII. Site Preparation	Yes	No	NA
Utility Locating and Excavation Clearance completed.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vehicle and Foot Traffic Routes 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: * Avoid contact with potentially contaminated media. Stand upwind from source areas and contact the PHSO for additional air monitoring guidance if sustained readings are observed in worker breathing zones. Elevated PID readings at source areas are anticipated. Avoid or control airborne dusts. (1) PAHs and metals have also been identified as site contaminants however, these compounds are unlikely to present a significant exposure concern. Use appropriate tools when cutting acetate liners.

Permit Issued by: _____ Permit Accepted by: _____

ATTACHMENT IV

OSHA POSTER

You Have a Right to a Safe and Healthful Workplace. IT'S THE LAW!

- You have the right to notify your employer or OSHA about workplace hazards. You may ask OSHA to keep your name confidential.
- You have the right to request an OSHA inspection if you believe that there are unsafe and unhealthful conditions in your workplace. You or your representative may participate in the inspection.
- You can file a complaint with OSHA within 30 days of discrimination by your employer for making safety and health complaints or for exercising your rights under the *OSH Act*.
- You have a right to see OSHA citations issued to your employer. Your employer must post the citations at or near the place of the alleged violation.
- Your employer must correct workplace hazards by the date indicated on the citation and must certify that these hazards have been reduced or eliminated.
- You have the right to copies of your medical records or records of your exposure to toxic and harmful substances or conditions.
- Your employer must post this notice in your workplace.



The *Occupational Safety and Health Act of 1970 (OSH Act)*, P.L. 91-596, assures safe and healthful working conditions for working men and women throughout the Nation. The Occupational Safety and Health Administration, in the U.S. Department of Labor, has the primary responsibility for administering the *OSH Act*. The rights listed here may vary depending on the particular circumstances. To file a complaint, report an emergency, or seek OSHA advice, assistance, or products, call 1-800-321-OSHA or your nearest OSHA office: • Atlanta (404) 562-2300 • Boston (617) 565-9860 • Chicago (312) 353-2220 • Dallas (214) 767-4731 • Denver (303) 844-1600 • Kansas City (816) 426-5861 • New York (212) 337-2378 • Philadelphia (215) 861-4900 • San Francisco (415) 975-4310 • Seattle (206) 553-5930. Teletypewriter (TTY) number is 1-877-889-5627. To file a complaint online or obtain more information on OSHA federal and state programs, visit OSHA's website at www.osha.gov. If your workplace is in a state operating under an OSHA-approved plan, your employer must post the required state equivalent of this poster.

1-800-321-OSHA www.osha.gov

ATTACHMENT V

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



TETRA TECH NUS, INC.

STANDARD OPERATING PROCEDURES

Number	HS-1.0	Page	1 of 11
Effective	03/00	Date	Revision
			1
Applicability	Tetra Tech NUS, Inc.		
Prepared	Health & Safety		
Approved	D. Senovich <i>DS</i>		

Subject
UTILITY LOCATING AND EXCAVATION CLEARANCE

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1.0 PURPOSE

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

The purpose of this procedure is to provide minimum requirements and technical guidelines regarding the appropriate procedures to be followed when performing subsurface and overhead utility locating services. It is the policy of Tetra Tech NUS, Inc. (TtNUS) to provide a safe and healthful work environment for the protection of our employees. The purpose of this Standard Operating Procedure (SOP) is to aid in achieving the objectives of the TtNUS Utility Locating and Clearance Policy. The TtNUS Utility Locating and Clearance Policy must be reviewed by anyone potentially involved with underground or overhead utility services.

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 or absence of 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 development of detailed operating procedures. This guidance is not intended to provide a detailed description of methodology and instrument operation. Specialized expertise during both planning and execution of several of the geophysical methods 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.

4.0 RESPONSIBILITIES

Project Manager (PM)/Task Order Manager (TOM) - Responsible for ensuring that all field activities are conducted in accordance with this procedure and the TtNUS Utility Locating and Clearance Policy.

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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 and the TtNUS Utility Locating and Clearance Policy. 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.

