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FINAL HEALTH AND SAFETY PLAN FOR PERFORMING INVESTIGATIVE WORK AND
SAMPLING WITH TRANSMITTAL LETTER NTC ORLANDO FL
3/4/2004
TETRA TECH



TETRA TECH NUS, INC.

800 Oak Ridge Turnpike, A-600 ■ Oak Ridge, Tennessee 37830
(865) 483-9900 ■ FAX: (865) 483-2014 ■ www.tetrattech.com

0304-E075

March 4, 2004

Commander, Southern Division
Naval Facilities Engineering Command
Attn: Ms. Barbara Nwokike, Code 1873
P.O. Box 190010
2155 Eagle Drive
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order Nos. 0281 and 0332

Subject: Health and Safety Plan, Revision 5
Naval Training Center, Orlando, Florida

Dear Ms. Nwokike:

Enclosed for your information is Revision 5 to the Tetra Tech NUS Health and Safety Plan in hard copy and CD formats for work at NTC Orlando. The plan was revised to address the fieldwork at Operable Unit 3 and Study Areas 2, 36NW, and 52. Please contact me if you have any questions regarding the plan.

Sincerely,

A handwritten signature in black ink that reads "Steven B. McCoy".

Steven B. McCoy
Task Order Manager

SBM:tko

Enclosures

c: Ms. Barbara Nwokike, Southern Division (Orlando office)
Mr. Mark Perry, TtNUS
Ms. Debbie Wroblewski, TtNUS (transmittal letter only)
File/db

HEALTH AND SAFETY PLAN
for
**PERFORMING INVESTIGATIVE
WORK AND SAMPLING**

Naval Training Center
Orlando, Florida



Southern Division
Naval Facilities Engineering Command
Contract No. N62467-94-D-0888
Contract Task Orders 0281 & 0332

March 2004

**HEALTH AND SAFETY PLAN
FOR
PERFORMING INVESTIGATIVE WORK
AND SAMPLING**

**NAVAL TRAINING CENTER
ORLANDO, FLORIDA**

**COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY CONTRACT**

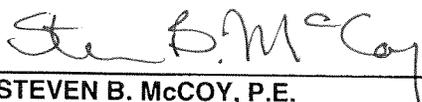
**Submitted to:
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29406**

**Submitted by:
Tetra Tech NUS, Inc.
661 Andersen Drive
Foster Plaza 7
Pittsburgh, Pennsylvania 15220**

**CONTRACT NO. N62467-94-D-0888
CONTRACT TASK ORDERS 0281 & 0332**

MARCH 2004

PREPARED UNDER THE SUPERVISION OF:



**STEVEN B. McCOY, P.E.
TASK ORDER MANAGER
TETRA TECH NUS, INC.
OAK RIDGE, TENNESSEE**

APPROVED FOR SUBMISSION BY:



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

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
ACRONYMS	vii
1.0 INTRODUCTION	1-1
1.1 KEY PROJECT PERSONNEL AND ORGANIZATION.....	1-1
1.2 SITE INFORMATION AND PERSONNEL ASSIGNMENTS.....	1-3
2.0 EMERGENCY ACTION PLAN	2-1
2.1 INTRODUCTION.....	2-1
2.2 PRE-EMERGENCY PLANNING.....	2-1
2.3 EMERGENCY RECOGNITION AND PREVENTION	2-2
2.3.1 Recognition	2-2
2.3.2 Prevention	2-3
2.4 EVACUATION ROUTES, PROCEDURES, AND PLACES OF REFUGE	2-4
2.4.1 Critical Operations	2-4
2.5 EMERGENCY CONTACTS	2-5
2.6 EMERGENCY ALERTING AND ACTION/RESPONSE PROCEDURES.....	2-10
2.7 EMERGENCY EQUIPMENT	2-10
2.8 DECONTAMINATION PROCEDURES / EMERGENCY MEDICAL TREATMENT.....	2-11
2.9 INJURY/ILLNESS REPORTING.....	2-11
2.10 FIRE EXTINGUISHERS	2-14
3.0 SITE BACKGROUND	3-1
3.1 SITE HISTORY	3-1
3.2 MAIN BASE.....	3-1
3.2.1 SA 8	3-2
3.2.2 SA 9	3-2
3.2.3 SA 36NW	3-3
3.3 MCCOY ANNEX	3-3
3.3.1 SA 52	3-3
3.4 HERNDON ANNEX.....	3-4
3.5 AREA C.....	3-5
4.0 AMENDED DESCRIPTION AND EVALUATION OF REMEDIAL ALTERNATIVES	4-1
4.1 BRUSH CLEARING	4-1
4.2 DECONTAMINATION.....	4-1
4.3 DIRECT PUSH TECHNOLOGY (DPT) OPERATIONS.....	4-1
4.4 DRILLING OPERATIONS.....	4-2
4.5 INVESTIGATION DERIVED WASTE (IDW) MANAGEMENT	4-2
4.6 MOBILIZATION/DEMobilIZATION	4-3
4.7 MONITORING WELL INSTALLATION	4-3
4.8 MONITORING WELL SAMPLING	4-4
4.8.1 Natural Attenuation Sampling.....	4-4
4.8.2 Oxidation-Reduction Potential (ORP).....	4-4
4.8.3 Water Level Measurements.....	4-4
4.9 MULTIMEDIA SAMPLING	4-4
4.9.1 Surface Soil Samples.....	4-4
4.9.2 Surface Water, Seeps, and Sediments.....	4-5
4.10 SURVEYING.....	4-5

5.0	TASKS/HAZARDS/ASSOCIATED CONTROL MEASURES SUMMARY	5-1
5.1	GENERAL SAFE WORK PRACTICES.....	5-11
5.2	DRILLING SAFE WORK PRACTICES	5-12
5.2.1	Before Drilling.....	5-12
5.2.2	During Drilling.....	5-13
5.2.3	After Drilling.....	5-14
5.3	DRUM HANDLING SAFE WORK PRACTICES	5-14
6.0	HAZARD ASSESSMENT	6-1
6.1	CHEMICAL HAZARDS	6-1
6.2	PHYSICAL HAZARDS	6-7
6.2.1	Slips, Trips, and Falls.....	6-8
6.2.2	Energized Systems (Contact with Underground or Overhead Utilities).....	6-8
6.2.3	Strain/Muscle Pulls from Heavy Lifting	6-8
6.2.4	Heat Stress	6-9
6.2.5	Pinch/Compression Points.....	6-9
6.2.6	Contact with Unexploded Ordnance (UXO).....	6-10
6.3	NATURAL HAZARDS	6-10
6.3.1	Insect/Animal Bites and Stings	6-11
6.3.2	Inclement Weather.....	6-12
6.3.3	Cuts and Lacerations	6-12
7.0	AIR MONITORING.....	7-1
7.1	INSTRUMENTS AND USE	7-1
7.1.1	Photoionization Detector or Flame Ionization Detector	7-1
7.1.2	Hazard Monitoring Frequency.....	7-2
7.2	FIELD CALIBRATION.....	7-3
8.0	TRAINING/MEDICAL SURVEILLANCE REQUIREMENTS.....	8-1
8.1	INTRODUCTORY/REFRESHER/SUPERVISORY TRAINING	8-1
8.1.1	Requirements for Subcontractors	8-1
8.2	SITE-SPECIFIC TRAINING	8-1
8.3	MEDICAL SURVEILLANCE.....	8-3
8.3.1	Medical Surveillance Requirements for Subcontractors	8-3
8.3.2	Requirements for All Field Personnel	8-3
8.4	SUBCONTRACTOR EXCEPTIONS	8-8
9.0	SITE CONTROL	9-1
9.1	EXCLUSION ZONE	9-1
9.2	CONTAMINATION REDUCTION ZONE	9-1
9.3	SUPPORT ZONE.....	9-2
9.4	SAFE WORK PERMITS	9-2
9.5	SITE VISITORS	9-2
9.6	SITE SECURITY	9-4
9.7	SITE MAP	9-4
9.8	BUDDY SYSTEM.....	9-5
9.9	MATERIAL SAFETY DATA SHEET (MSDS) REQUIREMENTS	9-5
9.10	COMMUNICATION.....	9-5
9.11	OTHER FACILITIES	9-5
10.0	SPILL CONTAINMENT PROGRAM	10-1
10.1	SCOPE AND APPLICATION	10-1
10.2	POTENTIAL SPILL AREAS	10-1
10.3	LEAK AND SPILL DETECTION.....	10-1
10.4	PERSONNEL TRAINING AND SPILL PREVENTION.....	10-2
10.5	SPILL PREVENTION AND CONTAINMENT EQUIPMENT	10-2

10.6	SPILL CONTROL PLAN	10-2
10.6.1	Procedures for Events Within the Control of Site Personnel	10-2
10.6.2	Procedures for Events Not Within the Control of Site Personnel	10-3
11.0	CONFINED-SPACE ENTRY	11-1
12.0	MATERIALS AND DOCUMENTATION	12-1
12.1	MATERIALS TO BE POSTED OR MAINTAINED AT THE SITE	12-1

TABLES

<u>NUMBER</u>		<u>PAGE</u>
2-1	Emergency Contacts	2-3
5-1	Tasks/Hazards/Control Measures Compendium	5-3
6-1	Chemical, Physical, and Toxicological Data	6-3

FIGURES

<u>NUMBER</u>		<u>PAGE</u>
2-1	Hospital Route – Main Base	2-6
2-2	Hospital Route – Area C	2-7
2-3	Hospital Route – Herndon Annex	2-8
2-4	Hospital Route – McCoy Annex	2-9
2-5	Emergency Response Protocol	2-12
7-1	Documentation of Field Calibration	7-4
8-1	Training Letter	8-2
8-2	Site-Specific Training Documentation	8-4
8-3	Subcontractor Medical Approval Form	8-5
8-4	Medical Surveillance Letter	8-7
9-1	Safe Work Permit	9-3

ATTACHMENTS

I	INJURY/ILLNESS PROCEDURE AND REPORT FORM
II	EQUIPMENT INSPECTION CHECKLIST
III	SAFE WORK PERMITS
IV	HEAT STRESS
V	STANDARD OPERATING PROCEDURE FOR UTILITY LOCATING AND EXCAVATION
VI	HEARING CONSERVATION PROGRAM

ACRONYMS

ACGIH	American Conference of Governmental Industrial Hygienists
BRAC	Base Realignment and Closure
BTEX	benzene, toluene, ethylbenzene, and xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
CLEAN III	Comprehensive Long-term Environmental Action - Navy
CNS	central nervous system
CSP	Contract Task Order
CRZ	Contamination Reduction Zone
DOD	United States Department of Defense
DPT	direct push technology
DRIs	direct reading instruments
EOD	Explosive Ordnance Division
eV	electron Volts
FDEP	Florida Department of Environmental Protection
FID	flame ionization detector
FOL	Field Operations Leader
GCTL	groundwater cleanup target level
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HHRA	human health risk assessment
HSM	Health and Safety Manager
IDLH	Immediately Dangerous to Life or Health
IDW	investigative-derived wastes
LEL/LFL	lower explosive limit / lower flammable limit
MSDS	Material Safety Data Sheets
N/A	not available
NAVFAC	Naval Facilities Engineering Command
Navy	U.S. Navy
NIOSH	National Institute for Occupational Safety and Health
NTC Orlando	Naval Training Center, Orlando
NTP	National Toxicity Program

OAFB-ORC	Orlando Air Force Base-Oxygen Release Compound
ORP	oxidation-reduction potential
OUs	operable units
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor)
PAHs	polynuclear aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PCE	tetrachloroethene
P.E.	Professional Engineer
PEL	Permissible Exposure Limit
PFD	personal flotation device
PHSO	Project Health and Safety Officer
PID	photoionization detector
PPE	personal protective equipment
SAs	Study Areas
SOPs	Standard Operating Procedures
SSO	Site Safety Officer
SVOCs	semivolatile organic compounds
TBD	to be determined
TCE	trichloroethene
TLV	Threshold Limit Value
TOM	Task Order Manager
TPH	total petroleum hydrocarbon
TtNUS	Tetra Tech NUS, Inc.
TWA	time-weighted average
UNF	Unnumbered Facility
USAAC	U.S. Army Air Corps
USAF	U.S. Army Air Force
USCG	U.S. Army Air Coast Guard
USGS	U. S. Geological Survey
USTs	underground storage tanks
UXO	unexploded ordnance
WP	Work Plan

1.0 INTRODUCTION

This Health and Safety Plan (HASP) has been developed to provide practices and procedures for Tetra Tech NUS, Inc. (TtNUS) and subcontractor personnel engaged in investigatory activities at the Naval Training Center, Orlando, Florida (NTC Orlando).

This HASP is prepared for NTC Orlando as part of an overall effort conducted under Comprehensive Long-Term Environmental Action-Navy (CLEAN III) administered through the U.S. Navy Southern Division Naval Facilities Engineering Command (NAVFAC), as defined under Contract Number N62467-94-D-0888. In addition to the HASP, a copy of the TtNUS Health & Safety Guidance Manual must be present at the site during the performance of site activities. The Guidance Manual provides detailed information pertaining to the HASP, as well as TtNUS Standard Operating Procedures (SOPs). Both documents must be present at the site to comply with the requirements stipulated in the Occupational Safety and Health Administration (OSHA) standard 29 Code of Federal Regulations (CFR) 1910.120.

This HASP has been developed using the latest available information regarding known or suspected chemical contaminants and potential physical hazards associated with the proposed work and site. The HASP will be modified if new information becomes available. All changes to the HASP will be made by the Project Health & Safety Officer (PHSO) and approved by the TtNUS Health and Safety Manager (HSM) and the Task Order Manager (TOM). The TOM will notify affected personnel of all changes.

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

1.1 KEY PROJECT PERSONNEL AND ORGANIZATION

This section defines responsibility for site safety and health for TtNUS and subcontractor employees engaged in on-site activities. Personnel assigned to these positions will exercise the primary responsibility for all on-site health and safety. These persons will be the primary points of contact for any questions regarding the safety and health procedures and the selected control measures that are to be implemented for on-site activities.

The 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 and medical surveillance.
 - 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 Site Safety Officer (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, applying, inspecting, and maintaining personal protective equipment.
 - Establishing work zones and control points in areas of operation.
 - Implementing air monitoring program for on-site activities.
 - Verifying training and medical clearance status of on-site personnel 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 on-site 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 NTC Orlando the FOL may also be responsible for SSO duties. This action will be performed only as credentials, experience, and availability permit.

1.2 SITE INFORMATION AND PERSONNEL ASSIGNMENTS

Site Name: Naval Training Center, Orlando
Orlando, Florida

Site Contact: Barbara Nwokike
Phone Number: (843) 820-5566

Project Team:

TtNUS Personnel	Discipline/Tasks Assigned	Phone Number
<u>Steve McCoy, P.E.</u>	<u>TOM</u>	<u>(865) 483-9900</u>
<u>TBD</u>	<u>FOL</u>	<u></u>
<u>TBD</u>	<u>SSO</u>	<u></u>
<u>Matthew M. Soltis, CIH, CSP</u>	<u>CLEAN HSM</u>	<u>(412) 921-8912</u>
<u>Donald J. Westerhoff, CSP</u>	<u>PHSO</u>	<u>(412) 921-7281</u>
<u>TDB</u>	<u>Field Geologist</u>	<u></u>
<u></u>	<u></u>	<u></u>

Non-TtNUS Personnel	Affiliation/Discipline/Tasks Assigned	Phone Number
<u></u>	<u></u>	<u></u>
<u></u>	<u></u>	<u></u>

Hazard Assessments (for purposes of 29 CFR 1910.132) and HASP preparation 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, Barbara Nwokike. In the event of an emergency that cannot be mitigated using on-site 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 and subcontractor personnel will not provide emergency response support beyond the capabilities of on-site response. Workers who are ill or who have suffered a non-serious injury may be transported by site personnel to nearby medical facilities, provided that such transport does not aggravate or further endanger the welfare of the injured/ill person. The emergency response agencies listed in this plan are capable of providing the most effective response, and as such, will be designated as the primary responders. These agencies are located within a reasonable distance from the area of site operations, which ensures adequate emergency response time. NTC Orlando contact Barbara Nwokike 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).

In connection with the performance of investigative activities, TtNUS will provide initial response measures for incidents such as:

- Initial fire-fighting support and prevention.
- Initial spill control and containment measures and prevention.
- Removal of personnel from emergency situations.
- Provision of initial medical support for injury/illness requiring only first-aid level support.
- Provision of site control and security measures as necessary.

Measures above these initial actions would require additional resources and would constitute an emergency.

2.2 PRE-EMERGENCY PLANNING

Through the initial hazard/risk assessment effort, emergencies resulting from chemical, physical, or fire hazards have been identified as the types of emergencies which could be encountered during site activities.

To minimize and eliminate the potential for these emergency situations, pre-emergency planning activities will include the following (which are the responsibility of the SSO and/or the FOL):

- Coordinating with the City of Orlando emergency response personnel to ensure that TtNUS emergency action activities are compatible with existing emergency response procedures.
- Establishing and maintaining information at the project staging area (support zone) for easy access in the event of an emergency. This information will include the following:
 - Chemical Inventory (of chemicals used on-site), with Material Safety Data Sheets (MSDS).
 - On-site personnel medical records (Medical Data Sheets).
 - A log book identifying personnel on-site 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.
- 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. Visual observation is primarily relevant for physical hazards that may be associated with the proposed scope of work. Visual observation will also play a role in detecting some chemical hazards. To adequately recognize chemical exposures, site personnel must have a clear knowledge of signs and symptoms of exposure associated with site contaminants. This information is provided in Table 6-1. Tasks to be performed at the site, potential hazards associated with those tasks and the recommended control methods are discussed in detail in Section 5.0. An assessment of the hazards identified in Section 5.0 is discussed in Section 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 logbook; however, all site personnel will be responsible for reporting

hazardous situations. Where potential hazards exist, TtNUS will initiate control measures to prevent adverse effects to human health and the environment.

The above actions will provide early recognition for potential emergency situations, and allow TtNUS to institute 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.

TABLE 2-1
EMERGENCY CONTACTS
NAVAL TRAINING CENTER
ORLANDO, FLORIDA

CONTACT	PHONE NUMBER
EMERGENCY (Police, Fire, Ambulance Service)	911
Area Hospitals – Orlando Regional Medical Center – Winter Park Memorial Hospital – Florida Hospital Orlando (Main) – Florida Hospital Orlando (East)	(407) 841-5111 (407) 646-7320 (407) 303-6611 (407) 303-8110
Chemtrec National Response Center Poison Control Center	(800) 424-9300 (800) 424-8802 (800) 222-1222
Sunshine State Utility One-Call of Florida	(800) 432-4770
NTC Orlando (Point-of-Contact) Barbara Nwokike	(843) 820-5566
TtNUS, Oak Ridge Office	(865) 483-9900
Task Order Manager Steve McCoy	(865) 483-9900
Health and Safety Manager Matthew M. Soltis, CIH, CSP	(412) 921-8912
Project Health and Safety Officer Donald J. Westerhoff, CSP	(412) 921-7281

Note: When dialing from the Orlando area, 10-digit dialing is required for local calls.

2.3.2 Prevention

TtNUS and subcontractor 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 on-site (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.

2.4.1 Critical Operations

There are no critical operations associated with this scope of work that will require personnel to man during an Emergency Evacuation. Therefore, in the event of an emergency all personnel shall evacuate to either the primary or secondary refuge locations as directed by the FOL and the SSO.

2.5 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. Figures 2-1 through 2-4 on the following four pages show routes from each area of the base to the nearest hospital. The SSO or FOL will provide each work group with copies of the maps.

As soon as possible, inform NTC Orlando Point of Contact Barbara Nwokike of any incident or accident.

Any pertinent information regarding allergies to medications or other special conditions will be provided to medical services personnel. This information should be provided on Medical Data Sheets filed on site for each crew member. If an exposure to hazardous materials has occurred, provide hazard information from Table 6-1 to medical service personnel.

EMERGENCY FACILITIES

Winter Park Memorial Hospital

200 N. Lakemount Avenue, Winter Park, FL 32792
(407) 646-7320

FLORIDA HOSPITAL ORLANDO (MAIN)

601 East Rollins Street, Orlando, Florida 32803
(407) 303-6611

FLORIDA HOSPITAL ORLANDO (EAST)

7727 Lake Underhill Road, Orlando, Florida 32822
(407) 303-8110

ORLANDO REGIONAL MEDICAL CENTER EMERGENCY ROOM

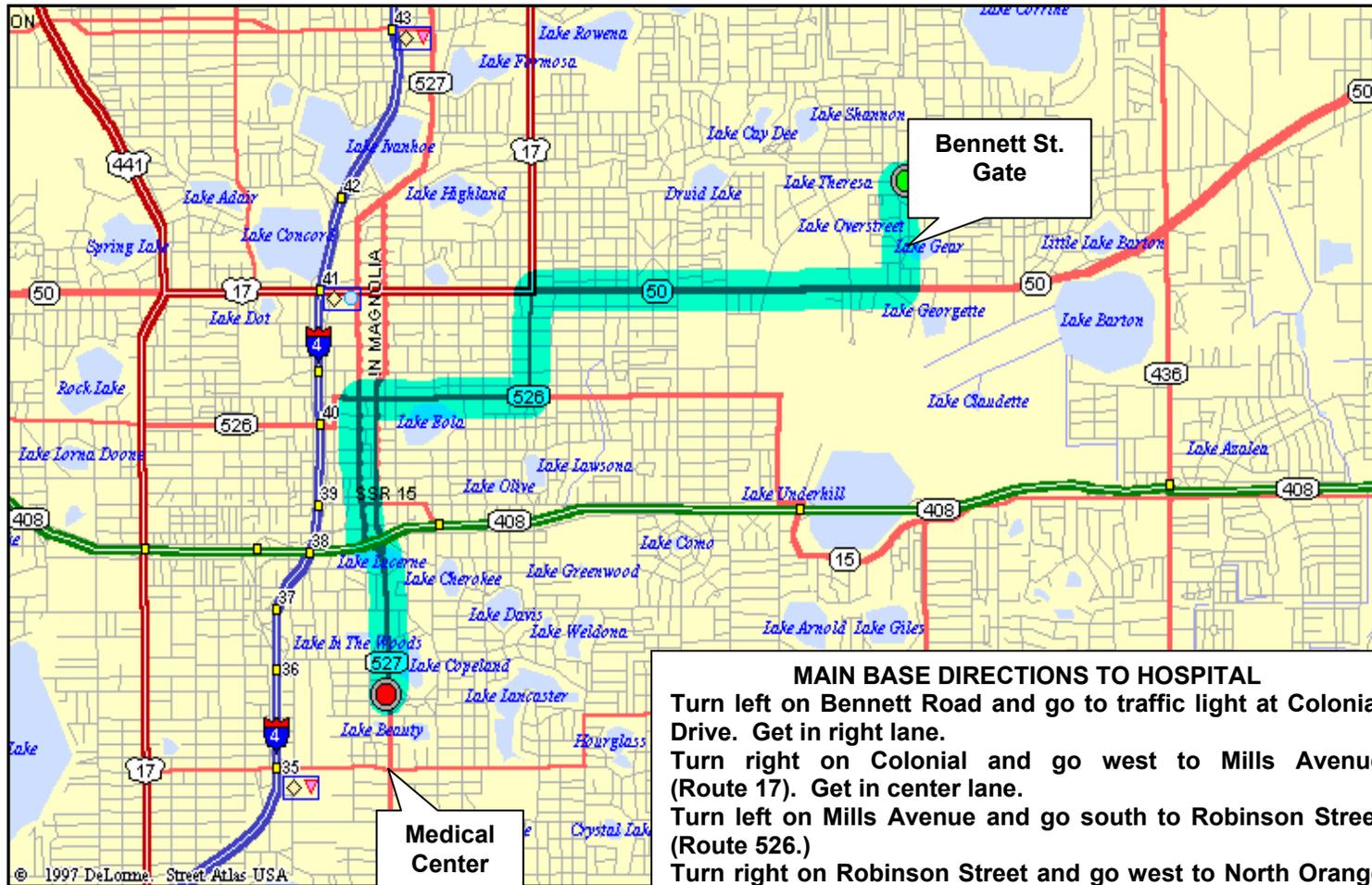
1414 Kuhl Avenue, Orlando, FL 32806
(407) 841-5111

ORLANDO REGIONAL MEDICAL CENTER WALK-IN CLINIC

818 Main Lane, Orlando, FL 32806
(Four lights north of main Regional Medical Center)
(407) 649-6111

Note: When dialing from the Orlando area, 10-digit dialing is required for local calls.

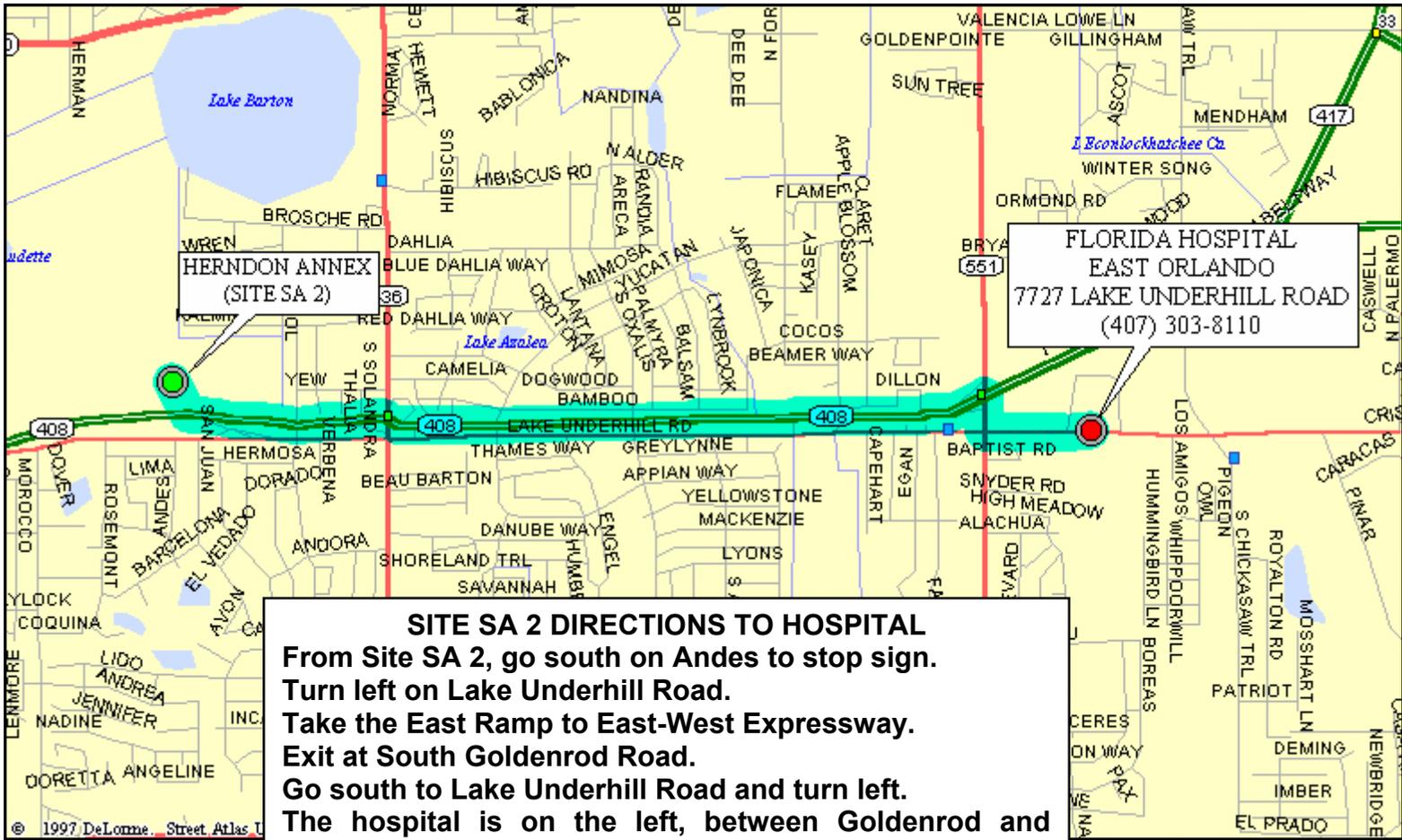
**FIGURE 2-1
ROUTE FROM MAIN BASE TO ORLANDO REGIONAL MEDICAL CENTER**



MAIN BASE DIRECTIONS TO HOSPITAL

Turn left on Bennett Road and go to traffic light at Colonial Drive. Get in right lane.
 Turn right on Colonial and go west to Mills Avenue (Route 17). Get in center lane.
 Turn left on Mills Avenue and go south to Robinson Street (Route 526.)
 Turn right on Robinson Street and go west to North Orange Avenue.
 Turn left on North Orange Avenue and watch for hospital on your right.

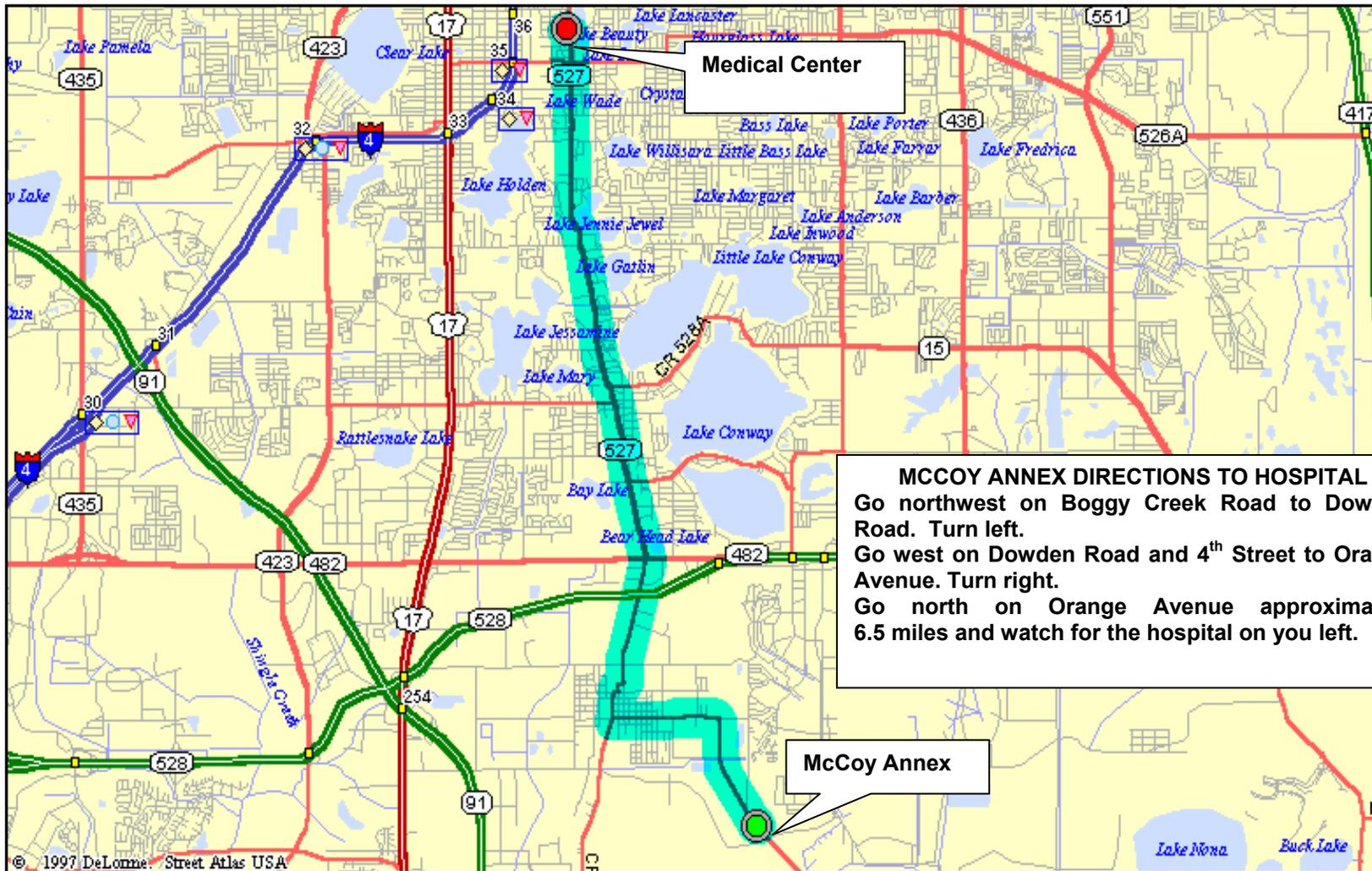
FIGURE 2-3
ROUTE FROM HERNDON ANNEX TO FLORIDA HOSPITAL EAST ORLANDO



SITE SA 2 DIRECTIONS TO HOSPITAL
 From Site SA 2, go south on Andes to stop sign.
 Turn left on Lake Underhill Road.
 Take the East Ramp to East-West Expressway.
 Exit at South Goldenrod Road.
 Go south to Lake Underhill Road and turn left.
 The hospital is on the left, between Goldenrod and Chickasaw Road.

ALTERNATE ROUTE
 From Site SA 2, go south on Andes to stop sign.
 Turn left on Lake Underhill Road.
 Go east approximately 2.5 miles.
 The hospital is on the left, between Goldenrod and Chickasaw Road.

**FIGURE 2-4
ROUTE FROM MCCOY ANNEX TO ORLANDO REGIONAL MEDICAL CENTER**



2.6 EMERGENCY ALERTING AND ACTION/RESPONSE PROCEDURES

TtNUS personnel will be working in close proximity to each other at NTC Orlando. 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 in close proximity, 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:
- Dial 911 and call other 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 to give directions to the site and follow the instructions given by the operator. The operator will then notify and dispatch the proper emergency response agencies.

2.7 EMERGENCY EQUIPMENT

A first-aid kit, eye wash units (or bottles of disposable eyewash solution) and fire extinguishers (strategically placed) will be maintained on site and shall be immediately available for use in the event of a potential emergency situation. 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 blood borne pathogens will also be available on site. Personnel identified within the field crew with blood borne pathogen and first-aid training will be the only personnel permitted to offer first-aid assistance. If no such trained person is

on-site, other crew members will administer only basic first-aid until emergency medical personnel arrive or the injured person arrives at a hospital.

2.8 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 rescue operations from emergency situations and may provide initial medical support for injury/illnesses requiring only "Basic First-Aid" level support, and only within the limits of training obtained by site personnel. Basic First-Aid is considered treatment that can be rendered by a trained first aid provider at the injury location and not requiring follow-up treatment or examination by a physician (for example; minor cuts, bruises, stings, scrapes, and burns). Not included as Basic First-Aid are second or third degree burns, cuts, lacerations requiring stitches or butterfly bandaging, heat exhaustion, severe poisonous plant or insect bite reactions. Personnel providing medical assistance are required to be trained in First-Aid and in the requirements of OSHA's Blood borne Pathogen Standard (29 CFR 1910.1030). Medical attention above First-Aid level support will require assistance from the designated emergency response agencies. Attachment I provides 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 2-5.**

2.9 INJURY/ILLNESS REPORTING

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

Any pertinent information regarding allergies to medications or other special conditions will be provided to medical services personnel. This information is listed on Medical Data Sheets filed on-site. If an exposure to hazardous materials has occurred, provide information on the chemical, physical, and toxicological properties of the subject chemical(s) to medical service personnel.

FIGURE 2-5 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 TtNUS employee, call the medical facility and advise them that the patient(s) is/are being sent and that they can anticipate a call from the WorkCare physician. WorkCare will contact the medical facility and request specific testing which may be appropriate. WorkCare physicians will monitor the care of the victim. Site officers and personnel should not attempt to get this information, as this activity leads to confusion and misunderstanding.
- Call WorkCare at 1-800-455-6155 and enter Extension 109, or follow the voice prompt for after hours and weekend notification and be prepared to provide:
 - Any known information about the nature of the injury.
 - As much of the exposure history as was feasible to determine in the time allowed.
 - Name and phone number of the medical facility to which the victim(s) has/have been taken.
 - Name(s) of the involved TtNUS employee(s).
 - Name and phone number of an informed site officer who will be responsible for further investigations.
 - Fax appropriate information to WorkCare at (714) 456-2154.
- Contact Corporate Health and Safety Department (Matt Soltis) and Human Resources Director Marilyn Duffy at 1-800-245-2730.

As data are 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 2-5 (Continued)

**WORKCARE
POTENTIAL EXPOSURE REPORT**

Name: _____ Date of Exposure: _____

Social Security No.: _____ Age: _____ Sex: _____

Client Contact: _____ Phone No.: _____

Company Name: _____

I. Exposing Agent

Name of Product or Chemicals (if known): _____

Characteristics (if the name is not known)

Solid Liquid Gas Fume Mist Vapor

II. Dose Determinants

What was individual doing? _____

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

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

Was there skin contact? _____

Was the exposing agent inhaled? _____

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

III. Signs and Symptoms (check off appropriate symptoms)

Immediately With Exposure:

Burning of eyes, nose, or throat

Tearing

Headache

Cough

Shortness of Breath

Chest Tightness / Pressure

Nausea / Vomiting

Dizziness

Weakness

Delayed Symptoms:

Weakness

Nausea / Vomiting

Shortness of Breath

Cough

Loss of Appetite

Abdominal Pain

Headache

Numbness / Tingling

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

Burning of eyes, nose, or throat

Tearing

Headache

Cough

Shortness of Breath

Chest Tightness / Pressure

Cyanosis

Nausea / Vomiting

Dizziness

Weakness

Loss of Appetite

Abdominal Pain

Numbness / Tingling

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

Improved: _____ Worsened: _____ Remained Unchanged: _____

V. Treatment of Symptoms (check off appropriate response)

None: _____ Self-Medicated: _____ Physician Treated: _____

2.10 FIRE EXTINGUISHERS

Each working group must have ready access to a general-purpose (Type ABC) fire extinguisher and at least one person trained to use it. Extinguishers must be inspected on a regular basis and the inspections must be recorded on tags on the extinguishers.

3.0 SITE BACKGROUND

3.1 SITE HISTORY

NTC Orlando is located in Orange County, Florida and consists of 2,072 acres divided into four discrete properties. The properties, all located within the City of Orlando, are:

- Main Base,
- McCoy Annex,
- Herndon Annex, and
- Area C.

The Federal Base Realignment and Closure (BRAC) Commission identified NTC Orlando for closure in July 1993. The closure and transition to other uses began in 1995 and will continue through 2002.

Brief summaries of the sites where TtNUS will or may perform work are provided in the following sections.

3.2 MAIN BASE

The Main Base is approximately three miles east of Downtown Orlando, and borders the City of Winter Park and unincorporated Orange County properties. The history of NTC Orlando dates to the construction of the original Orlando Municipal Airport prior to 1940. The municipal airport was taken over by the U.S. Army Air Corps (USAAC) in August 1940. Shortly thereafter, the construction program for Orlando Air Base began, with its official opening coming on December 1, 1940. During the following two years, USAAC acquired additional property, and auxiliary landing fields were constructed in the surrounding area. The Army Air Corps conducted operations at the Main Base from 1940 to 1947.

In 1947 the U.S. Air Force (USAF) assumed command of the facilities as the Orlando Air Force Base (OAFB). The base was deactivated on October 28, 1949, and remained on standby status until January 1, 1951, when it was reactivated as an Aviation Engineer's training site. After reactivation other USAF units arrived, and the Military Airlift Command assumed full jurisdiction of the base in 1953.

The Navy began moving its Training Device Center from Port Washington, New York to OAFB on September 15, 1965, and completed the move in June 1967. In 1968, the USAF ceased operations at OAFB, and the property was commissioned as the Naval Training Center, Orlando on July 1, 1968.

The Main Base contains many sites where prior hazardous activities have been investigated, including several Study Areas (SAs) and two Operable Units (OUs).

At the Main Base, all of the site features and the NTC roads and streets on which the sites were located have been demolished and removed by the site developer for the City of Orlando.

3.2.1 SA 8

SA 8, the Greenskeeper's Storage Area, is located in the eastern part of the Main Base east of Lake Baldwin and west of the former golf course's third fairway. The former Officer's Club, several single family residences, and the former Bachelor Officer's Quarters were located west of the southern portion of the golf course between Lake Baldwin and Lake Susannah. SA 8 is part of OU 3.

SA 8 was comprised of a fenced compound and occupied approximately 1/3 acre of land. Trident Lane ends as a cul-de-sac in the former Greenskeeper's Storage Area and was the only paved area at SA 8. Former Building 2134, an 800-square-foot concrete block structure built in 1943, was used for the storage and routine maintenance of golf course greenskeeper's equipment. A fence surrounded Building 2134 and several storage sheds and containers were located within this fence. A second fenced area containing three sheds abutted the south side of the primary storage area. This area was formerly used by the NTC Orlando grounds maintenance crew. Pesticides and herbicides were stored and used in this area in the past.

3.2.2 SA 9

SA 9, the former Pesticide Handling and Storage Area (Building 2132), is located in the eastern part of the Main Base on the southwest side of the former golf course. SA 9 is comprised of an approximately rectangular tract of land surrounding the former location of Building 2132, a former unnumbered storage shed, and a former parking area across Trident Lane. SA 9 is part of OU 3. The shore of Lake Baldwin is approximately 150 feet northwest of this location. Based on aerial photographs, the former storage area occupied approximately 0.42 acre. Currently, the site is a grassy field with drainage swales bordering the west, south, and east sides. There is a small concrete slab in the northwest corner of the site, approximately 15 feet south of Trident Lane; old aerial photographs indicate that the concrete slab was the foundation for a small shed that postdates the former Pesticide and Herbicide Handling Storage area. The site was used to store and mix pesticides and herbicides and to clean application equipment for all pest control activities at the Main Base. Pesticide mixing activity was halted at this location in 1972.

There were reports that pesticides had been stored in the building after 1972, but that there was no activity at the building.

3.2.3 SA 36NW

SA 36NW, so designated because it is located to the northwest of SA 36, is the site of benzene, toluene, ethylbenzene, and xylene (BTEX) contaminated groundwater at a depth of 20 to 35 feet. The contamination appears to originate from the former base service station (Building 109). Shallow groundwater (<20 feet deep) was cleaned up by the developer in the summer of 2003 but deep contamination remains. TtNUS completed a site investigation identifying the extent of contamination in October 2003.

3.3 MCCOY ANNEX

The history of McCoy Annex dates back to 1941 with the construction of the Orlando Municipal Airport in Pinecastle, Florida. The new airport was necessary because of the acquisition of the original municipal airport for construction of Orlando Air Base to the north. Before construction of the new airport, the property was undeveloped wetland. In 1942 the city leased the property to the USAAC for construction of Pinecastle Army Air Field which was completed in April of 1943. After World War II the air base was deactivated and the property was returned to the city. The terms of the property transfer included a reverted for reactivation clause in case of a national emergency. This clause was exercised in 1952 during the Korean Conflict and the base reopened as Pinecastle Air Force Base. In May of 1958, the base was renamed McCoy Air Force Base. The USAF retained command of the base until its closure in 1973. At the time of closure NTC Orlando acquired title to part of the property and changed the name to McCoy Annex. McCoy Annex was acquired to serve as a community support annex for NTC Orlando personnel. The majority of the property, including runways, aircraft hangers, and maintenance facilities previously used by the USAF, was never acquired by the Navy. Currently that property is owned and operated by the Orlando International Airport. Several Study Areas (SA) and one operable unit (OU) associated with McCoy Annex are discussed below.

3.3.1 SA 52

SA 52 is located in the central part of McCoy Annex, NTC Orlando. The focus of the site screening investigation was the area in the vicinity of former Building 7261. At one time Building 7261 was used as an entomology laboratory. Available drawings for Building 7261 indicate that it was built between 1956 and 1962 and was demolished in the early 1980s. A 1972 Master Plan for McCoy Annex indicates that the building was used for covered storage, and a 1973 drawing indicates that this building was the

Maintenance Shop (1,616 square feet in size), and was constructed with a concrete foundation, concrete floor, and wood walls. The building was located south of Building 7257.

3.4 HERNDON ANNEX

Herndon Annex, also known as SA 2, is located approximately 1.5 miles south of the Main Base, NTC Orlando. The history of Herndon Annex dates to the construction of the original Orlando Municipal Airport, prior to 1940. In August 1940, the USAAC established a tent camp on the southwest side of the old municipal airport. At this time, the City of Orlando agreed (under an AP-4 Agreement with the Federal Aviation Agency) to improve the airport under Army sponsorship. The improvements to the Orlando Municipal Airport were made by the Army under the "Development of Landing Areas for National Defense" program. The municipal field was later named Herndon Airport.

The construction of Orlando Army Air Base began in August 1940, and it was officially opened on December 1, 1940. During the next two years, the USAAC acquired additional property, including land north of Colonial Drive (State Route 50, or Old Cheney Highway), for the U.S. Army Air Force School of Applied Tactics. This property is now referred to as Main Base. Crews were given advanced training in bombardment methods and tactics at this school. The Air Defense Department was established to train fighter pilots in the techniques of defense against air bombardment attacks.

In 1947, the USAF assumed command of the facilities at Orlando Army Air Base, and the facility became known as OAFB. After World War II, OAFB served as a separation center and the headquarters for the Proving Ground Command (assigned to OAFB until July 1946). Reactivation of the Combat Air Command 14th Air Force brought the headquarters of the famous "Flying Tigers" to OAFB in 1946. OAFB was deactivated on October 29, 1949, and remained on a standby basis for two years. OAFB remained on standby status until January 1, 1951, when it was reactivated as an Aviation Engineers training site. During this period, the airfield and other excess property needs were scheduled for disposition under the War Surplus Act. The airport facilities and adjoining tracts were transferred to the City of Orlando, while control of Herndon Annex was retained by the USAF. Herndon Annex property, which was used on an occasional basis in the 1950s and early 1960s by the USAF as a sanitary landfill site, was held for potential future use as a disposal area in the event that another disposal area in the northwest section of the Main Base (i.e., the North Grinder Area) proved inadequate to meet the needs of the base.

In 1968, the USAF ceased operations at OAFB, and the Navy acquired the properties now referred to as Main Base, Area C, and Herndon Annex. These properties were commissioned as the Naval Training

Center on July 1, 1968. Remnants of some of the parking aprons and taxiways are still in evidence at Herndon Annex, which also included several warehouse facilities.

3.5 AREA C

Area C occupies approximately 46 acres and is located about one mile west of the Main Base off Maguire Boulevard. Area C served as a supply center for NTC, Orlando and included the base laundry and dry-cleaning facility and the Defense Reutilization and Marketing Office. Operable Unit (OU) 4 is included in Area C.

Area C is surrounded by urban development with multi-family residential development to the north and an office park to the east. Area C is also where the TtNUS, CH2M Hill, and SOUTHDIV offices are located.

4.0 AMENDED DESCRIPTION AND EVALUATION OF REMEDIAL ALTERNATIVES

The following is a list of the activities covered in this HASP for projects at NTC Orlando:

- Brush cleaning using heavy equipment and chain saws.
- Decontamination.
- Soil boring and installation of monitoring wells using direct push technology (DPT) hollow-stem auger, mud rotary, and/or Rotosonic drilling techniques.
- Investigation derived waste (IDW) management.
- Mobilization/demobilization.
- Monitoring well sampling (includes well purging and water level measurement).
- Surveying (includes geographical and geophysical).

The above listing represents a summarization of the tasks as they may apply to the scope and application of this HASP. For more detailed description of the associated tasks, refer to the appropriate Work Plan. Any tasks to be conducted outside of the elements listed here will be considered a change in scope requiring modification of this document. The TOM or a designated representative will submit all requested modifications to this document to the HSM.

4.1 BRUSH CLEARING

Brush clearing involves the use of a tractor with a bush hog or individuals with chain saws and machetes to clear sites of undergrowth to allow access for well installation or sampling.

4.2 DECONTAMINATION

Decontamination of heavy equipment involves the use of a portable steam cleaner; decontamination of sampling tools involves the use of detergent, solvents such as isopropanol, and de-ionized and potable water.

4.3 DIRECT PUSH TECHNOLOGY (DPT) OPERATIONS

This method uses hydraulic pressure and a percussion hammer to advance tooling into the ground. DPT operations include:

- Groundwater sampling,
- Microwell and piezometer installation, and
- Soil sampling.

For groundwater sampling a well screen fitted with an expendable drive tip is used as the first interval of tooling. The rod string is driven to the desired depth and the screen is deployed by knocking out the expendable drive tip and retracting the rod string, which exposes the screen. For microwell and piezometer installation pre-constructed wells are inserted into the hollow drive rods upon reaching the target depth. For soil sampling a 2-inch diameter sampling core containing a clear plastic liner is advanced in 2-foot or 4-foot intervals for soil sample extraction. Once the sample is collected the sampling core is withdrawn and the liner is removed. Once removed, the liner is cut open to enable sample collection, lithologic logging, and screening.

4.4 DRILLING OPERATIONS

Drilling operations include both hollow-stem auger drilling and mud rotary drilling and are typically performed in order to install monitoring wells and/or collect subsurface soil samples. The hollow-stem auger method involves the advancing of hollow augers into the ground. The augers are advanced by a combination of hydraulic down pressure and rotation. Soil cuttings are brought to the surface by moving upward along the auger flights as they rotate. Advantages of this type of drilling include:

Soil samples can be obtained while augers remain in the ground. Sampling requires the use of split-barrel or thin-wall tube samplers advanced through the hollow core of the auger.

No drilling fluids are required.

A well can be installed inside the auger stem and back-filled as the augers are withdrawn.

Mud rotary drilling consists of rotating a bit into the ground using a string of drill pipe. Cuttings are brought to the surface by the circulating drilling fluid (drilling mud). The advantages of this type of drilling compared to hollow-stem auger drilling include:

- Deeper wells can be drilled.
- Harder formation material can be drilled.
- Heaving or flowing sands can be controlled.