Site Personnel – Responsible for understanding and implementing this SOP and the TtNUS Utility Locating and Clearance 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. The following procedure must be followed prior to beginning any 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 locations shall be added to project maps upon completion of this exercise and returned to the PM/TOM.

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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 such methods as passive and intrusive surveys, physical probing, or hand augering. Each method has advantages and disadvantages including complexity, applicability, and price. It also should be noted that in many 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 with a hand auger or pole (tile probe) made of non-conductive material. 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.

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

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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

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.

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.

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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 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-auger Surveys

When the identification and location of underground utilities cannot be positively confirmed through document reviews and/or other methods, borings must be hand-augered for all locations where there is a potential to impact buried utilities. The minimum hand-auger depth that must be reached is to be determined considering the geographical location of the work site. This approach recognizes that the

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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-auger depths must be at least to the frost line depth plus two (2) feet, but never less than 4 feet below ground surface (bgs). For augering, the hole must be reamed by hand to 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-auger. It is important to note that a post-hole digger must not be used in place of a hand-auger.

Tile Probe Surveys

For some soil types, site conditions, and excavation requirements, tile probes may be used instead of or in addition to hand-augers. Tile probes must be performed to the same depth requirements as hand-augers. Depending upon the site conditions and intended probe usage, tile probes should be made of non-conductive material such as fiberglass.

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 subsurface 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. 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

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**

<p>ALABAMA Alabama Line Location (800) 292-8525 Tucson Blue Stake Center (800) 782-5348</p>	<p>Maine Dig Safe – Maine (800) 225-4977</p>
<p>Alaska Locate Call Center of Alaska Inc. (800) 478-3121</p>	<p>Maryland Miss Utility (800) 257-777 Miss Utility of Delmarva (800) 282-8555</p>
<p>Arizona Arizona Blue Stake Inc. (800) 782-5348</p>	<p>Massachusetts Dig Safe – Massachusetts (800) 322-4844</p>
<p>Arkansas Arkansas One Call System Inc. (800) 482-8998</p>	<p>Michigan Miss Dig System (800) 482-7171</p>
<p>California Underground Service Alert North (800) 227-2600 Underground Service Alert South (800) 227-2600</p>	<p>Minnesota Gopher State One Call (800) 252-1166</p>
<p>Colorado Utility Notification Center of Colorado (800) 922-1987</p>	<p>Mississippi Mississippi One-Call System Inc. (800) 227-6477</p>
<p>Connecticut Call Before You Dig (800) 922-4455</p>	<p>Missouri Missouri One Call System Inc. (800) 344-7483</p>
<p>Delaware Miss Utility of Delmarva (800) 282-8555</p>	<p>Montana Utilities Underground Location Center (800) 424-5555 Montana One Call Center (800) 551-8344</p>
<p>District of Columbia Miss Utility (800) 257-7777</p>	<p>Nebraska Diggers Hotline of Nebraska (800) 331-5666</p>
<p>Florida Call Sunshine (800) 432-4770</p>	<p>Nevada Underground Service Alert North (800) 227-2600</p>
<p>Georgia Utilities Protection Center Inc. (800) 282-7411</p>	<p>New Hampshire Dig Safe – New Hampshire (800) 225-4977</p>
<p>Idaho Palouse Empire Underground Coordinating Council (800) 882-1974 Utilities Underground Location Center (800) 424-5555 Kootenai Country Utility Coordinating Council (800) 428-4950 Shoshone County One Call (800) 398-3285 Dig Line (800) 342-1585 One Call Concepts (800) 626-4950</p>	<p>New Jersey New Jersey One Call (800) 272-1000</p>
<p>Illinois Julie Inc. (800) 892-0123 Digger (Chicago Utility Alert Network) (312) 744-7000</p>	<p>New Mexico New Mexico One Call System Inc. (800) 321-ALERT Las Cruces-Dona Utility Council (505) 526-0400</p>
<p>Indiana Indiana Underground Plant Protection Services (800) 382-5544</p>	<p>New York Underground Facilities Protection Organization (800) 962-7962 New York City: Long Island One Call Center (800) 272-4480</p>
<p>Iowa Underground Plant Location Service Inc. (800) 292-8989</p>	<p>North Carolina The North Carolina One-Call Center Inc. (800) 632-4949</p>
<p>Kansas Kansas One-Call Center (800) 344-7233</p>	<p>North Dakota Utilities Underground Location Center (800) 795-0555</p>
<p>Kentucky Kentucky Underground Protection Inc. (800) 752-6007</p>	<p>Ohio Ohio Utilities Protection Service (800) 362-2764 Oil & Gas Producers Underground Protection Service (800) 925-0988</p>
<p>Louisiana Louisiana One Call (800) 272-3020</p>	<p>Oklahoma Call Okie (800) 522-6543</p>