4.5 INVESTIGATION DERIVED WASTE (IDW) MANAGEMENT

This activity involves the handling, staging, and disposal of IDW. Anticipated IDW includes soil cuttings, development water, purge water, PPE and potentially contaminated trash such as plastic sheeting. IDW will be stored in a variety of containers such as drums, poly tanks, and roll-off bins. A licensed waste

hauler will move IDW to a temporary staging area in a locked building at Area C, then remove the IDW for final disposal.

4.6 MOBILIZATION/DEMobilIZATION

Mobilization/demobilization includes all activities associated with getting equipment, supplies, and personnel to and from the job site. It may also involve actions such as construction of temporary decontamination stations.

4.7 MONITORING WELL INSTALLATION

The installation of monitoring wells for NTC Orlando projects may involve multiple methods based on the function of the well, access requirements, and the established data quality objectives. The three primary methods to be used at NTC Orlando are hollow-stem auger, mud rotary, and DPT.

In some locations, subsurface soil samples will be collected as the drilling tool is advanced into the ground. Once the installation depth is reached, the well string is suspended in the boring and the construction materials (e.g. sand, bentonite, grout) are placed in the annular space. In the case of DPT and hollow-stem auger methods, the well is constructed inside the hollow tool and the materials are added as the tool is withdrawn from the boring. When using mud rotary, the tooling is removed and the well is constructed in an open borehole.

Following installation, new wells are developed to remove fines from the filter pack, and existing wells will be redeveloped if needed (based on groundwater turbidity). The steps are as follows:

The depth to water and total depth of the well is measured using an electronic water level indicator.

A surge block or submersible pump is lowered into the screened section of the well. The surge block or submersible pump is rapidly lowered and raised in the well causing groundwater to flow in and out of the well screen thus flushing fine sediment and debris out of the filter pack.

A submersible pump is lowered into the monitoring well, or a vertically-actuated pump (e.g., BK or Waterra) is mounted at the well head, and the well is pumped at the highest sustainable rate. The pumping will continue until well parameters (pH, temperature, specific conductance, etc.) have stabilized or the amount of water extracted from the well has reached a predetermined volume.

4.8 MONITORING WELL SAMPLING

Monitoring wells are typically sampled using low-flow purging and sampling techniques. Peristaltic pumps are generally used to purge and to collect the samples. Field measurements of pH, temperature, specific conductance, and turbidity are made during purging. These measurements are made at the start of purging and every 3 to 5 minutes until the parameters have stabilized. The wells are purged until well parameters (pH, temperature, specific conductance, etc.) have stabilized or a sufficient predetermined amount of water has been removed and the water quality measurements are acceptable. Tubing used for sampling is generally disposed of after the sample has been collected.

4.8.1 Natural Attenuation Sampling

In addition to the contaminant analysis for groundwater samples, aliquots may be removed for natural attenuation sampling purposes. Natural attenuation sampling uses a variety of testing mechanisms and reagents to measure the efficiency of degradation of contaminants within the hydrologic systems. This is accomplished through biodegradation, dispersion, dilution, sorption, volatilization and abiotic degradation mechanisms. This process utilizes chemical reagents to determine the geochemical properties of the sample substrate.

4.8.2 Oxidation-Reduction Potential (ORP)

The groundwater's ORP, frequently referenced as REDOX or Eh, is analyzed by using a portable, water-quality probe (e.g. Hanna® Model CE). The probe is used in conjunction with a flow-through sample chamber to reduce sample aeration and contact with the atmosphere.

4.8.3 Water Level Measurements

Water level measurements are typically made at existing and newly installed monitoring wells during groundwater sampling events. The water levels are measured with an electric water level indicator using the top of the well casing as the reference point for determining water depths.

4.9 MULTIMEDIA SAMPLING

4.9.1 Surface Soil Samples

Surface soil samples will be collected utilizing a variety of techniques.

4.9.1.1 Hand Auger/Stainless Steel Trowel

Soil samples collected from within two feet of the ground surface are considered surface soil samples. Samples collected from very shallow depths (ground surface to around 0.5 feet) will be collected using a

stainless steel trowel. If collected from below 0.5 feet, a hand auger will be used. The hand auger boring will be advanced to the desired depth utilizing stainless steel hand auger stems with an oversize bucket. Once at the desired depth, the oversize bucket will be exchanged for a smaller diameter bucket to grab the sample. The sample is extracted from the bucket and is placed in a stainless steel bowl, scanned with a direct reading instrument, then transferred into the appropriate glass container using a stainless steel or disposable trowel.

4.9.2 Surface Water, Seeps, and Sediments

The collection of these environmental media will proceed as follows:

- Selection of the location.
- A direct-reading monitoring instrument sweep.
- Transfer the selected environmental media into the containers to be sent to the analytical laboratory using direct pour, peristaltic pumps, or for sediments using stainless steel or disposable trowels.

4.10 SURVEYING

Geographical, or land, surveying involves measurements to determine the horizontal and vertical locations of site features, well locations, or sampling locations in relation to horizontal and vertical control monuments. Geophysical surveying involves the use of instruments to measure various properties of the site such as total magnetic field strength or apparent conductivity. The data are interpreted to determine site characteristics, for example, to infer the presence of drums or boundaries of landfill trenches.

5.0 TASKS/HAZARDS/ASSOCIATED CONTROL MEASURES SUMMARY

Table 5-1 of this section serves as the primary portion of the site-specific HASP which identifies the tasks that are to be performed as part of the scope of work. This table will be modified and incorporated into this document as new or additional tasks are performed at the site. The anticipated hazards, recommended control measures, air monitoring recommendations, required PPE, and decontamination measures for each task are discussed in detail. This table and the associated control measures shall be changed, if the scope of work, contaminants of concern or other conditions change.

Through using the table, site personnel can determine which hazards are associated with each task 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 PPE requirements, decontamination procedures, and proper air monitoring techniques based on site-specific conditions. A list of the tasks with the corresponding Table 5-1 is provided below.

- Brush removal using Heavy Equipment and Chain Saws
- Decontamination
- DPT and Drilling operations including the installation of monitoring wells
- Handling, staging, and sampling of drums
- IDW management
- Mobilization/demobilization
- Monitoring well (groundwater) sampling
- Multimedia sampling (surface and subsurface soils)
- Surveying

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

Safe Work Permits issued for all activities (See Section 9.4 and Attachment III) will use elements defined in Table 5-1 as the primary reference. The FOL and/or the SSO completing the Safe Work Permit will add additional site-specific information. In situations where the Safe Work Permit is more conservative

**TABLE 5-1
TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM**

**NAVAL TRAINING CENTER
ORLANDO, FLORIDA**

PAGE 1 OF 8

Tasks/Operations/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment <i>(Items in italics are deemed optional as conditions or the FOL/SSO dictate.)</i>	Decontamination Procedures
<p>Brush Removal Using Heavy Equipment and Chain Saws – SA 2, SA 8, and SA 9</p>	<p>Chemical Hazards: Given the tasks associated with this operation, there is limited potential for contact with site contaminants.</p> <p>Physical Hazards:</p> <ol style="list-style-type: none"> 2) Rotating/cutting machinery and light equipment operation 3) Noise 4) Lifting(muscle strains and pulls) 5) Ambient temperature extremes (heat stress) 6) Slips, trips, and falls 7) Biological hazards (insect/animal bites and stings) 8) Poisonous vegetation 9) Flying projectiles/sharp objects 	<ol style="list-style-type: none"> 1) Site contaminants are unlikely to be encountered during this site activity as a result, PPE to prevent contact is not required. However, PPE to protect against natural and physical hazards is required. In accordance with the TiNUS Hazard Communication Program, maintain accurate chemical inventories and require manufacturer Material Safety Data Sheets (MSDS) of chemicals/fuels used to support this activity. 2) The following control measures apply to heavy machinery: <ul style="list-style-type: none"> - All equipment to be used will be inspected in accordance with Federal safety and transportation guidelines, OSHA (1926.600, 601, 602), and manufacturers design. - Only manufacturer-approved parts may be used in repair of site equipment. - An equipment inspection checklist will be completed prior to the use of project vehicles or tools. (See Attachment II) - Operated by knowledgeable ground crew. - Establish safe zones and routes of approach to the operation - Restrictions at the operation (All personnel not directly supporting this clearance activity will remain at least 50 feet from the point of this operation). - Establish hand signals with the equipment operator. - Keep work areas clear of clutter. - Secure all loose articles to avoid possible entanglement. - Self-propelled equipment shall be equipped with movement warning systems. - Personnel working in equipment traffic areas are required to wear reflective vests for high visibility <p>Personnel will be instructed in the location and operations of the emergency shut off device(s). This device will be tested initially (and then periodically) to insure its operational status.</p> <p>Chipper Operations</p> <ul style="list-style-type: none"> - Safety devices and controls shall be tested initially, then periodically thereafter to insure operational status. - Buddy system - At least two persons shall be in close contact with one another when operating the chipper. This will enable one to engage safety controls to assist the second should the need arise. - Work gloves, long hair, loose fitting clothing shall be taped or otherwise secured to avoid snagging and entanglement in brush or moving chipper components. - Keep hands and feet away from the entry plane of the feed hopper. - Feed brush and limbs trunk first, to allow these materials to sweep past the worker and avoid hooking and dragging them into the hopper and blades. - Feeding the brush and limbs should take place from the side of the feed hopper to enable quick and accessible activation of the emergency shut off devices. - Once the induction device takes hold of the brush or limbs, walk away, this will assist in avoiding entanglement. - Lay short materials on top of longer materials or feed shorter materials by pushing them forward using longer materials into the intake. Direct the output into a containment structure or away from all personnel working in the area. <p>Chainsaw Operations</p> <ul style="list-style-type: none"> - Inspect the chainsaw prior to each use. Insure the blade is adjusted and sharp, and all parts are lubricated per the manufacture's instruction, - Test all safety devices initially and then periodically to insure operational status. - When starting, place the chainsaw on the ground or some other firm surface. Place your foot in the hand guard at the rear of the saw, grip the top handle of the saw with one hand, pull the start cord with the free hand. Never attempt to start the saw free hand or by placing on your knee. - Never cut with tip of the chain saw blade. - Plan the cut. Know where the tree will fall. Have a clear escape plan when dropping trees greater than 2 inches in diameter. - Preview the tree to be dropped, red wasps nest in hollow trunks and tree tops. - Stand clear of falling trees and branches and fixed items or other trees. - Never cut over your head. - Only cut wood with the chain saw. - Monitor the condition of the saw during use and make adjustments, as necessary. - When cutting limbs from a tree, cut from the opposite side of the trunk, which will serve as a shield. - Keep the work area free from clutter to avoid potential slip, trip, and fall hazards. <p>Hand tools (brush hooks, machetes, etc.):</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 with cutting blades shall be provided with a sheath to protect individuals, when not in use. All personnel will maintain a 10-foot perimeter around persons clearing brush. <ol style="list-style-type: none"> 3) Due to high levels of noise, use hearing protection. 4) Stretch back muscles prior to work. Bend knees and keep back straight to maintain normal back curve. Do not lift excessive weights. Get assistance if loads are excessive. 5) Wear appropriate clothing for weather conditions. Additional information regarding heat stress concerns is provided in Attachment IV of this HASP and Section 4 of the TiNUS Health and Safety Guidance Manual. 6) Preview work locations for unstable/uneven terrain. When possible, remove stumps and other tripping hazards. 7) Avoid nesting areas, use commercially available insect repellents. Report potential hazards to the Health and Safety Manager. See Section 6.5 of this HASP. 8) Use protective gloves. Wear Tyvek, as vegetation is dense. 9) Wear eye protection and hard hats. 	<p>Excessive chemical contaminant concentrations impacting field crews during this task is not anticipated.</p> <p>Not required during removal of vegetation as this activity is designed to keep the areas accessible to monitoring wells. It is not anticipated that contaminants will be encountered during this activity.</p> <p>The FOL/SSO may perform noise dosimetry to ensure the operational activities, and any other levels associated with the operation do not surpass the noise attenuation factors associated with the hearing protection selected.</p>	<p>Level D - (Minimum Requirements) For vegetation clearance activities:</p> <ul style="list-style-type: none"> - Field attire (long sleeve shirt; long pants) - Steel toe safety shoes - Safety glasses/chippers shield - Hardhat - Reflective vest for high traffic areas - Hearing protection - Work gloves - Chain saw chaps for chain saw operator - <i>Tyvek coveralls to prevent contact with natural hazards (poison ivy, ticks, etc.) and/or Tape pant legs to boots and use insect repellent</i> <p>Note: A Safe Work Permit (Attachment III) for this task 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:</p> <ul style="list-style-type: none"> - Wash hands, face, and exposed skin with cool water to remove oils associated with poison ivy, sumac, and oak. Leave contamination reduction zone - Perform careful body inspection to remove ticks and other insects. - Wash hands and face with soap and water before performing hand to mouth activities (eating, smoking, etc.).

Tasks/Operations/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment <i>(Items in italics are deemed optional as conditions or the FOL/SSO dictate.)</i>	Decontamination Procedures
<p>Decontamination of Sampling and Heavy Equipment – SA 2, SA 8, SA 9, SA 36NW, and SA 52</p>	<p>Chemical Hazards:</p> <p>1) Prior sampling data and/or site history have indicated the following as the primary contaminants for each site:</p> <p>Study Area 2-VOCs (specifically benzene) Study Area 8-Metals and pesticides (specifically 4,4'-DDT) Study Area 9-SVOCs, pesticides, herbicides, and metals (specifically arsenic) Study Area 36NW-VOCs (specifically BTEX) Study Area 52-Pesticides (specifically Dieldrin and 4,4'-DDT)</p> <p>Note: These contaminants may be bound to particulates (dusts, soils, etc.) and contact should be avoided whenever possible. None of the site contaminants, however, are anticipated to be present in significant concentrations to present an inhalation hazard. See Table 6-1 for more information on the chemicals of concern.</p> <p>Decontamination fluids – Liquinox (detergent), acetone, or isopropanol</p> <p>2) Transfer of contamination into clean areas or onto persons.</p> <p>Physical Hazards:</p> <p>3) Strain/muscle pulls from heavy lifting 4) Noise in excess of 85 dBA 5) Flying projectiles 6) Vehicular and foot traffic 7) Ambient temperature extremes (heat stress) 8) Slips, trips, and falls 9) High pressure spray</p> <p>Natural Hazards:</p> <p>10) Inclement weather</p>	<p>1) and 2) Use protective equipment to minimize contact with site contaminants and hazardous decontamination fluids. Obtain and follow manufacturer's MSDS for any decontamination solvents used onsite. Use appropriate PPE as identified on MSDS. All chemicals used must be listed on the Chemical Inventory for the site, and site activities must be consistent with the Hazard Communication section of the Health and Safety Guidance Manual (Section 5).</p> <p>3) Use multiple persons where necessary for lifting and handling large or heavy sampling equipment for decontamination purposes.</p> <p>4) Use hearing protection when operating high pressure washer for extended periods of time (e.g., 30 minutes or longer) with no more than 4 occurrences per day.</p> <p>5) Wear appropriate PPE (i.e., splash shield & safety glasses). All other personnel must be restricted from area.</p> <p>6) Traffic and heavy equipment considerations include:</p> <ul style="list-style-type: none"> - Establish safe zones of approach. - Heavy equipment shall be equipped with movement warning systems. - Activities will be conducted per Base requirements. <p>7) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crew. (see Attachment IV and Section 4 of the TtNUS Health and Safety Guidance Manual)</p> <p>8) Preview locations for unstable or uneven terrain.</p> <p>9) Restrict access to decontamination area. Select proper spray tip. For example, tips of 25° or more shall be used with units providing pressure greater than 3,000 psi.</p> <p>10) Suspend or terminate operations until directed otherwise by SSO.</p>	<p>Use visual observation, and real-time monitoring instrumentation to ensure all equipment has been properly cleaned of contamination and dried. After decon is completed, screen equipment with a PID/FID. If any elevated readings (i.e., above background) are observed, perform decon again and re-screen. Repeat until no elevated PID/FID readings are noted. Use radiation monitoring equipment where appropriate.</p>	<p><i>For Heavy Equipment</i> This applies to high pressure soap/water, steam cleaning wash and rinse procedures.</p> <p>Level D Minimum requirements -</p> <ul style="list-style-type: none"> - Standard field attire (sleeved shirt; long pants) - Steel toe safety shoes or boots - Safety glasses underneath a splash shield - Nitrile outer gloves - Chemical resistant boot covers - PVC Rainsuits or PE or PVC coated Tyvek - Ear plugs or ear muffs when operating pressure washer <p>For sampling equipment the following PPE is required.</p> <p><i>Note:</i> Consult MSDS for additional PPE guidance. Otherwise, observe the following:</p> <p>Level D Minimum requirements -</p> <ul style="list-style-type: none"> - Standard field attire (sleeved shirt; long pants) - Steel toe safety shoes or boots - Nitrile outer gloves - Safety glasses underneath a splash shield <p>In the event of overspray of chemical decontamination fluids employ PVC Rainsuits, PE or PVC coated Tyvek, or impermeable aprons as necessary.</p> <p>Note: A Safe Work Permit (Attachment III) for this task will be issued at the beginning of each day to address the tasks planned for that day. As part of this task, additional PPE may be assigned to reflect site-specific conditions or special considerations or conditions associated with any identified task.</p>	<p>This decontamination procedure for Level D protection will consist of:</p> <ul style="list-style-type: none"> - Soap/water wash and rinse of outer reusable gloves - Soap/water wash and rinse of the outer reusable splash suit, as applicable - Removal/disposable of non-reusable PPE (e.g., gloves) - Wash hands and face, leave contamination reduction zone <p>Heavy equipment Decontamination - Heavy equipment decontamination will take place at a centralized decontamination pad utilizing steam or pressure washers. Heavy equipment, such as the DPT rig, will have the wheels/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. Equipment used in the exclusion zone will require a complete decontamination between locations and prior to removal from the site. The FOL or the SSO will be responsible for evaluating equipment coming into and leaving the site. No equipment will be authorized access or exit without this evaluation.</p> <p>Evaluation will consist of</p> <ul style="list-style-type: none"> - Visual inspection - Scanning equipment with monitoring instruments <p>Sampling Equipment Decontamination -</p> <p>Chemical decontamination will proceed in accordance with the other site documents such as QA/QC, Work Plan, and/or the Sampling Analysis Plan. Prior to leaving the site, all sampling equipment will undergo a soap/water wash and rinse utilizing a suitable potable water source until visibly clean. Sampling equipment may also be cleaned using a high-pressure soap/water wash and rinse or steam.</p> <p>MSDS for any decon solutions (Alconox, isopropanol, etc.) will be obtained and used to determine proper handling / disposal methods and protective measures (PPE, first-aid, etc.).</p>

TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

PAGE 3 OF 8

Tasks/Operations/ Location	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment <i>(Items in italics are deemed optional as conditions or the FOL/SSO dictate.)</i>	Decontamination Procedures
<p>Soil boring and installation of monitoring wells using Direct Push Technology, and other drilling methods including (hollow-stem auger, mud rotary drilling and/or roto sonic)</p> <p>This table entry also includes monitoring well development tasks</p> <p>Site – SA 2</p>	<p>Chemical Hazards:</p> <p>1) Prior sampling data and/or site history have indicated the following as the primary contaminants for each site: Study Area 2-VOC (specifically benzene)</p> <p>Note: These contaminants may be bound to particulates (dusts, soils, etc.) and contact should be avoided whenever possible. None of the site contaminants, however, are anticipated to be present in significant concentrations to present an inhalation hazard. See Table 6-1 for more information on the chemicals of concern.</p> <p>2) Transfer of contamination into clean areas or onto persons</p> <p>Physical Hazards:</p> <p>3) Contact/entanglement with rotating equipment or machinery</p> <p>4) Noise in excess of 85 dBA</p> <p>5) Contact with underground or overhead utilities (electric lines, gas lines, water lines, etc.)</p> <p>6) Strain/muscle pulls from heavy lifting</p> <p>7) Slips, trips, and falls</p> <p>8) Vehicular and equipment traffic</p> <p>9) Ambient temperature extremes (heat stress)</p> <p>10) Flying projectiles</p> <p>11) UXO</p> <p>Natural Hazards</p> <p>12) Inclement weather</p> <p>13) Insect/animal bites or stings, poisonous plants, etc.</p>	<p>1) Use monitoring equipment action levels, appropriate safe work practices, and PPE to minimize the potential for exposure. Some of the potential contaminants of concern are likely to be present in the form of particulates or bound to particulates. Real-time air monitoring instruments are ineffective for detecting some of these contaminants. Therefore, generation of dusts should be minimized. If airborne dusts are observed, area wetting methods will be used. If area wetting methods are not feasible or are ineffective, task activities will be terminated to minimize exposure to excessive airborne dusts.</p> <p>2) Decontaminate all equipment and supplies between drilling events as well as prior to leaving the site.</p> <p>3) Heavy equipment used will be:</p> <ul style="list-style-type: none"> - Inspected in accordance with Federal safety and transportation guidelines, OSHA (1926.600, .60, .602), and manufacturer's design. Use the Equipment Inspection Checklist (see Attachment II) to document inspection. - Operated by knowledgeable operators and ground crew. - Only manufacturer-approved equipment may be used in conjunction with equipment repair procedures (e.g., DPT augers). <p>In addition to the equipment considerations, the following standard operating procedures will be used:</p> <ul style="list-style-type: none"> - Personnel not directly supporting the drilling operation will remain at least 25 feet from the point of operation (drill point). - Drilling, drill masts, or other projecting devices shall be at least 20 feet from overhead power sources and a minimum of 3 feet from underground utilities. - Keep any machine guarding in place. Avoid moving parts. Secure loose clothing, jewelry, or long hair that could become entangled. - Hand signals will be established prior to the commencement of drilling activities. - The driller must never leave the controls while equipment is operating unless all personnel are clear of the equipment. - Keeps hands and feet away from pinch points. - Work areas will be kept clear of clutter. - All equipment shall be equipped with movement warning systems (where applicable). - If present, all personnel will be instructed in the location and operations of the emergency shut off device(s). This device will be tested initially (and then periodically) to ensure its operational status. - Areas will be inspected prior to the movement of site equipment and support vehicles to eliminate any physical hazards. This will be the responsibility of the FOL and/or SSO. - DPT rig and support vehicles will be moved no closer than 3 feet to banks, ditches, and other excavations unless the wall is supported with a sidewall retaining device. - The drill operator shall verbally alert employees and visually ensure employees are clear from dangerous parts of equipment before starting or engaging equipment. - One employee shall be responsible for emergency shut-off switch operation during drilling operation, such that the machinery can be shutdown quickly if an employee is in danger. <p>4) Wear hearing protection during operation of DPT or drill rig.</p> <p>5) DPT and drilling activities will be conducted consistent with the requirements of the TtNUS SOP "Utility Locating and Excavation Clearance" (see Attachment V). All utility clearances shall be obtained in writing prior to subsurface activities. The locations of all underground utilities will be identified and marked prior to all subsurface investigations. Where the clearance cannot be obtained in a reasonable period, or not located, soil borings shall proceed with extreme caution.</p> <ul style="list-style-type: none"> - Projecting devices of site equipment shall be at least 20 feet from overhead power lines and a minimum of 3 feet from identified underground locations. <p>6) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques.</p> <p>7) Preview work location for uneven/unstable terrain.</p> <p>8) Traffic and heavy equipment considerations are to include the following:</p> <ul style="list-style-type: none"> - A traffic control plan will be developed prior to working in traffic areas and followed by all personnel. - Heavy equipment shall be equipped with movement warning systems. - Personnel working in high equipment traffic areas are required to wear reflective vests for high visibility. - Use safety belts and follow the site traffic rules. <p>9) Observe site personnel for signs and symptoms of heat stress disorders. Provide liquids (preferably containing electrolytes) for fluid replenishment. Refer to Attachment IV for additional information and work/rest regimen.</p> <p>10) Wear eye protection (safety glasses) when drill rig is operating. All non-essential personnel must be restricted from the area.</p> <p>11) Any worker seeing UXO or evidence of UXO shall report the sighting to the SSO. The SSO will stop work and all personnel will stay clear of the area until Navy personnel remove the object(s).</p> <p>12) Suspend or terminate operations until directed otherwise by SSO</p> <p>13) Wear appropriate clothing and PPE. Avoid potential nesting areas and suspicious vegetation (poison ivy, poison oak, etc.). When feasible and necessary, use commercially available insect repellents. Tape ankle and wrist areas to prevent tick, chiggers, etc. from getting under clothing and attaching to skin. Wear light colored clothing so that ticks and other insects can be easily visible. Refer to the Health and Safety Guidance Manual for additional information.</p>	<p>It is anticipated that potential contaminant concentrations at outdoor locations will be below levels that could present a health hazard.</p> <p><i>Air Monitoring:</i></p> <p>A Photoionization Detector (PID) w/a 10.6 eV lamp or a Flame ionization Detector (FID) will be used (at the discretion of the SSO) to screen for any detectable vapors. The following general guidance applies:</p> <p>1) Source (borehole, sampling point, etc.) monitoring will be conducted at each sample interval or at regular intervals determined by the SSO. Elevated readings observed at a source area will require the SSO obtain readings within the breathing zone (BZ) of all potentially affected employees.</p> <p>2) If sustained readings (more than 1 minute in duration) greater than 1 ppm are observed within a workers BZ initiate measures to minimize exposure (retreat to an unaffected area, station personnel in an upwind location, etc.). Workers must evacuate to a safe area if sustained BZ concentrations exceed 1 ppm above background levels.</p> <p>3) If elevated readings persist, contact the PHSO for additional air monitoring guidance. Work in the presence of elevated PID readings will require that Draeger tube samples for benzene be collected to evaluate benzene concentrations</p>	<p>All soil boring operations are to be initiated in Level D protection, which includes the following minimum protection:</p> <ul style="list-style-type: none"> - Standard field dress (long pants; sleeved shirts) - Steel toe/ safety shoes or boots - Nitrile gloves with a cotton liner or layered surgical style nitrile gloves, - Hardhat, safety glasses, and earplugs or muffs (for DPT and drill rig operations). - <i>Tyvek coveralls and impermeable boot covers will be worn if there is a possibility of soiling work attire or if muddy conditions exist</i> - <i>PVC or PE coated Tyvek will be incorporated if there is a potential for saturation of work attire.</i> - <i>Reflective vest for high traffic areas</i> <p>Note: A Safe Work Permit (Attachment III) for this task 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 outer protective equipment (boots, gloves, coveralls, etc.) as applicable. This function will take place at an area adjacent to the soil boring or well installation operations bordering the support zone.</p> <p>This decontamination procedure for will consist of</p> <ul style="list-style-type: none"> - Equipment drop - Soap/water wash and rinse of outer reusable gloves and outer boots, as applicable - Soap/water wash and rinse of the outer splash suit, as applicable - Outer suit, boot covers, outer glove removal, as applicable - Removal and disposal of non-reusable PPE - Wash hands and face, leave contamination reduction zone

TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

PAGE 4 OF 8

Tasks/Operations/ Location	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment <i>(Items in italics are deemed optional as conditions or the FOL/SSO dictate.)</i>	Decontamination Procedures
<p>IDW management – SA 2, SA 8, SA 9, SA 36NW, and SA 52. Includes moving IDW drums to storage areas</p> <p>Note: This work is conducted by a licensed waste hauler.</p>	<p>Chemical Hazards:</p> <p>1) Prior sampling data and/or site history have indicated the following as the primary contaminants for each site:</p> <p>Study Area 2-VOC (specifically benzene) Study Area 8-Metals and pesticides (specifically 4,4'-DDT) Study Area 9-SVOCs, pesticides, herbicides, and metals (specifically arsenic) Study Area 36NW-VOCs (specifically BTEX) Study Area 52-Pesticides (specifically Dieldrin and 4,4'-DDT)</p> <p>Note: These contaminants may be bound to particulates (dusts, soils, etc.) and contact should be avoided whenever possible. None of the site contaminants, however, are anticipated to be present in significant concentrations to present an inhalation hazard. See Table 6-1 for more information on the chemicals of concern.</p> <p>2) Transfer of contamination into clean areas</p> <p>Physical Hazards:</p> <p>3) Noise in excess of 85 dBA 4) Lifting (strain/muscle pulls) 5) Pinches and compressions 6) Slip, trips, and falls 7) Vehicular and foot traffic 8) Ambient temperature extremes (heat stress)</p> <p>Natural Hazards:</p> <p>9) Insect/animal bites and stings, poisonous plants, etc.</p>	<p>1) Employ real-time monitoring instrumentation, action levels, safe work practices, and identify PPE if opening drums or responding to a spill to control exposures to potentially contaminated media (e.g. air, water, soils).</p> <p>2) Decontaminate all equipment and supplies, if they become contaminated, between locations and prior to leaving the site.</p> <p>3) When working near heavy equipment, use hearing protection.</p> <p>4) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques.</p> <p>5) Keep any machine guarding in place. Avoid moving parts. Use tools or equipment where necessary to avoid contacting pinch points.</p> <p>6) Preview work locations for unstable/uneven terrain.</p> <p>7) Traffic and heavy equipment considerations are to include the following:</p> <ul style="list-style-type: none"> - Establish safe zones of approach (i.e. boom + 5 feet). - Secure all loose articles to avoid possible entanglement. - Heavy equipment shall be equipped with movement warning systems. - Activities are to be conducted consistent with the Base requirements. <p>8) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding heat stress concerns is provided in Section 4 of the TtNUS Health and Safety Guidance Manual and Attachment IV of this HASP.</p> <p>9) Avoid nesting areas, use commercially available repellents. Report potential hazards to the SSO. Follow guidance presented in Section 4 of the Health and Safety Guidance Manual. Various local animals (such as snakes, alligators, etc.) could be a hazard depending on the location of the samples to nesting areas, the time of year, and other factors. Crews performing sampling activities will maintain a high level of awareness. When required, one field crew member will act as a lookout to watch for any animals. Site activities will be suspended or terminated if dangerous conditions are determined to exist. If necessary Base personnel, the Florida Fish and Wildlife Conservation Commission, or other appropriate agency will be contacted to remove or relocate animals or nests.</p>	<p>It is not anticipated that potential contaminant concentrations at outdoor sample locations will present an inhalation hazard.</p> <p>A Photoionization Detector (PID) w/a 10.6 eV lamp or a Flame ionization Detector (FID) will be used (at the discretion of the SSO) to screen for any detectable vapors. The following general guidance applies:</p> <p>1) Source (borehole, sampling point, etc.) monitoring will be conducted at each sample interval or at regular intervals determined by the SSO. Elevated readings observed at a source area will require the SSO obtain readings within the breathing zone (BZ) of all potentially affected employees.</p> <p>2) If sustained readings (more than 1 minute in duration) greater than 1 ppm are observed within a workers BZ initiate measures to minimize exposure (retreat to an unaffected area, station personnel in an upwind location, etc.). Workers must evacuate to a safe area if sustained BZ concentrations exceed 1 ppm above background levels.</p> <p>3) If elevated readings persist, contact the PHSO for additional air monitoring guidance. Work in the presence of elevated PID readings will require that Draeger tube samples for benzene be collected to evaluate benzene concentrations</p>	<p>Level D protection will be utilized for the initiation of all sampling activities.</p> <p>Level D - (Minimum Requirements)</p> <ul style="list-style-type: none"> - Standard field attire (long sleeve shirt; long pants) - Nitrile or cotton/leather work gloves with surgical style inner gloves for drum handling - Safety shoes (steel toe/shank) - Safety glasses - Hardhat (when overhead hazards exists, or identified as a operation requirement) - Reflective vest in staging area or the high traffic areas - In the staging area, Tyvek coveralls and disposable boot covers if surface contamination is present or if the potential for soiling work attire exists. - Hearing protection for high noise areas, or as directed on an operation by operation scenario. <p><i>(Items in italics are deemed optional as conditions or the FOL or SSO dictate.)</i></p> <p>Note: A Safe Work Permit (Attachment III) for this task 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 outer protective equipment (boots, gloves, PVC splash suits, as applicable). The decon function will take place at an area adjacent to the site activities. This procedure will consist of:</p> <ul style="list-style-type: none"> - Equipment drop - Soap/water wash and rinse of outer boots and gloves, as applicable - Soap/water wash and rinse of the outer splash suit, as applicable - Disposable PPE will be removed and bagged.

TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

PAGE 5 OF 8

Tasks/Operations/ Location	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment <i>(Items in italics are deemed optional as conditions or the FOL/SSO dictate.)</i>	Decontamination Procedures
<p>Mobilization/ Demobilization</p> <p>This activity includes:</p> <p>Site reconnaissance and utility clearance activities</p> <p>Set-up and construction of decontamination facilities and IDW areas</p>	<p>Chemical Hazards:</p> <p>1) Site contaminants are unlikely to be encountered during this task. However, the TtNUS Hazard Communication Program will be followed for any chemicals (fuels, sample preservatives, decontamination solvents, etc.) that are brought onsite in support of site activities. To this end, chemical inventories and manufacturer Material Safety Data sheets (MSDS) will be maintained on site. Information contained within MSDS will be used to determine necessary safe work practices and PPE requirements.</p> <p>Physical Hazards:</p> <p>2) Lifting (strain/muscle pulls)</p> <p>3) Pinches and compressions</p> <p>4) Slip, trips, and falls</p> <p>5) Heavy equipment hazards (rotating equipment, hydraulic lines, etc.)</p> <p>6) Vehicular and foot traffic</p> <p>7) Ambient temperature extremes (heat stress)</p> <p>Natural Hazards:</p> <p>8) Insect/animal bites and stings, poisonous plants, etc.</p>	<p>1) Implement the Hazard Communication Program and assure that personnel understand its use. Inventory and obtain MSDSs for all materials in use. Maintain an MSDS binder in a location where all personnel can find it quickly.</p> <p>2) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques.</p> <p>3) Keep any machine guarding in place. Avoid moving parts. Use tools or equipment where necessary to avoid contacting pinch points.</p> <p>4) Preview work locations for unstable/uneven terrain.</p> <p>5) Heavy equipment will be:</p> <ul style="list-style-type: none"> - Inspected in accordance with OSHA and manufacturer's design. - Operated by knowledgeable operators and ground crew <p>6) Traffic and equipment considerations are to include the following:</p> <ul style="list-style-type: none"> - Establish safe zones of approach (i.e. boom + 5 feet). - Secure all loose articles to avoid possible entanglement. - Heavy equipment shall be equipped with movement warning systems. - Activities are to be conducted consistent with the Base requirements. <p>7) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding heat stress concerns is provided in Section 4 of the TtNUS Health and Safety Guidance Manual and Attachment IV of this HASP.</p> <p>8) Avoid nesting areas, use commercially available repellents. Report potential hazards to the SSO.</p>	<p>Not required</p>	<p>Level D - (Minimum Requirements)</p> <ul style="list-style-type: none"> - Standard field attire (long sleeve shirt; long pants) - Cotton or leather work gloves with surgical style inner gloves for drum handling - Safety shoes (steel toe/shank) - Safety glasses - Hardhat (when overhead hazards exists, or identified as a operation requirement) - Reflective vest for high traffic areas - Hearing protection for high noise areas, or as directed on an operation by operation scenario. <p>Note: A Safe Work Permit (Attachment III) for this task will be issued at the beginning of each day to address the tasks planned for that day. As part of this task, additional PPE may be assigned to reflect site-specific conditions or special considerations or conditions associated with any identified task.</p>	<p>Not required</p>

TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

PAGE 6 OF 8

Tasks/Operations/ Location	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment <i>(Items in italics are deemed optional as conditions or the FOL/SSO dictate.)</i>	Decontamination Procedures
<p>Monitoring well (groundwater) sampling - SA 2, SA 8, SA 9, SA 36NW, and SA 52.</p> <p>Includes water level measurement, well purging, and IDW sampling.</p>	<p>Chemical Hazards:</p> <p>1) Prior sampling data and/or site history has indicated the following as the primary contaminants of concern for each site:</p> <p>Operable Unit 3 (SAs 8 and 9) – Pesticides and metals (specifically 4,4'-DDT, arsenic, and lead)</p> <p>Study Area 2-VOC (specifically benzene)</p> <p>Study Area 8-Metals and pesticides (specifically 4,4'-DDT)</p> <p>Study Area 9-SVOCs, pesticides, herbicides, and metals (specifically arsenic)</p> <p>Study Area 36NW-VOCs (specifically BTEX)</p> <p>Study Area 52-Pesticides (specifically Dieldrin and 4,4'-DDT)</p> <p>None of the contaminants, however, are expected to be present in significant concentrations to present an inhalation hazard. Nonetheless, it is recommended that exposure (via inhalation, ingestion, or skin contact) to these contaminants be minimized. Further information on these contaminants is presented in Table 6-1.</p> <p>2) Natural Attenuation sampling reagents</p> <p>3) Transfer of contamination into clean areas or onto persons.</p> <p>Physical Hazards:</p> <p>4) Slips, trips, and falls</p> <p>5) Ambient temperature extremes (heat stress)</p> <p>6) Vehicular and equipment traffic</p> <p>7) Heavy lifting (muscle strains and pulls)</p> <p>8) Natural Attenuation reagent ampoules</p> <p>Natural Hazards:</p> <p>9) Insect/animal bites and stings, poisonous plants, etc.</p>	<p>1) Use monitoring equipment action levels, appropriate safe work practices, and PPE to minimize the potential for exposure.</p> <p>2) Natural Attenuation sampling ampoules contain corrosives. Use caution and follow manufacturer's instructions when opening ampoules and using reagents.</p> <p>3) Restrict the cross use of equipment and supplies between sampling locations without first going through a suitable decontamination.</p> <p>4) Preview work locations for unstable/uneven terrain.</p> <p>5) Observe site personnel for signs and symptoms of heat stress disorders. Provide liquids (preferably containing electrolytes) for fluid replenishment. Refer to Attachment IV for additional information and work/rest regimen.</p> <p>6) Traffic and heavy equipment considerations are to include the following:</p> <ul style="list-style-type: none"> - A traffic control plan will be developed prior to working in traffic areas and followed by all personnel. - Heavy equipment shall be equipped with movement warning systems. - Personnel working in high equipment traffic areas are required to wear reflective vests for high visibility. - Use safety belts and follow the site traffic rules. <p>7) Employ machinery or multiple personnel for heavy lifts. Use proper lifting techniques. Carry small loads to sampling sites.</p> <p>8) Improper breaking of reagent ampoules may result in cuts or lacerations. Follow manufacturer's instructions carefully. Carry glassware in coolers.</p> <p>1) Wear appropriate clothing and PPE. Avoid potential nesting areas and suspicious vegetation (poison ivy, poison oak, etc.). When feasible and necessary, use commercially available insect repellents. Tape ankle and wrist areas to prevent tick, chiggers, etc. from getting under clothing and attaching to skin. Wear light colored clothing so that ticks and other insects can be easily visible. Refer to the Health and Safety Guidance Manual for additional information.</p> <p>Various local animals (such as snakes, alligators, etc.) could be a hazard depending on the location of samples to nesting areas, the time of the year, and other factors. Crews performing sampling activities will avoid potential nesting areas (banks, marshy areas, tracks, sunning areas, tree branches, etc.) and maintain a high level of awareness when working in areas where these hazards may exist. One field crewmember will act as a lookout to watch for any animals approaching co-workers. Site activities will be suspended or terminated if dangerous conditions are determined to exist. If necessary, appropriate Base personnel, the Florida Fish and Wildlife Conservation Commission, or other appropriate agency will be contacted to remove or relocate animals or nests.</p>	<p>It is anticipated that potential contaminant concentrations at outdoor locations will be below levels that could present a health hazard.</p> <p>A Photoionization Detector (PID) w/a 10.6 Ev lamp or a Flame ionization Detector (FID) will be used (at the discretion of the SSO) to screen for any detectable vapors. The following general guidance applies:</p> <p>1) Source (borehole, sampling point, etc.) monitoring will be conducted at each sample interval or at regular intervals determined by the SSO. Elevated readings observed at a source area will require the SSO obtain readings within the breathing zone (BZ) of all potentially affected employees.</p> <p>2) If sustained readings (more than 1 minute in duration) greater than 1 ppm are observed within a workers BZ initiate measures to minimize exposure (retreat to an unaffected area, station personnel in an upwind location, etc.). Workers must evacuate to a safe area if sustained BZ concentrations exceed 1 ppm above background levels.</p> <p>3) If elevated readings persist, contact the PHSO for additional air monitoring guidance. Work in the presence of elevated PID readings will require that Draeger tube samples for benzene be collected to evaluate benzene concentrations</p>	<p>All sampling activities are to be initiated in level D protection, which includes the following minimum protection:</p> <ul style="list-style-type: none"> - Standard field dress (long pants, sleeved shirts) - Steel toe/ safety shoes or boots - Layered surgical style nitrile gloves, or nitrile - Hardhat and safety glasses if working near overhead hazards or flying projectiles/eye hazards are present. - Tyvek coveralls and impermeable boot covers will be worn if there is a possibility of soiling work attire or if muddy conditions exist - PVC or PE coated Tyvek will be incorporated if there is a potential for saturation of work attire. <p>Note: A Safe Work Permit for this task (Attachment III) will be issued at the beginning of each day to address the tasks planned for that day. As part of this task, additional PPE may be assigned to reflect site-specific conditions or special considerations or conditions associated with any identified task.</p>	<p>Personnel Decontamination – Will consist of a soap/water wash and rinse for outer protective equipment (boots, gloves, coveralls, etc.), if applicable.</p> <p>The decontamination procedure for Level D protection will consist of</p> <ul style="list-style-type: none"> - Removal and bagging of disposal tubing. - Removal and disposal of gloves. - Clean face and hands with hygienic wipes until access to a decon station or rest room is obtained.

Tasks/Operations/ Location	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment <i>(Items in italics are deemed optional as conditions or the FOL/SSO dictate.)</i>	Decontamination Procedures
<p>Multimedia sampling (includes IDW sampling) – SA 2, SA 8, SA 9, SA 36NW, and SA 52.</p> <p>This task also includes water level measurement and well purging.</p>	<p>Chemical Hazards:</p> <p>2) Study Area 2 – VOCs, principally benzene. Study Area 8-Metals and pesticides (specifically 4,4'-DDT) Study Area 9-SVOCs, pesticides, herbicides, and metals (specifically arsenic) Study Area 36NW –VOCs (specifically BTEX) Study Area 52-Pesticides (specifically Dieldrin and 4,4'-DDT)</p> <p>2) Natural Attenuation sampling reagents 3) Transfer of contamination into clean areas</p> <p>Physical Hazards:</p> <p>4) Noise in excess of 85 Dba 5) Lifting (strain/muscle pulls) 6) Pinches and compressions 7) Slip, trips, and falls 8) Natural Attenuation reagent ampoules 9) Ambient temperature extremes (heat stress) 10) Vehicular and foot traffic</p> <p>Natural Hazards:</p> <p>11) Insect/animal bites and stings, poisonous plants, etc. 12) Inclement weather</p>	<p>Chemical Hazards:</p> <p>3) Use real-time monitoring instrumentation, action levels, and identified PPE to control exposures to potentially contaminated media (air, water, soils, etc.). Generation of dusts should be minimized. If airborne dusts are observed, area wetting methods may be used. If area wetting methods are not feasible, termination of activities may be used to minimize exposure to observed airborne dusts.</p> <p>2) Natural Attenuation sampling ampoules contain corrosives. Use caution and follow manufacturer's instructions when opening ampoules and using reagents.</p> <p>3) Decontaminate all equipment and supplies between sampling locations and prior to leaving the site.</p> <p>Physical Hazards:</p> <p>4) When sampling at the drill rig use hearing protection. The use of hearing protection outside of 25 feet from the drill rig should be incorporated under the following condition: If you have to raise your voice to talk to someone who is within 2 feet of your location, hearing protection must be worn.</p> <p>5) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques. Carry small loads to sampling sites.</p> <p>6) Keep any machine guarding in place. Avoid moving parts. Use tools or equipment where necessary to avoid contacting pinch points. - A remote sampling device must be used to sample drill cuttings near rotating tools. The equipment operator shall shutdown machinery if the sampler is near moving machinery parts.</p> <p>7) Preview work locations for unstable/uneven terrain.</p> <p>8) Improper breaking of reagent ampoules may result in cuts or lacerations. Follow manufacturer's instructions carefully. Carry glassware in coolers.</p> <p>9) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding heat stress concerns is provided in the TtNUS Health and Safety Guidance Manual and Attachment IV of this HASP.</p> <p>10) Traffic and equipment considerations are to include the following: - Establish safe zones of approach (i.e. boom + 5 feet). - Secure all loose articles to avoid possible entanglement. - All equipment shall be equipped with movement warning systems. - All activities are to be conducted consistent with the Base requirements.</p> <p>Natural Hazards:</p> <p>11) Avoid nesting areas, use commercially available repellents. Report potential hazards to the SSO. Follow guidance presented in Section 4 of the Health and Safety Guidance Manual. Various local animals (such as snakes, alligators, etc.) could be a hazard depending on the location of the samples to nesting areas, the time of year, and other factors. Crews performing sampling activities will maintain a high level of awareness. When required, one field crew member will act as a lookout to watch for any animals. Personnel must use a sampling pole, <u>not</u> the hand, to collect surface water samples. Site activities will be suspended or terminated if dangerous conditions are determined to exist. If necessary Base personnel, the U.S. Fish and Wildlife Service, or other appropriate agency will be contacted to remove or relocate animals or nests.</p> <p>12) Suspend or terminate operations until directed otherwise by the SSO.</p>	<p>It is not anticipated that potential contaminant concentrations at outdoor sample locations will present an inhalation hazard.</p> <p>A Photoionization Detector (PID) w/a 10.6 eV lamp or a Flame ionization Detector (FID) will be used (at the discretion of the SSO) to screen for any detectable vapors. The following general guidance applies:</p> <p>1) Source (borehole, sampling point, etc.) monitoring will be conducted at each sample interval or at regular intervals determined by the SSO. Elevated readings observed at a source area will require the SSO obtain readings within the breathing zone (BZ) of all potentially affected employees.</p> <p>2) If sustained readings (more than 1 minute in duration) greater than 1 ppm are observed within a workers BZ initiate measures to minimize exposure (retreat to an unaffected area, station personnel in an upwind location, etc.). Workers must evacuate to a safe area if sustained BZ concentrations exceed 1 ppm above background levels.</p> <p>3) If elevated readings persist, contact the PHSO for additional air monitoring guidance. Work in the presence of elevated PID readings will require that Draeger tube samples for benzene be collected to evaluate benzene concentrations</p>	<p>Level D protection will be utilized for the initiation of all sampling activities.</p> <p>Level D - (Minimum Requirements)</p> <ul style="list-style-type: none"> - Standard field attire (Sleeved shirt; long pants) - Steel toe safety shoes - Safety glasses - Surgical style gloves (double-layered if necessary) - <i>Reflective vest for high traffic areas</i> - <i>Hardhat (when overhead hazards exists, or identified as a operation requirement)</i> - <i>Tyvek coveralls and disposable boot covers if surface contamination is present, if the potential for soiling work attire exists, or in tall brush. Tyvek aids in tick identification and removal.</i> - <i>Tape pant legs to boots.</i> - <i>Hearing protection for high noise areas, or as directed on an operation by operation scenario.</i> <p>Note: The Safe Work Permit(s) for this task (see Attachment III) will be issued at the beginning of each day to address the tasks planned for that day. As part of this task, additional PPE may be assigned to reflect site-specific conditions or special considerations or conditions associated with any identified task.</p>	<p>Personnel Decontamination will consist of a removal and disposal of non-reusable PPE (gloves, coveralls, etc., as applicable). The decon function will take place at an area adjacent to the site activities. This procedure will consist of:</p> <ul style="list-style-type: none"> - Removal and bagging of disposal tubing. - Removal and disposal of gloves. - Clean face and hands with hygienic wipes until access to a decon station or rest room is obtained. - Check body carefully for ticks.

TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

PAGE 8 OF 8

Tasks/Operations/ Location	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment <i>(Items in italics are deemed optional as conditions or the FOL/SSO dictate.)</i>	Decontamination Procedures
<p>Surveying (includes geographical and geophysical)</p> <p>Note: This work is normally performed by a subcontractor.</p>	<p>Chemical Hazard: Exposure to site contaminants during this activity is considered unlikely given the limited contact with potentially contaminated media.</p> <p>Physical Hazard:</p> <ol style="list-style-type: none"> 1) Lifting (strain/muscle pulls) 2) Slip, trips, and falls 3) Ambient temperature extremes (heat stress) 4) Equipment for clearing line of sight (machete, axe, etc.). Cuts or lacerations <p>Natural Hazards:</p> <ol style="list-style-type: none"> 5) Inclement weather 6) Insect/animal bites and stings, poisonous plants, etc. 	<ol style="list-style-type: none"> 1) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques. 2) Preview work locations for unstable/uneven terrain. All activities are to be conducted consistent with the Base requirements. 3) Wear appropriate clothing for weather conditions. Provide acceptable shelter and liquids for field crews. Additional information regarding heat stress is provided in the TiNUS Health and Safety Guidance Manual and Attachment IV of this HASP. 4) Keep equipment in sheath when not in use. Wear leather gloves and safety glasses. Assure that equipment is sharp and handles are not loose. 5) Suspend or terminate operations until directed otherwise by the SSO. 6) Wear appropriate PPE. Avoid nesting areas, use commercially available repellents. Report potential hazards to the SSO. 	<p>Not required, minimal exposure.</p>	<p>Level D - (Minimum Requirements)</p> <ul style="list-style-type: none"> - Standard field attire (long sleeve shirt; long pants) - Leather work gloves - Safety shoes (steel toe/shank for geographical surveying; sturdy work shoes for geophysical surveying) - Safety glasses, hard hats (if working around equipment or clearing lines of sight). - Snake chaps for heavily wooded areas where encounters are likely. - Reflective vest for high traffic areas - Tyvek coveralls for protection against poisonous plants and insects, particularly ticks. <p>Note: The Safe Work Permit(s) for this task (see Attachment III) will be issued at the beginning of each day to address the tasks planned for that day. As part of this task, additional PPE may be assigned to reflect site-specific conditions or special considerations or conditions associated with any identified task</p>	<p>A structured decontamination is not required due to limited contact with contaminated media. However, survey parties should inspect one another (and individually) for the presence of ticks when leaving wooded areas, grassy fields, etc.</p>

than the direction provided in Table 5-1 due to the incorporation of site-specific elements, the Safe Work Permit will be followed.