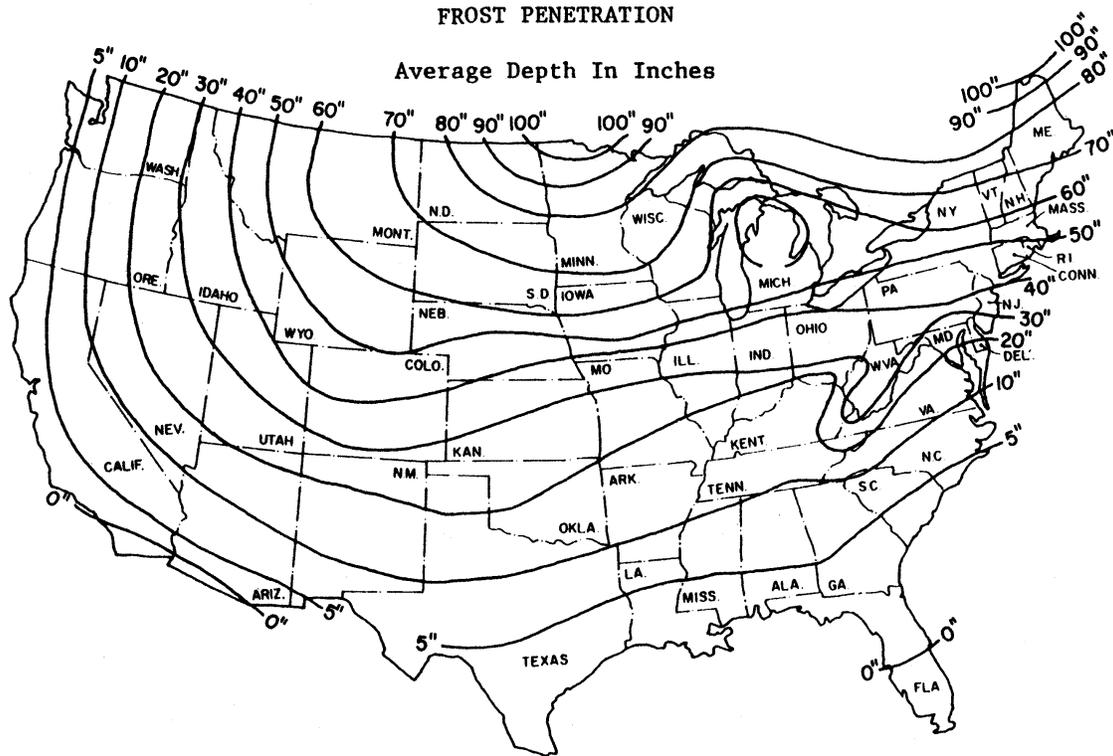
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<p>Oregon Utilities Underground Location Center (800) 424-5555</p> <p>Douglas Utilities Coordinating Council (503) 673-6676</p> <p>Josephine Utilities Coordinating Council (503) 476-6676</p> <p>Rogue Basin Utility Coordinating Council (503) 779-6676</p> <p>Utilities Notification Center (800) 332-2344</p>
<p>Pennsylvania Pennsylvania One Call System Inc. (800) 242-1776</p>
<p>Rhode Island Dig Safe – Rhode Island (800) 225-4977</p>
<p>South Carolina Palmetto Utility Protection Service Inc. (800) 922-0983</p>
<p>South Dakota South Dakota One Call (800) 781-7474</p>
<p>Tennessee Tennessee One-Call System (800) 351-1111</p>
<p>Texas Texas One Call System (800) 245-4545</p> <p>Texas Excavation Safety System (800) 344-8377</p> <p>Lone Star Notification Center (800) 669-8344</p>
<p>Utah Blue Stakes Location Center (800) 662-4111</p>
<p>Vermont Dig Safe – Vermont (800) 225-4977</p>
<p>Virginia Miss Utility of Virginia (800) 552-7001</p> <p>Miss Utility (800) 257-7777</p> <p>Miss Utility of Delmarva (800) 441-8355</p>
<p>Washington Utilities Underground Location Center (800) 424-5555</p> <p>Grays Harbor & Pacific County Utility Coordinating Council (206) 535-3550</p> <p>Utilities County of Cowlitz County (360) 425-2506</p> <p>Chelan-Douglas Utilities Coordinating Council (509) 663-6111</p> <p>Upper Yakima County Underground Utilities Council (800) 553-4344</p> <p>Inland Empire Utility Coordinating Council (509) 456-8000</p> <p>Palouse Empire Utilities Coordinating Council (800) 822-1974</p> <p>Utilities Notification Center (800) 332-2344</p>
<p>West Virginia Miss Utility of West Virginia Inc. (800) 245-4848</p>
<p>Wisconsin Diggers Hotline Inc. (800) 242-8511</p>