5.1 GENERAL SAFE WORK PRACTICES

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

- Refrain from eating, drinking, chewing gum or tobacco, taking medication, or smoking in contaminated or potentially contaminated areas or where the possibility for the transfer of contamination exists.
- Wash hands and face thoroughly upon leaving a contaminated or suspected contaminated area. A thorough shower and washing must be conducted as soon as possible if excessive skin contamination occurs.
- Avoid contact with potentially contaminated substances by walking around puddles, pools, mud, or other such areas. Avoid, whenever possible, kneeling on the ground or leaning or sitting on equipment. Do not place monitoring equipment on potentially contaminated surfaces.
- Be familiar with and adhere to all instructions in the site-specific HASP.
- Be aware of the location of the nearest telephone and all emergency telephone numbers. See Section 2.0, Table 2-1.
- Attend briefings on anticipated hazards, equipment requirements, Safe Work Permits, emergency procedures, and communication methods before going on site.
- Plan and mark entrance, exit, and emergency escape routes. See Section 2.0.
- Rehearse unfamiliar operations prior to implementation.

Use the “buddy system” whenever respiratory protection equipment is in use. Establish hand signals or other means of emergency communication in case of two-way radio failure.

- Maintain visual contact with each other and with other on-site team members by remaining in close proximity in order to assist each other in case of emergency.
- Establish appropriate Safety Zones including Support, Contamination Reduction, and Exclusion Zones.
- Minimize the number of personnel and equipment in contaminated areas (such as the Exclusion Zone). Non-essential vehicles and equipment should remain within the Support Zone.
- Establish appropriate decontamination procedures for leaving the site.
- Be familiar with all MSDSs relevant to site operations
- Immediately report all injuries, illnesses, and unsafe conditions, practices, and equipment to the SSO.
- Matches and lighters are restricted from entering in the Exclusion Zone or Contamination Reduction Zone.
- Observe coworkers for signs of toxic exposure and heat or cold stress. (Attachment IV)
- Inform co-workers of potential symptoms of illness, such as headaches, dizziness, nausea, or blurred vision.

5.2 DRILLING SAFE WORK PRACTICES

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

5.2.1 Before Drilling

Identify all underground utilities and buried structures before drilling. Use the Utility Locating and Excavation Clearance SOP provided in Attachment V.

All drill rigs will be inspected by a Competent Person (the SSO or designee) prior to the acceptance of the equipment at the site and prior to the use of the equipment. All repairs or deficiencies identified will be corrected prior to use. The inspection will be accomplished using the Equipment Inspection Checklist

provided in Attachment II. Inspection frequencies will be once every shift (either 5 or 10 day) or following repairs.

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

5.2.2 During Drilling

- The drill operator shall verbally alert employees and visually ensure employees are clear from dangerous parts of equipment before starting or engaging equipment.
- One employee shall be responsible for emergency shut-off switch operation during drilling operation, such that the machinery can be shutdown quickly if an employee is in danger.
- Secure frayed or loose clothing, hair, and jewelry when working with rotating equipment.
- Minimize contact to the greatest extent possible with contaminated tooling and environmental media.
- Support functions (sampling and screening stations) will be maintained a minimum distance from the drill 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 rig.
- In order to minimize contact with potentially contaminated tooling and media and to minimize lifting hazards, multiple personnel should move auger flights and other heavy tooling.

- Only personnel absolutely essential to the work activity will be allowed in the exclusion zone. Site visitors will be escorted at all times.

5.2.3 After Drilling

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

5.3 DRUM HANDLING SAFE WORK PRACTICES

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

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

6.0 HAZARD ASSESSMENT

The following section provides information regarding the chemical, physical, and natural hazards associated with the sites to be investigated and the activities that are to be conducted as part of the scope of work. Table 6-1, which is included as part of this HASP, provides various information, exposure limits, symptoms of exposure, physical properties, and air monitoring and sampling data. Section 6.1 provides general information regarding all contaminants that may be present at the sites; Section 6.2 addresses physical hazards associated with performance of site activities; and Section 6.3 focuses on natural hazards.

6.1 CHEMICAL HAZARDS

The potential health hazards include inhalation, ingestion, and dermal contact of various contaminants which may be present in shallow and deep soils as well as sediments, surface water and groundwater. As the focus of this field investigation is to conduct additional sampling of various media at the associated sites, concentrations of the chemical hazards present are not fully determined. Based on prior activities at the sites however, there are several contaminants that are known to be present in elevated levels and other constituents which may be encountered. The following have been identified as the primary classes of hazards:

- Metals
- Volatile organic compounds (VOCs)
- Semivolatile organic compounds (SVOCs)
- Polynuclear aromatic hydrocarbons (PAHs)
- Total petroleum hydrocarbons (TPHs)
- Radionuclides (See Section 7.2)
- Pesticides
- Herbicides

Additional hazardous materials which may be encountered at various sites:

McCoy Annex

- Study Area 52 – pesticides (specifically Dieldrin and 4,4-DDT).

Herndon Annex

- Study Area 2 – VOCs (specifically benzene).

**TABLE 6-1
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA
NAVAL TRAINING CENTER
ORLANDO, FLORIDA
PAGE 1 OF 4**

Substance	CAS No.	Air Monitoring/Sampling Information	Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information	
Diesel Fuel No. 2-D	Mixture	Components of this substance will be detected readily; however, no documentation exists as to the relative response ratio of either PID or FID.	Air sampling use charcoal tube as a collection media; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol in accordance with NIOSH Method #1550.	OSHA; NIOSH; ACGIH: 5 mg/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: <300-550°F; 149-288°C Melting Pt: Not available Solubility: Negligible Flash Pt: 95-145°F; 35-62°C Autoignition: 475°F, 246°C LEL/LFL: 0.6% UEL/UFL: 8.0% Vapor Density: >5 Vapor Pressure: <0.1 mmHg @ 70°F; 21°C Specific Gravity: 0.80 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. Because of 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.
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.	Air sample using charcoal tube; carbon disulfide desorption; Sampling and analytical protocol in accordance with OSHA 07 or NIOSH Method #1500.	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.	Air sample using charcoal tube; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol in accordance with OSHA Method #07 or NIOSH Method #1501 Aromatic Hydrocarbon.	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
NAVAL TRAINING CENTER
ORLANDO, FLORIDA
PAGE 2 OF 4**

Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Gasoline	8006-61-9	Relative response ratios for the components of gasoline range from 100 - 200% for PID and FID detection.	See components for measurement considerations.	ACGIH & OSHA: 300 ppm 500 ppm STEL NIOSH: Reduce to lowest feasible concentration.	Respiratory Protection: Odor threshold 0.7 ppm, adequate air purifying respirator with organic vapor cartridges up to 100 ppm. Recommended Gloves: Nitrile >6.00 hrs; PV alcohol >6.00 hrs; Viton/neoprene >8.00 hrs	Boiling Pt: 102°F; 39°C Melting Pt: Not available Solubility: Negligible Flash Pt: -50°F; -45°C LEL/LFL: 1.4% UEL/UFL: 7.6% Vapor Density: ~5 Vapor Pressure: 38-300 mmHg (varies seasonally) Specific Gravity: 0.74 @ 20/20°C Incompatibilities: Strong oxidizers, peroxides, strong acids, and perchlorates Appearance and Odor: Colorless liquid with gasoline odor.	Overexposure to this substance may result in irritation to the eyes, skin, and mucous membranes. Systemically, headache, fatigue, blurred vision, dizziness, slurred speech, confusion, possible convulsion, and chemical pneumonia (aspiration). Prolonged or chronic exposures may result in possible liver or kidney damage. Components of this substance have been determined to be confirmed human carcinogens.
Toluene	108-88-3	PID: I.P. 8.82 eV, High response with PID and 10.2 eV lamp. FID: 110% response with FID.	Air sample using charcoal tube; carbon disulfide desorption. Sampling and analytical protocol shall proceed in accordance with OSHA Method #07, or NIOSH Method #1500.	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.
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.	Air sample using charcoal tube; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol shall proceed in accordance with OSHA 07, or NIOSH Method 1500.	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: -130/-54m/56p°F; -25o/-48m/13p °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.	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.

**TABLE 6-1
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA
NAVAL TRAINING CENTER
ORLANDO, FLORIDA
PAGE 3 OF 4**

Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
General PAHs / Coal Tar Pitch Volatiles / Creosote / cresol (Fluoranthene, pyrene, benzo(a) anthracene, benzo(a) pyrene, benzo(f)fluoranthene, benzo(k)fluoranthene, etc.)	(CAS Numbers vary depending on specific compound)	PID: I.P. of 8.97 eV, relative response ratio unknown. FID: Response factor unknown but given the substances flammability, detection by FID can be anticipated.	Refer to NIOSH methods for each specific compound for appropriate air sampling protocols. Many PAHs can be sampled using <u>NIOSH Method 5506 or 5515</u> - Teflon filter with support ring - High pressure liquid chromatography with UV detector. For cresol (a major constituent of creosote) by silica gel or xad-7 sorbent tube; Acetone desorption and analysis by gas chromatography - flame ionization detector or high-pressure liquid chromatography. (NIOSH Method #2001, or OSHA Method #32)	General PAHs: Most PAHs have no established exposure limits. Other Coal Tar Pitch Volatiles / PAHs such as chrysene and benzo(a)pyrene have an exposure limit of 0.2 mg/m ³ (OSHA and ACGIH). 0.1 mg/m ³ - (NIOSH) Creosote / Cresol: OSHA; ACGIH: 5 ppm NIOSH: 2.3 ppm IDLH: 80 mg/m ³	Adequate - use a full-face air-purifying respirator with organic vapor / dust/mist cartridge up to 250 ppm. Cresol has an Odor Threshold of 0.00005-0.0079 ppm. Recommended gloves: Viton >96.00 hrs; butyl rubber >90.00 hrs; neoprene >4.50 hrs	Properties of various PAHs/Coal Tar Pitch Volatiles vary depending upon the specific compound. <i>For Creosote/Cresol:</i> Boiling Pt: 376-397°F; 191-203°C Melting Pt: 52-96°F; 10.9-35.5°C Solubility: Insoluble Flash Pt: 178°F; 81°C LEL/LFL: Not available UEL/UFL: Not available Vapor Density: 3.72 Vapor Pressure: 1 mmHg @ 100-127°F; 38-53°C Specific Gravity: 1.030-1.038 Incompatibilities: Nitric acid, oleum, chlorosulfonic acid, oxidizers Appearance and Odor: Yellowish or colorless, flammable, oily liquid (often brownish because of impurities or oxidation)	Regulated based on effects on respiratory tract and skin irritation Other effects may include eye irritation and central nervous system, disturbances. Acute exposures may result in difficulty breathing, respiratory failure and skin and eye irritation and burns. Chronic exposure may damage the liver, kidneys, lungs and skin and cause photosensitivity. IARC, NTP, NIOSH, ACGIH, and the EPA list some PAHs such as benzo(a)pyrene as a potential carcinogen (ARC 2A, NTP-2, ACGIH TLV-A2, NIOSH-X, EPA-B2).
Dieldrin	60-57-1	PID: PID will not detect this substance. FID: FID will not detect this substance.	Air sample using glass fiber filters followed by extraction with iso-octane and analysis by GC. Sampling and analytical protocol will proceed in accordance with NIOSH Method S283.	OSHA & ACGIH: 0.25 mg/m ³ (Skin) NIOSH: 0.25 mg/m ³ (Skin) NOTE: NIOSH considers Dieldrin a potential human carcinogen and the ACGIH consider it an "A4 - Not Classifiable as a Human Carcinogen"	Mild chemical odor A SCBA operated in a pressure-demand mode or other positive pressure mode (per NIOSH classification as a potential human carcinogen). Recommended gloves: PTFE Teflon for pure product. Nitrile acceptable for incidental contact.	Boiling Pt: Decomposes Melting Pt: 349°F; 176°C Solubility: 0.186 in water @ 84°F; 29°C Flash Pt: Not available LEL/LFL: Not available UEL/UFL: Not available Vapor Density: 13.2 Vapor Pressure: 1.8 x 10 ⁻⁷ mmHg @ 68°F; 20°C Specific Gravity: 1.75 Incompatibilities: Concentrated mineral acids, acid catalysts, and acid oxidizing agents. Appearance and Odor: Light brown crystals with a mild chemical odor.	Symptoms of minor exposure may include headache, dizziness, nausea, vomiting, blood in the urine, malaise and sweats. More significant acute exposures may include limb jerking, convulsions, coma, and other symptoms associated with pesticide overexposures. Chronic exposure may cause dermatitis, weight loss, muscular twitching, and convulsions. Animals exposures produced liver and kidney damage.

**TABLE 6-1
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA
NAVAL TRAINING CENTER
ORLANDO, FLORIDA
PAGE 4 OF 4**

Substance	CAS No.	Air Monitoring/Sampling Information	Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information	
DDT and the major metabolites; DDD and DDE.	50-29-3 72-54-8 72-55-9	Substance is not volatile, I.P. is unknown, detection by PID is unknown. Substance non-combustible, therefore a FID is anticipated to have reduced response to DDT.	Air sample using a binder free, glass fiber filter; isooctane desorption; gas chromatography-electron capture detector. Sampling and analytical protocol will proceed in accordance with NIOSH Method #3(S274).	OSHA; ACGIH: 1 mg/m ³ NIOSH: 0.5 mg/m ³	Adequate - Can use air purifying respirator with high efficiency particulate air filter (HEPA). Recommended glove: Nitrile acceptable for incidental contact.	Boiling Pt: 230°F; 110°C Melting Pt: 226°F; 108°C Solubility: Insoluble Flash Pt: 162-171°F; 72-77°C LEL/LFL: Not available UEL/UFL: Not available Vapor Density: Not available Vapor Pressure: Low Specific Gravity: 0.99 Incompatibilities: Strong oxidizers and alkalis Appearance and Odor: Colorless crystals or off-white powder with a slight aromatic odor	Large doses are followed by vomiting due to gastric irritation, diarrhea may follow. Numbness and paresthesias of the lips tongue and face associated with malaise, headache, sore throat, fatigue and weakness. Coarse tremors (usually first of the neck, head, and eyelids). This may be accompanied by confusion, apprehension, and depression. Convulsions may result and death may occur from respiratory failure. DDT is absorbed and retained in the fat of humans. Chronic exposure may result in damage to the liver, kidneys and Peripheral Nervous System. DDT is recognized as possessing carcinogenic properties by IARC and NTP.
Aroclor-1260 (Polychlorinated Biphenyl, PCB) It should be noted that this substance is representative of the more common isomers Aroclor - 1242, 1254, which may be encountered.	11096-82-5 53469-21-9 (42%) 11097-69-1 (54%)	Substance is not volatile (VP=0.00006 mmHg), I.P. is unknown however is anticipated to be elevated, therefore, PID is not anticipated to detect substance. Substance is non combustible and as a result will not be detected by FID.	Air sample using a particulate filter, Florisil sorbent tube with glass fiber filter; hexane desorption; gas chromatography-electron capture detector. Sampling and analytical protocol shall proceed in accordance with NIOSH Method #5503 (PCBs).	OSHA; ACGIH: 0.5 mg/m ³ (skin) NIOSH: 0.001 mg/m ³ IDLH: 5 mg/m ³	Inadequate - However due to the low volatility it is assumed unless agitated this substance does not present a volatile vapor or gas respiratory threat. For dusty conditions where this material may cling to particulates, use a HEPA filter. APRs are approved for escape only when concentrations exceed the exposure limits. Concentrations greater than the exposure limits require PAPR or supplied air respirators. Recommended glove: Butyl rubber >24 hrs; Neoprene rubber >24.00 hrs; Silver shield or Viton (for pure product).	Boiling Pt: distillation range 689- 734 °F; 365-390°C Melting Pt: -2 to 50°F; -19 to 10°C Solubility: Insoluble Flash Pt: Not applicable LEL/LFL: Not applicable UEL/UFL: Not applicable Nonflammable liquid, however, exposure to fire results in black soot containing PCBs, dibenzofurans, & chlorinated dibenzo-p-dioxins Vapor Density: Not available Vapor Pressure: 0.00006 - 0.001 mmHg Specific Gravity: 1.566 @ 60°F; 15.5 °C Incompatibilities: Strong oxidizers Appearance and Odor: Colorless to pale yellow, viscous liquid or solid (Aroclor 54 below 50°F) with a mild, hydrocarbon odor	This substance is irritating to the eyes and skin. Chronic effects of overexposure may include potential to cause liver damage, chloracne, and reproductive effects. Recognized as possessing carcinogenic properties by NIOSH, and NTP

Main Base

- Study Area 36NW – VOCs (specifically BTEX)
- Operable Unit 3 (SA 8 and SA 9 within the Main Base portion of NTC Orlando) - low concentrations of pesticides and herbicides (primarily 4,4'-DDT) and metals (primarily arsenic and lead)

Area C

- Operable Unit 4 – VOCs (specifically PCE, TCE, and vinyl chloride), antimony.
- Study Area 55 – arsenic and benzo (a) pyrene

It is anticipated that the greatest potential for exposure to site contaminants is during intrusive activities (i.e., drilling/DPT activities). The most efficient route of exposure for the contaminants of concern is through inhalation of airborne VOCs or dusts. However, available analytical data from previous site investigations indicates that elevated airborne concentrations in worker breathing zones are unlikely to be encountered during site activities. Potential exposures as a result of dermal contact or accidental ingestion of contaminated sediment or water by hand-to-mouth contact during sampling activities will be prevented through the use of PPE and basic hygiene practices (washing face and hands before leaving site).

Table 6-1 provides information on the compounds and individual substances likely to be present at the sites to be investigated. Included is information on the toxicological, chemical, and physical properties of these substances.

6.2 PHYSICAL HAZARDS

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

- Slips, trips, and falls.
- Water hazards.
- Lifting (strain/muscle pulls).
- Pinches and compressions.
- Heavy equipment hazards (pinch/compression points, rotating equipment, etc.).
- Energized systems (contact with underground or overhead utilities).
- Noise in excess of 85 dBA (see Attachment VI for the TtNUS Hearing Conservation Program).

- Flying projectiles.
- Ambient temperature extremes (heat stress).
- Vehicular and foot traffic.
- Cuts, lacerations.

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 Slips, Trips, and Falls

During various site activities there is a potential for slip, trip, and fall hazards associated with wet, steep, or unstable work surfaces. To minimize hazards of this nature, personnel required to work in and along areas prone to these types of hazards will be required to exercise caution, and use appropriate precautions (restrict access, guardrails, life lines and/or safety harnesses) and other means suitable for the task at hand. All activities will be performed using the buddy system. Personnel will use site maps and personal experience to select the most suitable routes to sites.

6.2.2 Energized Systems (Contact with Underground or Overhead Utilities)

Underground utilities such as pressurized lines, water lines, telephone lines, buried utility lines, and high voltage power lines may be present throughout the facility. Clearance of underground and overhead utilities for each sample location will be coordinated with NTC or City of Orlando personnel. Additionally, drilling operations will be conducted at a safe distance (>20 feet) from overhead power lines. Whenever underground utilities are suspected to be close to subsurface sampling locations, the borehole will be advanced to a minimum of four (4) feet with a hand auger or posthole digger prior to drilling. As-built drawings may also be utilized for additional clarification. Personnel may use a magnetometer and/or soil probe to assist in locating utilities. In certain cases, site personnel may need to de-energize electrical cables using facility lockout/tagout procedures to ensure electrical hazards are eliminated.

6.2.3 Strain/Muscle Pulls from Heavy Lifting

During execution of planned activities there is some potential for strains, sprains, and/or muscle pulls due to the physical demands and nature of this site work. To avoid injury during lifting tasks personnel are to lift with the force of the load carried by their legs and not their backs. When lifting or handling heavy material or equipment use an appropriate number of personnel. Keep the work area free from clutter to avoid unnecessary twisting or sudden movements while handling loads.

The following steps will help prevent back injury:

- Clear the path you will follow.
- Lift with your legs, not your back.
- “Hug” the load. Minimize the horizontal distance between the load and your center of gravity.
- Avoid twisting.
- Break large loads into smaller, more manageable ones.
- Take frequent rest and stretch breaks.

6.2.4 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 70o 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.

Sunburn produces additional stress in the form of pain or itching. The following steps can help prevent sunburn:

- Wear a hat and long-sleeved shirt.
- Use a sunscreen with a minimum skin protection factor (SPF) of 15. An SPF of 20 or 30 is much better. Replace sunscreen frequently.
- Provide a portable canopy or umbrella to provide shade.

6.2.5 Pinch/Compression Points

Pinch and compression points may result in injury. All equipment must be maintained in proper working order, with machine guarding devices in place (if applicable). Any equipment found to be lacking in these areas shall be removed from service. Additionally, all personnel shall be properly trained in the use and function of all equipment used within the investigating activity. Spring loaded dredges are often

responsible for injuries to the hands and fingers. Particular attention should be given during use of these devices.

6.2.6 Contact with Unexploded Ordnance (UXO)

Because of the prior uses of the areas to be investigated, there is a possibility that UXO may be encountered during operations. All activities in areas suspected to contain UXO will be conducted consistent with the UXO procedures discussed in Appendix VII of this HASP.

- In general, field personnel will practice UXO avoidance techniques.
 - Do not pick-up or kick any unknown materials.
 - Notify the explosive ordnance disposal (EOD) Specialist if you encounter unknown materials.
 - Where the potential exists for UXO materials the EOD Specialist will clear all access routes and work areas.

- To minimize the risk of a UXO encounter, a trained UXO or EOD Specialist will provide support during selected site activities. In all cases, an exclusion zone of 300 feet will be established before detection activities begin.

- When soil-boring operations are conducted, the area and access roads will be swept. The borehole will be cleared down to a depth of two (2) feet and a magnetic gradiometer (down-hole instrument) or similar instrument will be lowered into the hole to clear the borehole. This clearance procedure will continue until the borehole has been cleared to a depth of ten (10) feet. This will be accomplished by hand. Advancement through mechanical means may proceed within a two foot radius of the clearance boring.

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

6.3 NATURAL HAZARDS

Insect/animal bites and stings, poisonous plants, and inclement weather are natural hazards that may be present given the location of activities to be conducted. In general, avoidance of areas of known infestation or growth will be the preferred exposure control for insects/animals and poisonous plants. Specific discussion on principle hazards of concern follows:

6.3.1 Insect/Animal Bites and Stings

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

Areas to be investigated could be prime nesting and/or hiding locations for other insects and snakes. Personnel should avoid reaching into areas that are not visibly clear of snakes or insects. Snake chaps will be worn in areas of known or anticipated snake infestation. Bees also build shelter in places that may be difficult to see, including in the soil. Many people suffer extremely serious allergic reactions to bee stings. All site personnel who are allergic to stinging insects such as bees, wasps, and hornets must be particularly careful since severe illness and death may result from allergic reactions. As with any medical condition or allergy, information regarding the condition must be listed on the Medical Data Sheet and the FOL and SSO notified.

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

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

- Most human attacks associated with alligators occur when they have been fed by humans or when defending their nests.

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

Snakes may be found throughout central Florida. Good snakebite defenses include wearing leather boots, chaps, and gloves. Few snakebites result in death, but any snakebite should be considered serious. Call 911, describe the event, and follow the instructions given by the emergency service operator.

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

6.3.2 Inclement Weather

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

6.3.3 Cuts and Lacerations

Cuts and lacerations are the most common and most preventable injuries. Three of the most common are discussed below.

Some soil samplers collect samples in heavy plastic wrappers or acetate liners. These liners must be cut open before personnel can examine the sample or perform tests on it. A cut finger or hand can result if the sample or the knife slips during the cutting. Wearing leather gloves, placing the sample on a firm surface, and slicing the liner carefully with a sharp knife can prevent this type of injury. More pressure is required if the knife is dull, and greater pressure increases the chance of a slip.

Workers often hurry while clearing brush with a machete, axe, or other tool. Haste increases the chance of falling while carrying a sharp tool. Clearing must be done carefully with sharp tools while paying close attention to anything that might deflect the tool. Cutting tools must be kept in protective sheaths when not in use.

The reagents used in Natural Attenuation sampling are delivered in small glass ampoules. The user breaks the ampoule tip, then mixes the contents with a sample to conduct an analysis. If the vendor's instructions are carefully followed when opening the ampoules, the operation is fairly risk-free. Careless opening can result in jamming a finger or thumb onto the sharp glass top of the broken ampoule. The cut would then be drenched with the reagent (often a corrosive). This type of injury can be avoided if the user wears heavy nitrile gloves and follows the vendor's instructions for opening the ampoules.

7.0 AIR MONITORING

Direct reading instruments (DRIs) will be used to screen source areas (sample locations, wells, etc.) and worker breathing zones for volatile and detectable site contaminants. Some of the anticipated site contaminants, however, are not volatile and are unable to be detected with the use of DRIs. Specifically, the PAHs, metals, and pesticides are unable to be detected due to their solid nature, low vapor pressure, and/or non-ionizing properties. Action levels are discussed in Table 5-1 as they may apply to a specific task or location. The use of personal protective equipment and the observance of the other control requirements presented in this HASP has been selected to minimize potential for personnel exposures to hazardous concentrations (known or unknown) of airborne contaminants. 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, a photoionization detector (PID) with a lamp energy of 10.2 eV or greater must be used. These lamp energies are measured in electron volts or eV and can be found in Table 5-1 for the appropriate work location, and contaminant. 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, and may be preferable to use of a 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).

Prior to using a PID or FID, the SSO or FOL must assess the nature of the contaminants to be monitored, then refer to the instrument operation manual to see if a correction factor must be applied to instrument

readings. Extra care must be used if a FID is to be used at a landfill site, because methane from the landfill may produce very high, erroneous readings.

The instrument reading multiplied by the appropriate correction factor approximates the actual observed concentration. Apparently equal instrument readings can represent large differences in concentrations.

Other important points to remember include:

- For a particular PID, the Correction Factor will change if the lamp is replaced with one whose output energy is different (e.g. – replacing a 10.2 eV lamp with an 11.7 eV lamp).
- A FID will readily detect methane while a PID will not.
- PIDs are very sensitive to high humidity, especially if an instrument has been moved from a warm office or vehicle to a cool atmosphere. Usually, allowing the PID's temperature to equilibrate will restore proper operation. FIDs are not sensitive to humidity.

Action Levels

Direct Reading Instruments, such as the PID/FID, will be used to detect and evaluate the presence of site contaminants and other potentially harmful agents. This instrument was selected based on its ability to detect the VOCs of concern. If any sustained (greater than 1 minute) breathing zone readings above 1 ppm are measured, site workers must initiate measures to prevent exposures (move to an unaffected area, perform additional air monitoring, contact the PHSO, etc.). This conservative action level has been established given the potential presence of benzene. If sustained readings continue, workers shall suspend site activities until the nature of the elevated readings is determined. Colorimetric tubes (Draeger tubes) for benzene (benzene 0.5/a) will be used when work is conducted in the presence of any elevated PID readings to establish if benzene is the airborne contaminant that is causing the elevated reading. If benzene can be eliminated as the source, workers may continue activities using a higher action level (10 ppm). If benzene is determined to be present within a workers breathing zone, site activities will be suspended and the PHSO will be contacted for additional air monitoring and safe work requirements.

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 FIELD CALIBRATION

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

Radiation monitoring instruments will be rented, with calibration information supplied by the vendor. This procedure eliminates the cumbersome paperwork needed to transport radiological calibration sources.

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 on site activities. All TtNUS personnel must complete 40 hours of introductory hazardous waste site training prior to performing work at the NTC Orlando. TtNUS personnel who have had introductory training more than 12 months prior to site work must have completed 8 hours of refresher training within the past 12 months before being cleared for site work. In addition, 8-hour supervisory training in accordance with 29 CFR 1910.120(e)(4) will be required for site supervisory personnel.

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

8.1.1 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 NTC Orlando. 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 TtNUS personnel who will perform work on this project. Site-specific training will include:

- Names of designated personnel and alternates responsible for site safety and health
- Safety, health, and other hazards present on site
- Use of personal protective equipment
- Work practices to minimize risks from hazards

FIGURE 8-1
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

Steve McCoy, P.E.
Task Order Manager
Tetra Tech NUS, Inc.
800 Oak Ridge Turnpike, Suite A-600
Oak Ridge, Tennessee 37830

Subject: HAZWOPER Training for Naval Training Center (NTC) Orlando, Florida

Dear Mr. McCoy:

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)

- Medical surveillance requirements
- Contents of the Health and Safety Plan
- Signs and symptoms of overexposure to site contaminants
- 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
- Emergency response procedures (evacuation and assembly points)
- Associated hazards and restricted areas within the NTC Orlando.

Site-specific training documentation will be established through the use of Figure 8-2.

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. Documentation for medical clearances will be maintained in the TtNUS Pittsburgh office and made available, as necessary.

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 8-4 of this HASP.

8.3.2 Requirements for All Field Personnel

Each field team member (including subcontractors) and visitors entering the Exclusion Zone(s) 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.

FIGURE 8-3
SUBCONTRACTOR MEDICAL APPROVAL FORM

For employees of: _____
Company Name

Participant Name: _____ Date of Exam: _____

Part A

The above-named individual has:

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

- qualified to perform work at the NTC Orlando work site
- not qualified to perform work at the NTC Orlando work site

and,

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

- qualified to wear respiratory protection
- not qualified to wear respiratory protection

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

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

Part B

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

and have determined the following information:

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

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

2. Any detected medical conditions 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 NTC Orlando work site, this participant

- may
- may not

perform his/her assigned task.

Physician's Signature _____

Address _____

Phone Number _____

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

Address

FIGURE 8-4
MEDICAL SURVEILLANCE LETTER

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

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

Month, day, year

Mr. Steve McCoy, P.E.
Task Order Manager
Tetra Tech NUS, Inc.
800 Oak Ridge Turnpike, Suite A-600
Oak Ridge, Tennessee 37830

Subject: Medical Surveillance and Clearance for NTC Orlando, Florida

Dear Mr. McCoy:

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

LIST OF 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)

8.4 SUBCONTRACTOR EXCEPTIONS

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 providing concrete coring services.

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

9.0 SITE CONTROL

This section outlines the means by which TtNUS will delineate work zones and use these work zones in conjunction with decontamination procedures to prevent the spread of contaminants into previously unaffected areas of the site. It is anticipated that a three zone approach will be used during work at this site; exclusion zone, contamination reduction zone, and support zone.

9.1 EXCLUSION ZONE

The exclusion zone will be considered those areas of the site of known or suspected contamination. In many cases, however, significant amounts of surface contamination will not be encountered in the proposed work areas of this site until/unless contaminants are brought to the surface by intrusive activities (i.e., sediment sampling). Furthermore, once such activities have been completed and surface contamination has been removed, the potential for exposure is again diminished and the area can then be reclassified as part of the contamination reduction zone. Therefore, the exclusion zones for this project will be limited to those areas of the site where active work is being performed and/or anywhere there is believed to be the potential for encountering any of the potential hazards defined in this HASP.

The following exclusion zones (radii) will be maintained:

Mud rotary drilling – height of mast plus 5 feet around drilling location. 20 feet from top of mast to power line.

DPT activities – 25 feet surrounding point of activity. 20 feet from top of mast to power line.

Groundwater sampling – 10 feet around well head and discharge drum.

Other sampling – 10 feet around sampling point. Only essential personnel will be allowed in boats used for sampling.

9.2 CONTAMINATION REDUCTION ZONE

The contamination reduction zone (CRZ) will be a buffer area between the exclusion zone and any area of the site where contamination is not suspected. The personnel and equipment decontamination area established for this project will take place in the CRZ. This area will serve as a focal point in supporting

exclusion zone activities. In addition, this area will serve as the access and control points to the exclusion zone.

9.3 SUPPORT ZONE

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

9.4 SAFE WORK PERMITS

All Exclusion Zone work conducted in support of this project will be performed using Safe Work Permits to guide and direct field crews on a task by task basis. An example of the Safe Work Permit to be used is illustrated in Figure 9-1. Partially completed Permits for the work to be performed are included in Attachment III. The daily meetings conducted at the site will further support these work permits. This effort will ensure all site-specific considerations and changing conditions are incorporated into the planning effort. All permits will require the signature of the FOL and/or the SSO. Use of these permits will provide the communication line for reviewing protective measures and hazards associated with each operation. This HASP will be used as the primary reference for selecting levels of protection and control measures. The work permit will take precedence over the HASP when more conservative measures are required based on specific site conditions. All permits will be turned into the FOL and/or the SSO upon reaching their termination period or upon completion of the task for which the permit was issued.

9.5 SITE VISITORS

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

- Personnel invited to observe or participate in operations by TtNUS
- Regulatory personnel (DOD, OSHA, etc.)
- Southern Division Navy Personnel
- Other authorized visitors

It is not anticipated that this operation will result in a large number of site visitors. However, as some visitors can reasonably be expected, the following requirements will be enforced:

**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 NTC Orlando

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

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

Modifications/Exceptions: _____

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

VI. Additional Safety Equipment/Procedures

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

Modifications/Exceptions: _____

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

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

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

X. Special instructions, precautions: _____

Permit Issued by: _____ Permit Accepted by: _____
Job Completed by: _____ Date: _____

- All site visitors will be routed to the FOL, who will sign them in to the field logbook. Information to be recorded in the logbook will include the individual's name (proper identification required), who they represent, and purpose for the visit.
- All site visitors will be required to produce the necessary information supporting clearance onto the site. This includes information attesting to applicable training (40-hours of HAZWOPER training required for all Southern Division Navy personnel) and medical surveillance, as stipulated in Section 8 of this document. In addition, to enter the site's 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 document.

NOTE: All site visitors will be escorted at all times while at the site.

Following this, the site visitor 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 area of their visit. 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 Navy On-site Representative will be notified of any unauthorized visitors.

9.6 SITE SECURITY

Site security will be accomplished using TtNUS field personnel. TtNUS will retain complete control over active operational areas. As this activity takes place at Navy facilities open to public access, and along public highways, the first line of security will take place using traffic permit restrictions, Exclusion Zone barriers, and any existing barriers at the sites to restrict the general public. The second line of security will take place at the work site referring interested parties to the FOL or designee. The FOL will serve as a focal point for all non-project interested parties, and serve as the final line of security and the primary enforcement contact.

9.7 SITE MAP

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

9.8 BUDDY SYSTEM

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

9.9 MATERIAL SAFETY DATA SHEET (MSDS) REQUIREMENTS

TiNUS 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. A chemical inventory of all chemicals used at the sites will be developed using the Health and Safety Guidance Manual. The MSDSs will then be maintained in a central location (i.e., temporary office) and will be available for anyone to review upon request.

9.10 COMMUNICATION

As personnel will be working in proximity to one another during field activities, a supported means of communication between field crews members will not be necessary. External communication will be accomplished by using the telephones at predetermined and approved locations. External communication will primarily be used for the purpose of resource and emergency resource communications. Prior to the commencement of activities, the FOL will determine and arrange for telephone communications.

9.11 OTHER FACILITIES

There are few sheltered areas for crews to use during work breaks. In very hot weather, the FOL may elect to erect a portable shelter and provide a work table and chairs. Personnel may also elect to take breaks in their vehicles or wooded areas.

Toilet facilities are available in some former NTC buildings at some sites and near public facilities at others. Rental toilet units will not be required.

Each work crew will have a cooler supplied with bottled water. Personnel may keep other drinks and snacks in the coolers if they wish. The FOL will be responsible for assuring that adequate potable water is available and urging all personnel to drink water frequently.

10.0 SPILL CONTAINMENT PROGRAM

10.1 SCOPE AND APPLICATION

It is not anticipated that bulk hazardous materials (over 55-gallons) will be handled at any given time as part of this scope of work. It is also not anticipated that such spillage would constitute a danger to human health or the environment. However, as the job progresses, the potential may exist for accumulating Investigative Derived Wastes (IDW) such as decontamination fluids, soil cuttings, and purge and well development waters, in a central staging area. Once these fluids and other materials have been characterized, they can be removed from this area and properly disposed.

10.2 POTENTIAL SPILL AREAS

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

- Resource deployment
- Waste transfer
- Central staging
- Drum characterization

It is anticipated that all IDW generated as a result of this scope of work will be containerized, labeled, and staged to await further analyses. The results of these analyses will determine the method of disposal.

10.3 LEAK AND SPILL DETECTION

To establish an early detection of potential spills or leaks, a periodic walk-around by the personnel staging or disposing of drums or in the Resource Deployment area will be conducted during working hours to visually determine that storage vessels are not leaking. If a leak is detected, the contents will be transferred, using a hand pump, into a new vessel. The leak will be collected and contained using absorbents such as Oil-Dry, vermiculite, or sand, which are stored at the vulnerable areas in a conspicuously marked drum. This used material, too, will be containerized for disposal pending analysis. All inspections will be documented in the project logbook.

10.4 PERSONNEL TRAINING AND SPILL PREVENTION

All personnel will be instructed in the procedures for initial spill prevention, containment, and collection of hazardous materials in the site-specific training. The FOL and the SSO will serve as the Spill Response Coordinators for this operation, should the need arise.

10.5 SPILL PREVENTION AND CONTAINMENT EQUIPMENT

The following represents the types of equipment that may be necessary (depending on anticipated need) at the staging areas for the purpose of supporting this Spill Prevention/Containment Program.

- Sand, clean fill, vermiculite, or other non combustible absorbent (Oil-dry)
- Drums (55-gallon U.N. 1A2)
- Shovels, rakes, and brooms
- Container labels
- A small electric pump with at least 20 feet of hose
- Boot covers, heavy nitrile gloves, and respirators with general purpose cartridges
- Alconox, scrub brushes and potable water for decontamination
- Type BC fire extinguisher

10.6 SPILL CONTROL PLAN

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

10.6.1 Procedures for Events Within the Control of Site Personnel

Events within the control of site personnel include those that might occur during normal site operations and relatively minor situations discovered after their occurrence. Examples include small leaks in drums, burst hydraulic hoses on large equipment, and the discovery of small quantities of materials left on site by unauthorized persons. The procedures for dealing with such events are as follows:

1. Notify the SSO or FOL immediately upon detection of a leak or spill. Activate emergency alerting procedures for that area to remove all non-essential personnel.
2. Establish a boundary around the spill with stakes, tape, or rope to create an exclusion zone.

3. Employ the personal protective equipment stored at the staging area. Take immediate actions to stop the leak or spill by plugging or patching the container or raising the leak to the highest point in the vessel. Spread the absorbent material in the area of the spill, covering it completely. If possible, use absorbent materials to prevent the spill from reaching ditches, canals, or sewers.
4. Transfer the material to a new vessel and collect and containerize the absorbent material. Label the new container appropriately. Await analyses for treatment and disposal options.
5. Recontainerize spills, including 2-inches of top cover impacted by the spill. Await test results for treatment or disposal options.

10.6.2 Procedures for Events Not Within the Control of Site Personnel

Events not within the control of site personnel include spills of unknown materials left on site by others, large spills such as might occur with a large leaking tank, and spills due to vandalism or vehicle accidents. Under no circumstances shall personnel attempt a spill recovery. The procedures for dealing with such events are as follows:

1. Notify the SSO or FOL immediately upon detection of the spill. The SSO or FOL will notify the PHSO. Activate emergency alerting procedures for that area to remove all non-essential personnel. In acute situations, all persons must withdraw a safe distance and await help from emergency workers.
2. Notify emergency workers by calling 911. Explain the nature of the spill and 911 operators will contact spill control experts.
3. Establish a boundary around the spill with stakes, tape, or rope to create an exclusion zone.
4. Employ the personal protective equipment stored at the staging area. If possible, take immediate actions to stop the leak or spill by plugging or patching the container. Establish secondary containment if the spill threatens to overflow primary containment structures.
5. If it is certain that the spilled material presents no fire hazard, pump the spilled material into drums. Otherwise, await help from emergency workers.

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

11.0 CONFINED-SPACE ENTRY

It is not anticipated, under the proposed scope of work, that confined space and permit-required confined space activities will be conducted. Therefore, personnel under the provisions of this HASP are not allowed, under any circumstances, to enter any confined spaces.

A confined space is defined as a space that:

- Is large enough and so configured that an employee can bodily enter and perform assigned work.
- Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry).
- Is not designed for continuous employee occupancy.

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

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

For further information on confined space, consult the Health and Safety Guidance Manual or call the PHSO. If confined space operations are to be performed as part of the scope of work, detailed procedures and training requirements will have to be addressed.

12.0 MATERIALS AND DOCUMENTATION

The TtNUS FOL shall ensure 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)

12.1 MATERIALS TO BE POSTED OR MAINTAINED AT THE SITE

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

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

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

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

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

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

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

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

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

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

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

ATTACHMENT I

**INJURY/ILLNESS PROCEDURE
AND REPORT FORM**

TETRA TECH NUS, INC.

INJURY/ILLNESS PROCEDURE WORKER'S COMPENSATION PROGRAM

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

- If injury is minor, obtain appropriate first aid treatment.
- If injury or illness is severe or life threatening, obtain professional medical treatment at the nearest hospital emergency room.
- If incident involves a chemical exposure on a project work site, follow instructions in the Health & Safety Plan.
- Immediately report any injury or illness to your supervisor or office manager. In addition, you must contact your Human Resources representative, Marilyn Duffy 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 Duffy at (412) 921-8475 for the number of the Referral Unit.

ADDITIONAL QUESTIONS REGARDING WORKER'S COMPENSATION:

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

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

WHO IS COVERED:

All employees of Tetra Tech, whether they are on a full-time, part-time or temporary status, working in an office or in the field, are entitled to worker's compensation benefits. All employees must follow the

TETRA TECHNUS, INC.
INJURY/ILLNESS PROCEDURE
WORKER'S COMPENSATION PROGRAM

above injury/illness reporting procedures. Consultants, independent contractors, and employees of subcontractors are not covered by Tetra Tech's Worker's Compensation plan.

WHAT IS COVERED:

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



TETRA TECH, INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT

To: _____
Subsidiary Health and Safety Representative

Prepared by: _____

Position: _____

cc: _____
Workers Compensation Administrator

Office: _____

Project name: _____

Telephone number: _____

Project number: _____

Fax number: _____

Information Regarding Injured or Ill Employee

Name: _____

Office: _____

Home address: _____

Gender: M F No. of dependents: _____

Marital status: _____

Home telephone number: _____

Date of birth: _____

Occupation (regular job title): _____

Social security number: _____

Department: _____

Date of Accident: _____

Time of Accident: _____ a.m. p.m.

Time Employee Began Work: _____

Check if time cannot be determined

Location of Incident

Street address: _____

City, state, and zip code: _____

County: _____

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

Information About the Incident

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

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

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



TETRA TECH, INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT (Continued)

Information About the Incident (Continued)

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

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

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

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

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

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

Witness (Attach additional sheets for other witnesses.)

Name: _____

Company: _____

Street address: _____

City: _____ State: _____ Zip code: _____

Telephone number: _____

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

Name of physician or health care professional: _____

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

Facility name: _____

Street address: _____

City: _____ State: _____ Zip code: _____

Telephone number: _____

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

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

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



TETRA TECH, INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT (Continued)

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

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

Name of Tetra Tech employee the injury or illness was first reported to: _____

Date of Report: _____ **Time of Report:** _____

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

Printed Name of Injured Employee

Telephone Number

Signature of Injured Employee

Date

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

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

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



TETRA TECH, INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT (Continued)

To Be Completed by the Subsidiary Health and Safety Representative

Classification of Incident:
 Injury Illness

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

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

OSHA Recordable Case Number _____

To Be Completed by Human Resources

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

To Be Completed during Report to Workers Compensation Carrier

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

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

ATTACHMENT II

EQUIPMENT INSPECTION CHECKLIST

EQUIPMENT INSPECTION

COMPANY: _____ **UNIT NO.** _____

FREQUENCY: Inspect at the initiation of the project, after repairs, once every 10-day shift.

Inspection Date: ___/___/___ Time: _____ Equipment Type: _____
 (e.g., bulldozer, generator)

	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"/>
Access-ways: 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 (was 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 equipment's 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: _____ | | |

Site Safety Officer Signature: _____

Approved for Use: Yes No

ATTACHMENT III

SAFE WORK PERMITS

**SAFE WORK PERMIT FOR
MOBILIZATION/DEMobilIZATION ACTIVITIES
NTC ORLANDO**

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

SECTION I: General Job Scope

- I. Work limited to the following (description, area, equipment used): Mobilization/demobilization and other non hazardous waste-related activities such as surveying (no or limited potential for contact with potentially contaminated media).
- II. Required Monitoring Instruments: None Required.
- III. Field Crew: _____
- IV. On-site Inspection conducted Yes No Initials of Inspector TtNUS

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

- V. Protective equipment required Respiratory equipment required
 Level D Level B
 Level C Level A
 Detailed on Reverse None
 Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, safety shoes, leather/cotton work gloves with surgical-style inner gloves.

VI. Chemicals of Concern <u>Potentially contaminated media</u> <u>Is unlikely to be encountered</u> <u>During these activities</u>	Action Level(s) <u>Avoid contact with potentially</u> <u>contaminated media.</u>	Response Measures <u>Suspend site activities and</u> <u>report to an unaffected area.</u>
---	--	---

- VII. Additional Safety Equipment/Procedures
- | | |
|---|---|
| Hard-hat <input type="checkbox"/> Yes <input type="checkbox"/> No
Safety Glasses <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Chemical/splash goggles <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Splash Shield <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Splash suits/coveralls <input type="checkbox"/> Yes <input type="checkbox"/> No
Steel toe Work shoes or boots <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | Hearing Protection (Plugs/Muffs) <input type="checkbox"/> Yes <input type="checkbox"/> No
Safety belt/harness <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Radio <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Barricades <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Gloves (Type – <u>Work</u>) <input type="checkbox"/> Yes <input type="checkbox"/> No
Work/rest regimen <input type="checkbox"/> Yes <input type="checkbox"/> No |
|---|---|
- Modifications/Exceptions: Tyvek coverall if there is a potential for encountering natural hazards (poison ivy, ticks, etc.).

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

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

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

- XI. Special instructions, precautions: Site contaminants are unlikely to present a significant exposure concern during these tasks. Avoid contact with potential contaminated media. Inspect work areas to identify potential hazards (slip, trips, falls, nesting areas, etc).

Permit Issued by: _____ Permit Accepted by: _____

**SAFE WORK PERMIT FOR
SOIL BORINGS AND INSTALLATION OF MONITORING WELLS
NTC ORLANDO**

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

SECTION I: General Job Scope

- I. Work limited to the following (description, area, equipment used): Soil boring and installation of monitoring wells using Direct Push Technology (DPT), Hollow Stem Augering, Mud Rotary, and/or Rotasonic drilling.
- II. Required Monitoring Instrument(s): PID or FID
- III. Field Crew: _____
- IV. On-site Inspection conducted Yes No Initials of Inspector TtNUS

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

- V. Protective equipment required Respiratory equipment required
 Level D Level B None
 Level C Level A
 Detailed on Reverse

Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, safety footwear, and nitrile gloves w/cotton liner or layered nitrile gloves. Safety glasses, hearing protection, and hard hats will be worn when working within 50 feet of operating equipment.

- | | | |
|---|---|--------------------------------------|
| VI. Chemicals of Concern | Action Level(s) | Response Measures |
| <u>Primary site contaminants - VOCs</u> | <u>Any sustained readings in BZ</u> | <u>Suspend site activities and</u> |
| <u>assoc. w/ fuels (BETX) and misc.</u> | <u>above 1 ppm above background.</u> | <u>report to an unaffected area.</u> |
| <u>metals, pesticides/herbicides</u> | <u>Avoid contact / generating dust.</u> | |

- VII. Additional Safety Equipment/Procedures
- | | |
|---|---|
| Hard-hat..... <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | Hearing Protection (Plugs/Muffs) <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No |
| Safety Glasses <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | Safety belt/harness..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Chemical/splash goggles..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Radio..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Splash Shield..... <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | Barricades..... <input 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: Tyvek coverall if there is a potential for soiling work cloths and PVC or PE coated Tyvek if saturation or work cloths may occur. Reflective vests if working near roadways or where moving equipment is present.

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

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

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

- XI. Special instructions, precautions: Available data suggests that there is limited potential for airborne concentrations of VOCs that are capable of presenting an exposure concern. Most VOCs are associated with fuels and a conservative action level has been established given the presence of benzene. Contact the PHSO if sustained airborne concentrations are observed in worker breathing zones. Exposures to other contaminants will be prevented through the use of safe work practices and PPE. Follow TtNUS SOP "Utility Locating and Excavation Clearance". Inspect site equipment prior to use and at least every 10 days. Stand clear of moving/rotating equipment and ensure emergency stop devices are manned and functional (test daily).

Permit Issued by: _____ Permit Accepted by: _____

Job Completed by: _____ Date: _____

**SAFE WORK PERMIT
GROUNDWATER SAMPLING
NTC ORLANDO**

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

SECTION I: General Job Scope

- I. Work limited to the following (description, area, equipment used): Groundwater sampling and misc. activities including well development, purging, and water level measurements.
- II. Required Monitoring Instruments: PID or FID will be used to screen source areas and worker breathing zones.
- 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: None
- Modifications/Exceptions: Minimum requirements include sleeved shirt and long pants, safety footwear, safety glasses, and surgical-style (nitrile) gloves.