<p>Wyoming West Park Utility Coordinating Council (307) 587-4800</p> <p>Call-In Dig-In Safety Council (800) 300-9811</p> <p>Fremont County Utility Coordinating Council (800) 489-8023</p> <p>Central Wyoming Utilities Coordinating Council (800) 759-8035</p> <p>Southwest Wyoming One Call (307) 362-8888</p> <p>Carbon County Utility Utility Coordinating Council (307) 324-6666</p> <p>Albany County Utility Coordinating Council (307) 742-3615</p> <p>Southeast Wyoming Utilities Coordinating Council (307) 638-6666</p> <p>Wyoming One-Call (800) 348-1030</p> <p>Utilities Underground Location Center (800) 454-5555</p> <p>Converse County Utility Coordination Council (800) 562-5561</p>
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ATTACHMENT 2

FROST LINE PENETRATION DEPTHS BY GEOGRAPHIC LOCATION



Courtesy U.S. Department Of Commerce

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**ATTACHMENT 3
UTILITY CLEARANCE FORM**

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

1. **Underground Utilities** Circle One
- a) Review of existing maps? yes no N/A
 - b) Interview local personnel? yes no N/A
 - c) Site visit and inspection? yes no N/A
 - d) Excavation areas marked in the field? yes no N/A
 - e) Utilities located in the field? yes no N/A
 - f) Located utilities marked/added to site maps? yes no N/A
 - g) Client contact notified yes no N/A
 Name _____ Telephone: _____ Date: _____
 - g) State One-Call agency called? yes no N/A
 Caller: _____
 Ticket Number: _____ Date: _____
 - h) Geophysical survey performed? yes no N/A
 Survey performed by: _____
 Method: _____ Date: _____
 - i) Hand augering performed? yes no N/A
 Augering 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

ATTACHMENT VI

EQUIPMENT INSPECTION CHECKLIST

EQUIPMENT INSPECTION

COMPANY: _____ **UNIT NO.** _____

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

Inspection Date: ___/___/___ Time: _____ Equipment Type: _____

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

Safety Guards:

	Yes	No
- Around rotating apparatus (belts, pulleys, sprockets, spindles, drums, flywheels, chains) all points of operations protected from accidental contact? _____	<input type="checkbox"/>	<input type="checkbox"/>
- Hot pipes and surfaces exposed to accidental contact? _____	<input type="checkbox"/>	<input type="checkbox"/>
- All emergency shut offs have been identified and communicated to the field crew? _____	<input type="checkbox"/>	<input type="checkbox"/>
- Have emergency shutoffs been field tested? _____	<input type="checkbox"/>	<input type="checkbox"/>
- Results? _____	<input type="checkbox"/>	<input type="checkbox"/>
- Are any structural members bent, rusted, or otherwise show signs of damage? _____	<input type="checkbox"/>	<input type="checkbox"/>

- Are fueling cans used with this equipment approved type safety cans? _____
- 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