VI. Chemicals of Concern	Action Level(s)	Response Measures
<u>Primary site contaminants - VOCs</u>	<u>Any sustained readings in BZ</u>	<u>Suspend site activities and</u>
<u>assoc. w/ fuels (BETX) and misc.</u>	<u>above 1 ppm above background.</u>	<u>report to an unaffected area.</u>
<u>metals, pesticides/herbicides</u>	<u>Avoid contact / generating dust.</u>	

- VII. Additional Safety Equipment/Procedures

Hard-hat	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Hearing Protection (Plugs/Muffs) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Safety Glasses	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Safety belt/harness <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Chemical/splash goggles	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Radio <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Splash Shield	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Barricades <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Splash suits/coveralls	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Gloves (Type - <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 checked="" type="checkbox"/> No	

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

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

- IX. Equipment Preparation

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

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

- XI. Special instructions, precautions: Available data suggests that there is limited potential for airborne concentrations of VOCs that are capable of presenting an exposure concern. Most VOCs are associated with fuels and solvents and a conservative action level has been established given the presence of benzene. Contact the PHSO if sustained airborne concentrations are observed in worker breathing zones. Exposures to other contaminants (pesticides, herbicides, metals, etc.) will be prevented through the use of safe work practices and PPE. Use safe lifting procedures when handling heavy or awkward objects (sample coolers).

Permit Issued by: _____ Permit Accepted by: _____

**SAFE WORK PERMIT
MULTI MEDIA SAMPLING
NTC ORLANDO**

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

SECTION I: General Job Scope

- I. Work limited to the following (description, area, equipment used): Surface and subsurface soil sampling.
- II. Required Monitoring Instruments: PID or FID will be used to screen source areas & worker breathing zones.
- III. Field Crew: _____
- IV. On-site Inspection conducted Yes No Initials of Inspector _____

TtNUS

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

- V. Protective equipment required Respiratory equipment required
 Level D Level B
 Level C Level A
 Detailed on Reverse None

Modifications/Exceptions: Minimum requirements include sleeved shirt and long pants, safety footwear, and surgical-style (nitrile) gloves.

VI. Chemicals of Concern <u>Primary site contaminants - VOCs</u> <u>assoc. w/ fuels (BETX) and misc.</u> <u>metals, pesticides/herbicides</u>	Action Level(s) <u>Any sustained readings in BZ</u> <u>above 1 ppm above background.</u> <u>Avoid contact / generating dust.</u>	Response Measures <u>Suspend site activities and</u> <u>report to an unaffected area.</u>
--	---	---

VII. Additional Safety Equipment/Procedures

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

Modifications/Exceptions: Reflective vests for high traffic areas. Tyvek coverall if there is a potential for soiling work cloths. PVC or PE coated Tyvek if saturation or work cloths may occur. Hard hat and safety glasses when sampling within the exclusion zone of operating equipment.

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

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

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

- XI. Special instructions, precautions: Available data suggests that there is limited potential for airborne concentrations of VOCs that are capable of presenting an exposure concern. Most VOCs are associated with fuels and a conservative action level has been established given the presence of benzene. Contact the PHSO if sustained airborne concentrations are observed in worker breathing zones. Exposures to other contaminants (pesticides, herbicides, metals, SVOCs, etc.) will be prevented through the use of safe work practices and PPE. Use safe lifting procedures when handling heavy or awkward objects (sample coolers).

Permit Issued by: _____ Permit Accepted by: _____

**SAFE WORK PERMIT FOR
BRUSH CLEARING ACTIVITIES
NTC ORLANDO**

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

SECTION I: General Job Scope

- I. Work limited to the following (description, area, equipment used): Clearing brush to gain access to sampling locations.
- II. Required Monitoring Instruments: None Required.
- 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 None
- Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, safety shoes, safety glasses, and leather/cotton work gloves.

- VI. Chemicals of Concern
- | | | |
|---------------------------------------|---|--|
| <u>Potentially contaminated media</u> | <u>Action Level(s)</u> | <u>Response Measures</u> |
| <u>Is unlikely to be encountered</u> | <u>Avoid contact with potentially contaminated media.</u> | <u>Suspend site activities and report to an unaffected area.</u> |
| <u>During these activities</u> | | |

- VII. Additional Safety Equipment/Procedures
- | | | | |
|-------------------------------|---|----------------------------------|---|
| Hard-hat..... | <input type="checkbox"/> Yes <input type="checkbox"/> No | Hearing Protection (Plugs/Muffs) | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Safety Glasses | <input 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>Work</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: Hard hats and hearing protection when overhead hazards exist or when noise producing equipment is used. Chainsaw chaps and faceshields when using chainsaws. Tyvek coverall if there is a potential for encountering natural hazards (poison ivy, ticks, etc.).

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

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

- XI. Special instructions, precautions: Site contaminants are unlikely to present a significant exposure concern during these tasks. Follow safe work practices identified in Table 5-1 for this activity.

Permit Issued by: _____ Permit Accepted by: _____

**SAFE WORK PERMIT FOR
IDW MANAGEMENT, AND STAGING OF DRUMS
NTC ORLANDO**

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

SECTION I: General Job Scope

- I. Work limited to the following (description, area, equipment used): Handling, sampling, and staging of IDW drums
- II. Required Monitoring Instruments: PID or FID to detect presence of site contaminants
- III. Field Crew: _____
- IV. On-site Inspection conducted Yes No Initials of Inspector TtNUS

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

- V. Protective equipment required Respiratory equipment required
 Level D Level B None
 Level C Level A
 Detailed on Reverse
- Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, safety shoes, leather/cotton work gloves with surgical-style inner gloves.

- VI. Chemicals of Concern Action Level(s) Response Measures
Primary site contaminants - VOCs Any sustained readings in BZ Suspend site activities and
assoc. w/ fuels (BETX) and misc. above 1 ppm above background. report to an unaffected area.
metals, pesticides/herbicides Avoid contact / generating dust.

- VII. Additional Safety Equipment/Procedures
- | | | | |
|-------------------------------|---|--------------------------------------|---|
| Hard-hat..... | <input type="checkbox"/> Yes <input type="checkbox"/> No | Hearing Protection (Plugs/Muffs) | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Safety Glasses | <input 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>Work/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: Tyvek coverall if there is a potential for soiling clothes. Cotton or leather gloves with surgical inner gloves. Hard hat and hearing protection when working near operating equipment.

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

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

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

- XI. Special instructions, precautions: Site contaminants are unlikely to present a significant exposure concern via inhalation. Avoid contact with potential contaminated media. Be cautious of drums that appear to be pressurized (bulging lids) due to exposure to heat/sunlight. Use equipment when moving drums containing IDW (they may weigh as much as 600 lbs.). Pinch hazards exist when handling drums, use caution and wear leather/cotton work gloves. Site personnel will not be permitted to sample drums containing unknown materials. If elevated airborne readings are determined to exist in work breathing zones, contact the PHSO.

Permit Issued by: _____ Permit Accepted by: _____

**SAFE WORK PERMIT FOR
DECONTAMINATION ACTIVITIES
NTC ORLANDO**

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., drill rigs, augers, etc.). Brushes and spray bottles will be used to decon small sampling equipment. Pressure washers or steam cleaning units will be used to decon the augers and drill rigs
- II. Required Monitoring Instrument(s): PID or FID (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)

- V. Protective equipment required Respiratory equipment required
 Level D Level B None
 Level C Level A
 Detailed on Reverse

Modifications/Exceptions: Minimum requirement include sleeved shirt and long pants, safety glasses, safety footwear, and nitrile gloves. When using pressure washers, steam cleaners field crews will wear hearing protection, and face shields.

V. Chemicals of Concern	Action Level(s)	Response Measures
<u>VOCs (BTEX) metals,</u>	<u>Any detectable readings</u>	<u>Repeat decon procedure</u>
<u>Pesticides/herbicides. SVOCs</u>	_____	_____

- VI. Additional Safety Equipment/Procedures
- | | | | |
|-------------------------------|---|----------------------------------|---|
| Hard-hat..... | <input type="checkbox"/> Yes <input type="checkbox"/> No | Hearing Protection (Plugs/Muffs) | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Safety Glasses | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | Safety belt/harness | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |
| Chemical/splash goggles | <input type="checkbox"/> Yes <input 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 checked="" type="checkbox"/> No |

Modifications/Exceptions: PVC rain suits or PE or PVC coated Tyvek for protection against splashes and overspray. Chemical resistant boot covers if excessive liquids are generated or to protect footwear. Faceshield/goggles when splash potential exists.

- | | | | | | |
|--|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|
| 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"/> | | | |

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

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

X. Special instructions, precautions: To minimize the potential for exposure, site personnel will use PPE and prevent contact with potentially contaminated equipment. Refer to the manufacturer's MSDS regarding PPE, handling, storage, and first-aid measures related to decontamination fluids. Pressure washers can cause serious injury to skin and eyes if not appropriately protected. Pressurized water stream may cause debris to become airborne and present a flying projectile hazard.

Permit Issued by: _____ Permit Accepted by: _____

ATTACHMENT IV

HEAT STRESS

HEAT STRESS

Because some physically demanding field work is expected to take place during warmer months or periods, heat related disorders are a potential problem. Discussed below are the common heat-related disorders and the recommended actions to prevent heat stress.

Heat Related Disorders

Heat Rash

Also known as prickly heat, this condition affects the skin. It occurs in situations where the skin remains wet most of the time. The sweat ducts become plugged and a skin rash soon appears.

Signs and Symptoms

- Skin rash will appear on affected areas of the body.
- Tingling or prickling sensation will be felt on the affected areas.

Heat Cramps

Heat cramps are muscle pains, usually in the lower extremities, the abdomen, or both, that occur after profuse sweating with accompanying salt depletion. Heat cramps most often afflict people in good physical condition, who overwork in conditions of high temperature and humidity. Untreated, heat cramps may progress to heat exhaustion.

Signs and Symptoms

- Cramps in the extremities and abdomen that begin suddenly during vigorous activity. Heat cramps can be mild with only slight abdominal cramping and tingling in the extremities, but more commonly present intense and incapacitating pain in the abdomen and extremities.
- Respiration rate will increase, decreasing after the pain subsides.
- Pulse rate will increase
- Skin will be pale and moist.
- Body temperature will be normal
- Generalized weakness will be noted as the pain subsides.
- Loss of consciousness and airway maintenance are seldom problems with this condition.

Treatment for heat cramps is aimed at eliminating the exposure and restoring the loss of salt and water.

Heat Exhaustion

Heat exhaustion is a more severe response to salt and water loss, as well as an initial disturbance in the body's heat-regulations system. Like heat cramps, heat exhaustion tends to occur in people working in hot environments. Heat exhaustion may progress to heat stroke. Treatment for heat exhaustion is similar in principle to that for heat cramps.

Signs and Symptoms

- Heat exhaustion may be accompanied present by a headache, fatigue, dizziness, or nausea with occasional abdominal cramping. More severe cases of heat exhaustion may resulting partial or complete temporary loss of respiration and circulation due to cerebral ischemia.
- Sweating will be profuse.
- Pulse rate will be rapid and weak.
- Respiration rate will be rapid and shallow.
- The skin will be pale and clammy
- The body temperature will be normal or decreased.
- The person could be irritable and restless.

Heat Stroke

Heat stroke is caused by a severe disturbance in the body's heat-regulating system and is a profound emergency: The mortality rate ranges from 25 to 50 percent. It is most common in men over 40, especially alcoholics. It can also occur to people of any age having too much exposure to the sun or prolonged confinement in a hot atmosphere. Heat stroke comes on suddenly. As the sweating mechanism fails, the body temperature begins to rise precipitously, reaching 106°F (41°C) or higher within 10 to 15 minutes. If the situation is not corrected rapidly, the body cells -- especially have very vulnerable cells to the brain--are literally cooked, and the central nervous system is irreversibly damaged. The treatment for heat stroke is aimed at maintaining vital functions and causing as rapid a decrease of body temperature as possible.

Signs and Symptoms

- The person's pulse will be strong and bounding.
- The skin will be hot, dry, and flushed.
- The worker may experience headache, dizziness, and dryness of mouth
- Seizures and coma can occur.
- Loss of consciousness and airway maintenance problems can occur.

These are only guidelines for heat related emergencies. Actual training in emergency medical care or basic first aid is recommended.

Controlling Heat Stress

The SSO shall visually monitor personnel to note for signs of heat stress. Field personnel will also be instructed to observe for symptoms of heat stress and methods on how to control it. One or more of the following control measures can be used to help control heat stress:

- Provide adequate liquids to replace lost body fluids. Personnel must replace water and salt lost from sweating. Personnel must be encouraged to drink more than the amount required to satisfy thirst. Thirst satisfaction is not an accurate indicator of adequate salt and fluid replacement.
- Replacement fluids can be commercial mixes such as Gatorade®.
- Establish a work regime that will provide adequate rest periods for cooling down. This may require additional shifts of workers.
- Cooling devices such as vortex tubes or cooling vests can be worn beneath protective garments.
- Breaks are to be taken in a cool rest area (77°F is best).
- Personnel shall remove impermeable protective garments during rest periods.
- Personnel shall not be assigned other tasks during rest periods.
- Personnel shall be informed of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress.

The heat stress of personnel onsite may be monitored utilizing biological monitoring.

One of the following biological monitoring procedures may be utilized by the SSO to monitor heat stress concerns.

- Heart rate (HR) shall be measured by the pulse for 30 seconds as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 110 beats/minute. If the HR is higher, the next work period should be shortened by 10 minutes (or 33 percent), while the length of rest period stays the same. If the pulse rate is 100 beats/minute at the beginning of the next rest period, the following work cycle should be shortened by 33 percent. The length of the initial work period will be determined by using the table below.

PERMISSIBLE HEAT EXPOSURE THRESHOLD LIMIT VALUES

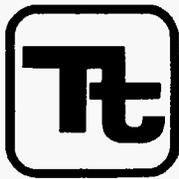
<u>Work-Rest Regimen</u>	<u>Work Load</u>		
	<u>Light</u>	<u>Moderate</u>	<u>Heavy</u>
Continuous	80.0°F	80.0°F	77.0°F
75% Work - 25% Rest, Each Hour	87.0°F	82.4°F	78.6°F
50% Work - 50% Rest, Each Hour	88.5°F	85.0°F	82.2°F
25% Work - 75% Rest, Each Hour	90.0°F	88.0°F	86.0°F

- Body temperature shall be measured orally with a clinical thermometer as early as possible in the resting period. Oral temperature at the beginning of the rest period should not exceed 99°F. If it does, the next work period should be shortened by 10 minutes (or 33 percent), while the length of the rest period stays the same. However, if the oral temperature exceeds 99.7°F at the beginning of the next rest period, the following work cycle shall be further shortened by 33 percent. OT should be measured at the end of the rest period to make sure that it has dropped below 99°F. At no time shall work begin with the oral temperature above 99°F.

NOTE: External temperatures in excess of those stated above shall be regarded as inclement weather. Work continuation, termination, or alteration of the work schedule will be at the discretion of the FOL or SSO.

ATTACHMENT V

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



TETRA TECH NUS, INC.

STANDARD OPERATING PROCEDURES

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

Subject
UTILITY LOCATING AND EXCAVATION CLEARANCE

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
1.0 PURPOSE	2
2.0 SCOPE	2
3.0 GLOSSARY	2
4.0 RESPONSIBILITIES	3
5.0 PROCEDURES	3
5.1 BURIED UTILITIES	3
5.2 OVERHEAD POWER LINES	5
6.0 UNDERGROUND LOCATING TECHNIQUES	5
6.1 GEOPHYSICAL METHODS	5
6.2 PASSIVE DETECTION SURVEYS	6
6.3 INTRUSIVE DETECTION SURVEYS	6
7.0 INTRUSIVE ACTIVITIES SUMMARY	7
8.0 REFERENCES	8

ATTACHMENTS

1	Listing of Underground Utility Clearance Resources	9
2	Frost Line Penetration Depths by Geographic Location.....	11
3	Utility Clearance Form.....	12
4	OSHA Letter of Interpretation.....	13

Subject UTILITY LOCATING AND EXCAVATION CLEARANCE	Number HS-1.0	Page 2 of 15
	Revision 2	Effective Date 12/03

1.0 PURPOSE

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

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

2.0 SCOPE

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

3.0 GLOSSARY

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

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

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

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

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

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

Subject UTILITY LOCATING AND EXCAVATION CLEARANCE	Number HS-1.0	Page 3 of 15
	Revision 2	Effective Date 12/03

4.0 RESPONSIBILITIES

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

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

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

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

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

5.0 PROCEDURES

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

5.1 Buried Utilities

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

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

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

Subject UTILITY LOCATING AND EXCAVATION CLEARANCE	Number HS-1.0	Page 4 of 15
	Revision 2	Effective Date 12/03

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

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

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

Subject UTILITY LOCATING AND EXCAVATION CLEARANCE	Number HS-1.0	Page 5 of 15
	Revision 2	Effective Date 12/03

5.2 Overhead Power Lines

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

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

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

6.0 UNDERGROUND LOCATING TECHNIQUES

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

6.1 Geophysical Methods

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

Electromagnetic Induction

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

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

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

Subject UTILITY LOCATING AND EXCAVATION CLEARANCE	Number HS-1.0	Page 6 of 15
	Revision 2	Effective Date 12/03

Magnetics

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

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

Ground Penetrating Radar

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

6.2 Passive Detection Surveys

Acoustic Surveys

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

Thermal Imaging

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

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

6.3 Intrusive Detection Surveys

Vacuum Excavation

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

Subject UTILITY LOCATING AND EXCAVATION CLEARANCE	Number HS-1.0	Page 7 of 15
	Revision 2	Effective Date 12/03

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

Hand Excavation

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

Tile Probe Surveys

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

7.0 INTRUSIVE ACTIVITIES SUMMARY

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

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

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

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

Subject UTILITY LOCATING AND EXCAVATION CLEARANCE	Number HS-1.0	Page 8 of 15
	Revision 2	Effective Date 12/03

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

8.0 REFERENCES

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

Subject UTILITY LOCATING AND EXCAVATION CLEARANCE	Number HS-1.0	Page 9 of 15
	Revision 2	Effective Date 12/03

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



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

**ONE-CALL SYSTEMS INTERNATIONAL
CONDENSED DIRECTORY**

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

Subject UTILITY LOCATING AND EXCAVATION CLEARANCE	Number HS-1.0	Page 10 of 15
	Revision 2	Effective Date 12/03

ATTACHMENT 1 (Continued)

Texas

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

Utah

Blue Stakes of Utah
1-800-662-4111

Vermont

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

Virginia

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

Washington

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

West Virginia

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

Wisconsin

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

Wyoming

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

District of Columbia

Miss Utility
1-800-257-7777

Alberta

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

British Columbia

BC One Call
1-800-474-6886

Ontario

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

Quebec

Info-Excavation
1-800-663-9228

Subject

UTILITY LOCATING AND
EXCAVATION CLEARANCE

Number

HS-1.0

Revision

2

Page

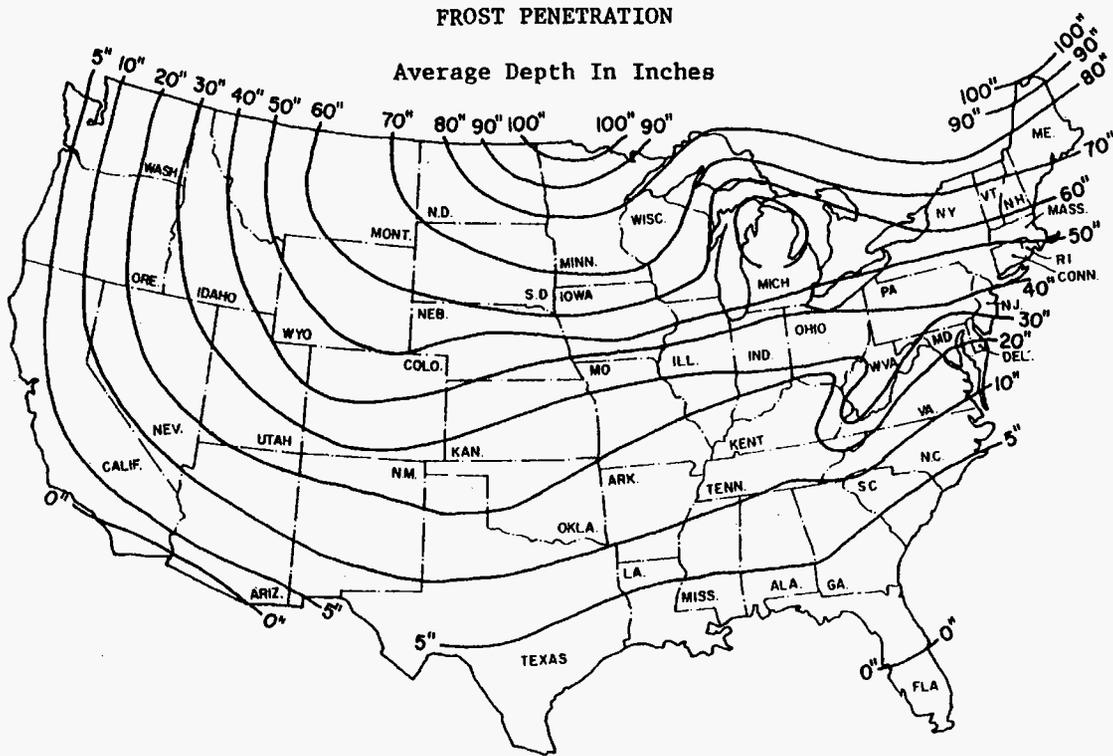
11 of 15

Effective Date

12/03

ATTACHMENT 2

FROST LINE PENETRATION DEPTHS BY GEOGRAPHIC LOCATION



Courtesy U.S. Department Of Commerce

Subject UTILITY LOCATING AND EXCAVATION CLEARANCE	Number HS-1.0	Page 12 of 15
	Revision 2	Effective Date 12/03

**ATTACHMENT 3
UTILITY CLEARANCE FORM**

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

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

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

3. Notes:

Approval:

 Site Manager/Field Operations Leader Date

c: PM/Project File
 Program File

Subject UTILITY LOCATING AND EXCAVATION CLEARANCE	Number HS-1.0	Page 13 of 15
	Revision 2	Effective Date 12/03

**ATTACHMENT 4
OSHA LETTER OF INTERPRETATION**

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

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

Dear Mr. Caldwell:

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

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

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

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

Answer

Background

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

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

Paragraph (b)(3) provides:

Subject UTILITY LOCATING AND EXCAVATION CLEARANCE	Number HS-1.0	Page 14 of 15
	Revision 2	Effective Date 12/03

ATTACHMENT 4 (Continued)

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

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

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

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

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

Non-conductive hand tools are permitted

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

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

Subject UTILITY LOCATING AND EXCAVATION CLEARANCE	Number HS-1.0	Page 15 of 15
	Revision 2	Effective Date 12/03

ATTACHMENT 4 (Continued)

Hydro-vacuum excavation

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

Other technologies

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

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

Sincerely,

Russell B. Swanson, Director
Directorate of Construction

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

ATTACHMENT VI

HEARING CONSERVATION PROGRAM

TETRA TECHNUS, INC.

**HEARING CONSERVATION
PROGRAM**

**HEARING CONSERVATION
TABLE OF CONTENTS**

<u>SECTION</u>	<u>PAGE</u>
1.0 PURPOSE.....	4
2.0 SCOPE.....	4
3.0 RESPONSIBILITIES	4
4.0 MONITORING AND ESTABLISHING HIGH-NOISE AREAS.....	4
5.0 HEARING PROTECTION	5
6.0 TRAINING PROGRAM	5
7.0 RECORDKEEPING.....	6
8.0 ATTACHMENTS	6
8.1 29 CFR 1910.95 Occupational Noise Exposure	6
8.1.1 Code of Federal Regulations, Subsection 1910.95	6

TETRA TECH NUS, INC.
HEARING CONSERVATION PROGRAM

1.0 PURPOSE

To establish general and site-specific hearing conservation procedures and guidelines.

2.0 SCOPE

Applies to all hazardous waste and other field activities where exposure to high levels of noise may occur. This program is designed to comply with OSHA General Industry Standard 29 CFR 1910.95.

3.0 RESPONSIBILITIES

Project Health and Safety Officer (PHSO) - The PHSO shall ensure that hearing conservation measures are adequately addressed in the Site Specific Health and Safety Plan.

Site Safety Officer (SSO) - The SSO is responsible for establishing and implementing a hearing conservation program. The SSO also ensures that adequate procedures are followed to prevent excessive exposure of individuals to high levels of noise.

Project Manager (PM) - The PM will ensure that sufficient information has been provided to the PHSO to prepare adequate procedures for inclusion in the site-specific Health and Safety Plan (HASP). The PM is also ultimately responsible for the effective compliance with these requirements.

4.0 MONITORING AND ESTABLISHING HIGH-NOISE AREAS

4.1 The SSO, as necessary, will perform an initial noise survey on Tetra Tech NUS and Subcontractors operations and work areas by the use of a sound meter and/or dosimetry. All monitoring will be done in accordance with 29 CFR 1910.95. Areas and operations which are expected to reach or exceed 85 decibels (dBA) will be required to adhere to the requirements for this program.

- 4.2** The HASP will set policy on mandatory use of hearing protection in affected areas, and while performing certain operations. The FOL and/or SSO will notify all Tetra Tech NUS and Subcontractor personnel of high noise areas and operations prior to work initiation.

The FOL and/or the SSO will be responsible for implementation and enforcement of the site-specific Hearing Conservation elements.

- 4.3** The FOL and/or the SSO will post or otherwise identify areas of operations which exceed 85 dBA. If significant changes in noise levels occur (such as a shutdown in an operating unit, change in procedures), the noise levels shall be re-evaluated by the SSO to determine if hearing protection will be worn.

5.0 HEARING PROTECTION

Each employee will have the opportunity to choose from a variety of hearing protection devices. Hearing protectors shall be replaced as necessary. The SSO will evaluate the attenuation factors of hearing protection devices and will select appropriate types based on sound level monitoring or personal dosimetry.

6.0 TRAINING PROGRAM

The Health Sciences Department will institute and maintain an initial training program for new employees and provide an annual training program for employees who may be exposed to noise sources 85 dBA or greater. The annual training will be incorporated with the refresher health and safety training curricula. All affected employees will be involved in the program and their participation documented.

- 6.1** The training program shall include the effects of noise on hearing. It will also include the purpose of hearing protectors; the advantages, disadvantages, and attenuation factors of the various types. Instruction shall be given on issue points, selection, fitting, use and care of hearing protectors.

6.2 A copy of the OSHA Noise Standard and applicable informational and training material will be available to all employees.

7.0 RECORDKEEPING

Exposure measurements, related records will be kept at the site. Record retention will be done in accordance with the time periods stated in 29 CFR 1910.95 and 1910.20.

8.0 ATTACHMENTS

- 8.1 29 CFR 1910.95 Occupational Noise Exposure
- 8.1.1 Code of Federal Regulations, Subsection 1910.95

ATTACHMENT 8.1

29 CFR 1910.95 OCCUPATIONAL NOISE EXPOSURE

Site:		Type of Audio Monitoring Equipment:		Date:
Employee Name	Operation	Hearing Protection Type Attenuation Factor	Noise Levels Measured	Duration of Use

Forward completed table (with backup noise monitoring data) to the Manager, Health Sciences.

ATTACHMENT 8.1.1

CODE OF FEDERAL REGULATIONS, SUBSECTION 1910.95

Occupational Safety and Health Admin., Labor

§ 1910.95

FR 5322, Feb. 10, 1984; 55 FR 32015, Aug. 6, 1990; 58 FR 35308, June 30, 1993

TABLE G-16—PERMISSIBLE NOISE EXPOSURES¹

§ 1910.95 Occupational noise exposure.

(a) Protection against the effects of noise exposure shall be provided when the sound levels exceed those shown in Table G-16 when measured on the A scale of a standard sound level meter at slow response. When noise levels are determined by octave band analysis, the equivalent A-weighted sound level may be determined as follows:

Duration per day, hours	Sound level dBA slow response
8.....	90
6.....	92
4.....	95
3.....	97
2.....	100
1½.....	102
1.....	105
½.....	110
¼ or less.....	115

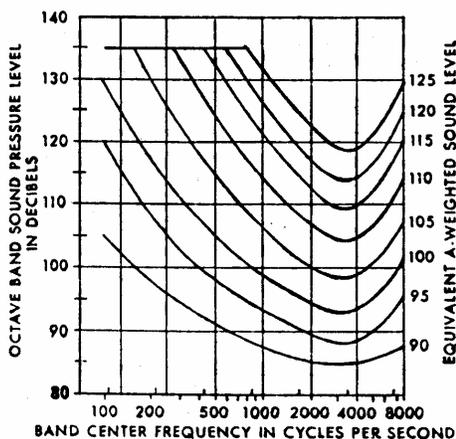


FIGURE G-9

Equivalent sound level contours. Octave band sound pressure levels may be converted to the equivalent A-weighted sound level by plotting them on this graph and noting the A-weighted sound level corresponding to the point of highest penetration into the sound level contours. This equivalent A-weighted sound level, which may differ from the actual A-weighted sound level of the noise, is used to determine exposure limits from Table 1.G-16.

(b)(1) When employees are subjected to sound exceeding those listed in Table G-16, feasible administrative or engineering controls shall be utilized. If such controls fail to reduce sound levels within the levels of Table G-16, personal protective equipment shall be provided and used to reduce sound levels within the levels of the table.

(2) If the variations in noise level involve maxima at intervals of 1 second or less, it is to be considered continuous.

¹When the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered, rather than the individual effect of each. If the sum of the following fractions: $C_1/T_1 + C_2/T_2 + C_n/T_n$ exceeds unity, then, the mixed exposure should be considered to exceed the limit value. C_n indicates the total time of exposure at a specified noise level, and T_n indicates the total time of exposure permitted at that level. Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level.

(c) Hearing conservation program.

(1) The employer shall administer a continuing, effective hearing conservation program, as described in paragraphs (c) through (o) of this section, whenever employee noise exposures equal or exceed an 8-hour time-weighted average sound level (TWA) of 85 decibels measured on the A scale (slow response) or, equivalently, a dose of fifty percent. For purposes of the hearing conservation program, employee noise exposures shall be computed in accordance with appendix A and Table G-16a, and without regard to any attenuation provided by the use of personal protective equipment.

(2) For purposes of paragraphs (c) through (n) of this section, an 8-hour time-weighted average of 85 decibels or a dose of fifty percent shall also be referred to as the action level.

(d) *Monitoring.* (1) When information indicates that any employee's exposure may equal or exceed an 8-hour time-weighted average of 85 decibels, the employer shall develop and implement a monitoring program.

(i) The sampling strategy shall be designed to identify employees for inclusion in the hearing conservation program and to enable the proper selection of hearing protectors.

(ii) Where circumstances such as high worker mobility, significant variations in sound level, or a significant

§ 1910.95

29 CFR Ch. XVII (7-1-93 Edition)

component of impulse noise make area monitoring generally inappropriate, the employer shall use representative personal sampling to comply with the monitoring requirements of this paragraph unless the employer can show that area sampling produces equivalent results.

(2)(i) All continuous, intermittent and impulsive sound levels from 80 decibels to 130 decibels shall be integrated into the noise measurements.

(ii) Instruments used to measure employee noise exposure shall be calibrated to ensure measurement accuracy.

(3) Monitoring shall be repeated whenever a change in production, process, equipment or controls increases noise exposures to the extent that:

(i) Additional employees may be exposed at or above the action level; or

(ii) The attenuation provided by hearing protectors being used by employees may be rendered inadequate to meet the requirements of paragraph (j) of this section.

(e) *Employee notification.* The employer shall notify each employee exposed at or above an 8-hour time-weighted average of 85 decibels of the results of the monitoring.

(f) *Observation of monitoring.* The employer shall provide affected employees or their representatives with an opportunity to observe any noise measurements conducted pursuant to this section.

(g) *Audiometric testing program.* (1) The employer shall establish and maintain an audiometric testing program as provided in this paragraph by making audiometric testing available to all employees whose exposures equal or exceed an 8-hour time-weighted average of 85 decibels.

(2) The program shall be provided at no cost to employees.

(3) Audiometric tests shall be performed by a licensed or certified audiologist, otolaryngologist, or other physician, or by a technician who is certified by the Council of Accreditation in Occupational Hearing Conservation, or who has satisfactorily demonstrated competence in administering audiometric examinations, obtaining valid audiograms, and properly using,

maintaining and checking calibration and proper functioning of the audiometers being used. A technician who operates microprocessor audiometers does not need to be certified. A technician who performs audiometric tests must be responsible to an audiologist, otolaryngologist or physician.

(4) All audiograms obtained pursuant to this section shall meet the requirements of Appendix C: *Audiometric Measuring Instruments.*

(5) *Baseline audiogram.* (i) Within 6 months of an employee's first exposure at or above the action level, the employer shall establish a valid baseline audiogram against which subsequent audiograms can be compared.

(ii) *Mobile test van exception.* Where mobile test vans are used to meet the audiometric testing obligation, the employer shall obtain a valid baseline audiogram within 1 year of an employee's first exposure at or above the action level. Where baseline audiograms are obtained more than 6 months after the employee's first exposure at or above the action level, employees shall wear hearing protectors for any period exceeding six months after first exposure until the baseline audiogram is obtained.

(iii) Testing to establish a baseline audiogram shall be preceded by at least 14 hours without exposure to workplace noise. Hearing protectors may be used as a substitute for the requirement that baseline audiograms be preceded by 14 hours without exposure to workplace noise.

(iv) The employer shall notify employees of the need to avoid high levels of non-occupational noise exposure during the 14-hour period immediately preceding the audiometric examination.

(6) *Annual audiogram.* At least annually after obtaining the baseline audiogram, the employer shall obtain a new audiogram for each employee exposed at or above an 8-hour time-weighted average of 85 decibels.

(7) *Evaluation of audiogram.* (i) Each employee's annual audiogram shall be compared to that employee's baseline audiogram to determine if the audiogram is valid and if a standard threshold shift as defined in paragraph (g)(10) of this section has oc-

Occupational Safety and Health Admin., Labor

§ 1910.95

curred. This comparison may be done by a technician.

(ii) If the annual audiogram shows that an employee has suffered a standard threshold shift, the employer may obtain a retest within 30 days and consider the results of the retest as the annual audiogram.

(iii) The audiologist, otolaryngologist, or physician shall review problem audiograms and shall determine whether there is a need for further evaluation. The employer shall provide to the person performing this evaluation the following information:

(A) A copy of the requirements for hearing conservation as set forth in paragraphs (c) through (n) of this section;

(B) The baseline audiogram and most recent audiogram of the employee to be evaluated;

(C) Measurements of background sound pressure levels in the audiometric test room as required in Appendix D: Audiometric Test Rooms.

(D) Records of audiometer calibrations required by paragraph (h)(5) of this section.

(8) *Follow-up procedures.* (i) If a comparison of the annual audiogram to the baseline audiogram indicates a standard threshold shift as defined in paragraph (g)(10) of this section has occurred, the employee shall be informed of this fact in writing, within 21 days of the determination.

(ii) Unless a physician determines that the standard threshold shift is not work related or aggravated by occupational noise exposure, the employer shall ensure that the following steps are taken when a standard threshold shift occurs:

(A) Employees not using hearing protectors shall be fitted with hearing protectors, trained in their use and care, and required to use them.

(B) Employees already using hearing protectors shall be refitted and retrained in the use of hearing protectors and provided with hearing protectors offering greater attenuation if necessary.

(C) The employee shall be referred for a clinical audiological evaluation or an otological examination, as appropriate, if additional testing is necessary or if the employer suspects that a

medical pathology of the ear is caused or aggravated by the wearing of hearing protectors.

(D) The employee is informed of the need for an otological examination if a medical pathology of the ear that is unrelated to the use of hearing protectors is suspected.

(iii) If subsequent audiometric testing of an employee whose exposure to noise is less than an 8-hour TWA of 90 decibels indicates that a standard threshold shift is not persistent, the employer:

(A) Shall inform the employee of the new audiometric interpretation; and

(B) May discontinue the required use of hearing protectors for that employee.

(9) *Revised baseline.* An annual audiogram may be substituted for the baseline audiogram when, in the judgment of the audiologist, otolaryngologist or physician who is evaluating the audiogram:

(i) The standard threshold shift revealed by the audiogram is persistent; or

(ii) The hearing threshold shown in the annual audiogram indicates significant improvement over the baseline audiogram.

(10) *Standard threshold shift.* (i) As used in this section, a standard threshold shift is a change in hearing threshold relative to the baseline audiogram of an average of 10 dB or more at 2000, 3000, and 4000 Hz in either ear.

(ii) In determining whether a standard threshold shift has occurred, allowance may be made for the contribution of aging (presbycusis) to the change in hearing level by correcting the annual audiogram according to the procedure described in Appendix F: *Calculation and Application of Age Correction to Audiograms.*

(h) *Audiometric test requirements.*

(1) Audiometric tests shall be pure tone, air conduction, hearing threshold examinations, with test frequencies including as a minimum 500, 1000, 2000, 3000, 4000, and 6000 Hz. Tests at each frequency shall be taken separately for each ear.

(2) Audiometric tests shall be conducted with audiometers (including microprocessor audiometers) that

§ 1910.95

29 CFR Ch. XVII (7-1-93 Edition)

meet the specifications of, and are maintained and used in accordance with, American National Standard Specification for Audiometers, S3.6-1969.

(3) Pulsed-tone and self-recording audiometers, if used, shall meet the requirements specified in Appendix C: *Audiometric Measuring Instruments*.

(4) Audiometric examinations shall be administered in a room meeting the requirements listed in Appendix D: *Audiometric Test Rooms*.

(5) *Audiometer calibration*. (i) The functional operation of the audiometer shall be checked before each day's use by testing a person with known, stable hearing thresholds, and by listening to the audiometer's output to make sure that the output is free from distorted or unwanted sounds. Deviations of 10 decibels or greater require an acoustic calibration.

(ii) Audiometer calibration shall be checked acoustically at least annually in accordance with Appendix E: *Acoustic Calibration of Audiometers*. Test frequencies below 500 Hz and above 6000 Hz may be omitted from this check. Deviations of 15 decibels or greater require an exhaustive calibration.

(iii) An exhaustive calibration shall be performed at least every two years in accordance with sections 4.1.2; 4.1.3.; 4.1.4.3; 4.2; 4.4.1; 4.4.2; 4.4.3; and 4.5 of the American National Standard Specification for Audiometers, S3.6-1969. Test frequencies below 500 Hz and above 6000 Hz may be omitted from this calibration.

(i) *Hearing protectors*. (1) Employers shall make hearing protectors available to all employees exposed to an 8-hour time-weighted average of 85 decibels or greater at no cost to the employees. Hearing protectors shall be replaced as necessary.

(2) Employers shall ensure that hearing protectors are worn:

(i) By an employee who is required by paragraph (b)(1) of this section to wear personal protective equipment; and

(ii) By any employee who is exposed to an 8-hour time-weighted average of 85 decibels or greater, and who:

(A) Has not yet had a baseline audiogram established pursuant to paragraph (g)(5)(ii); or

(B) Has experienced a standard threshold shift.

(3) Employees shall be given the opportunity to select their hearing protectors from a variety of suitable hearing protectors provided by the employer.

(4) The employer shall provide training in the use and care of all hearing protectors provided to employees.

(5) The employer shall ensure proper initial fitting and supervise the correct use of all hearing protectors.

(j) *Hearing protector attenuation*. (1) The employer shall evaluate hearing protector attenuation for the specific noise environments in which the protector will be used. The employer shall use one of the evaluation methods described in Appendix B: *Methods for Estimating the Adequacy of Hearing Protection Attenuation*.

(2) Hearing protectors must attenuate employee exposure at least to an 8-hour time-weighted average of 90 decibels as required by paragraph (b) of this section.

(3) For employees who have experienced a standard threshold shift, hearing protectors must attenuate employee exposure to an 8-hour time-weighted average of 85 decibels or below.

(4) The adequacy of hearing protector attenuation shall be re-evaluated whenever employee noise exposures increase to the extent that the hearing protectors provided may no longer provide adequate attenuation. The employer shall provide more effective hearing protectors where necessary.

(k) *Training program*. (1) The employer shall institute a training program for all employees who are exposed to noise at or above an 8-hour time-weighted average of 85 decibels, and shall ensure employee participation in such program.

(2) The training program shall be repeated annually for each employee included in the hearing conservation program. Information provided in the training program shall be updated to be consistent with changes in protective equipment and work processes.

Occupational Safety and Health Admin., Labor

§ 1910.95

(3) The employer shall ensure that each employee is informed of the following:

- (i) The effects of noise on hearing;
- (ii) The purpose of hearing protectors, the advantages, disadvantages, and attenuation of various types, and instructions on selection, fitting, use, and care; and
- (iii) The purpose of audiometric testing, and an explanation of the test procedures.

(1) *Access to information and training materials.* (1) The employer shall make available to affected employees or their representatives copies of this standard and shall also post a copy in the workplace.

(2) The employer shall provide to affected employees any informational materials pertaining to the standard that are supplied to the employer by the Assistant Secretary.

(3) The employer shall provide, upon request, all materials related to the employer's training and education program pertaining to this standard to the Assistant Secretary and the Director.

(m) *Recordkeeping*—(1) *Exposure measurements.* The employer shall maintain an accurate record of all employee exposure measurements required by paragraph (d) of this section.

(2) *Audiometric tests.* (i) The employer shall retain all employee audiometric test records obtained pursuant to paragraph (g) of this section:

- (ii) This record shall include:
 - (A) Name and job classification of the employee;
 - (B) Date of the audiogram;
 - (C) The examiner's name;
 - (D) Date of the last acoustic or exhaustive calibration of the audiometer; and
 - (E) Employee's most recent noise exposure assessment.
- (F) The employer shall maintain accurate records of the measurements of the background sound pressure levels in audiometric test rooms.

(3) *Record retention.* The employer shall retain records required in this paragraph (m) for at least the following periods.

- (i) Noise exposure measurement records shall be retained for two years.

(ii) Audiometric test records shall be retained for the duration of the affected employee's employment.

(4) *Access to records.* All records required by this section shall be provided upon request to employees, former employees, representatives designated by the individual employee, and the Assistant Secretary. The provisions of 29 CFR 1910.20 (a)-(e) and (g)-(i) apply to access to records under this section.

(5) *Transfer of records.* If the employer ceases to do business, the employer shall transfer to the successor employer all records required to be maintained by this section, and the successor employer shall retain them for the remainder of the period prescribed in paragraph (m) (3) of this section.

(n) *Appendices.* (1) Appendices A, B, C, D, and E to this section are incorporated as part of this section and the contents of these appendices are mandatory.

(2) Appendices F and G to this section are informational and are not intended to create any additional obligations not otherwise imposed or to detract from any existing obligations.

(o) *Exemptions.* Paragraphs (c) through (n) of this section shall not apply to employers engaged in oil and gas well drilling and servicing operations.

(p) *Startup date.* Baseline audiograms required by paragraph (g) of this section shall be completed by March 1, 1984.

(Approved by the Office of Management and Budget under control number 1218-0048)

APPENDIX A TO § 1910.95—NOISE EXPOSURE COMPUTATION

This Appendix is Mandatory

I. Computation of Employee Noise Exposure

(1) Noise dose is computed using Table G-16a as follows:

- (i) When the sound level, L, is constant over the entire work shift, the noise dose, D, in percent, is given by: $D = 100 C/T$ where C is the total length of the work day, in hours, and T is the reference duration corresponding to the measured sound level, L, as given in Table G-16a or by the formula shown as a footnote to that table.

§ 1910.95

(ii) When the workshift noise exposure is composed of two or more periods of noise at different levels, the total noise dose over the work day is given by:

$$D = 100 (C_1/T_1 + C_2/T_2 + \dots + C_n/T_n),$$

where C_n indicates the total time of exposure at a specific noise level, and T_n indicates the reference duration for that level as given by Table G-16a.

(2) The eight-hour time-weighted average sound level (TWA), in decibels, may be computed from the dose, in percent, by means of the formula: $TWA = 16.61 \log_{10} (D/100) + 90$. For an eight-hour workshift with the noise level constant over the entire shift, the TWA is equal to the measured sound level.

(3) A table relating dose and TWA is given in Section II.

TABLE G-16a

A-weighted sound level, L (decibel)	Reference duration, T (hour)
80	32
81	27.9
82	24.3
83	21.1
84	18.4
85	16
86	13.9
87	12.1
88	10.6
89	9.2
90	8
91	7.0
92	6.1
93	5.3
94	4.6
95	4
96	3.5
97	3.0
98	2.6
99	2.3
100	2
101	1.7
102	1.5
103	1.3
104	1.1
105	1
106	0.87
107	0.76
108	0.66
109	0.57
110	0.5
111	0.44
112	0.38
113	0.33
114	0.29
115	0.25
116	0.22
117	0.19
118	0.16
119	0.14
120	0.125
121	0.11
122	0.095
123	0.082

29 CFR Ch. XVII (7-1-93 Edition)

TABLE G-16a—Continued

A-weighted sound level, L (decibel)	Reference duration, T (hour)
124	0.072
125	0.063
126	0.054
127	0.047
128	0.041
129	0.036
130	0.031

In the above table the reference duration, T, is computed by

$$T = \frac{8}{2^{(L-90)/5}}$$

where L is the measured A-weighted sound level.

II. Conversion Between "Dose" and "8-Hour Time-Weighted Average" Sound Level

Compliance with paragraphs (c)-(r) of this regulation is determined by the amount of exposure to noise in the workplace. The amount of such exposure is usually measured with an audiodosimeter which gives a readout in terms of "dose." In order to better understand the requirements of the amendment, dosimeter readings can be converted to an "8-hour time-weighted average sound level." (TWA).

In order to convert the reading of a dosimeter into TWA, see Table A-1, below. This table applies to dosimeters that are set by the manufacturer to calculate dose or percent exposure according to the relationships in Table G-16a. So, for example, a dose of 91 percent over an eight hour day results in a TWA of 89.3 dB, and, a dose of 50 percent corresponds to a TWA of 85 dB.

If the dose as read on the dosimeter is less than or greater than the values found in Table A-1, the TWA may be calculated by using the formula: $TWA = 16.61 \log_{10} (D/100) + 90$ where TWA = 8-hour time-weighted average sound level and D = accumulated dose in percent exposure.

ATTACHMENT 8.1.1
 CODE OF FEDERAL REGULATIONS, SUBSECTION 1910.95
 PAGE SEVEN

Occupational Safety and Health Admin., Labor

§ 1910.95

TABLE A-1—CONVERSION FROM “PERCENT NOISE EXPOSURE” OR “DOSE” TO “8-HOUR TIME-WEIGHTED AVERAGE SOUND LEVEL” (TWA)

TABLE A-1—CONVERSION FROM “PERCENT NOISE EXPOSURE” OR “DOSE” TO “8-HOUR TIME-WEIGHTED AVERAGE SOUND LEVEL” (TWA)—Continued

Dose or percent noise exposure	TWA	Dose or percent noise exposure	TWA
10.....	73.4	180.....	94.2
15.....	76.3	185.....	94.4
20.....	78.4	190.....	94.6
25.....	80.0	195.....	94.8
30.....	81.3	200.....	95.0
35.....	82.4	210.....	95.4
40.....	83.4	220.....	95.7
45.....	84.2	230.....	96.0
50.....	85.0	240.....	96.3
55.....	85.7	250.....	96.6
60.....	86.3	260.....	96.9
65.....	86.9	270.....	97.2
70.....	87.4	280.....	97.4
75.....	87.9	290.....	97.7
80.....	88.4	300.....	97.9
81.....	88.5	310.....	98.2
82.....	88.6	320.....	98.4
83.....	88.7	330.....	98.6
84.....	88.7	340.....	98.8
85.....	88.8	350.....	99.0
86.....	88.9	360.....	99.2
87.....	89.0	370.....	99.4
88.....	89.1	380.....	99.6
89.....	89.2	390.....	99.8
90.....	89.2	400.....	100.0
91.....	89.3	410.....	100.2
92.....	89.4	420.....	100.4
93.....	89.5	430.....	100.5
94.....	89.6	440.....	100.7
95.....	89.6	450.....	100.8
96.....	89.7	460.....	101.0
97.....	89.8	470.....	101.2
98.....	89.9	480.....	101.3
99.....	89.9	490.....	101.5
100.....	90.0	500.....	101.6
101.....	90.1	510.....	101.8
102.....	90.1	520.....	101.9
103.....	90.2	530.....	102.0
104.....	90.3	540.....	102.2
105.....	90.4	550.....	102.3
106.....	90.4	560.....	102.4
107.....	90.5	570.....	102.6
108.....	90.6	580.....	102.7
109.....	90.6	590.....	102.8
110.....	90.7	600.....	102.9
111.....	90.8	610.....	103.0
112.....	90.8	620.....	103.2
113.....	90.9	630.....	103.3
114.....	90.9	640.....	103.4
115.....	91.1	650.....	103.5
116.....	91.1	660.....	103.6
117.....	91.1	670.....	103.7
118.....	91.2	680.....	103.8
119.....	91.3	690.....	103.9
120.....	91.3	700.....	104.0
125.....	91.6	710.....	104.1
130.....	91.9	720.....	104.2
135.....	92.2	730.....	104.3
140.....	92.4	740.....	104.4
145.....	92.7	750.....	104.5
150.....	92.9	760.....	104.6
155.....	93.2	770.....	104.7
160.....	93.4	780.....	104.8
165.....	93.6	790.....	104.9
170.....	93.8	800.....	105.0
175.....	94.0	810.....	105.1

§ 1910.95

29 CFR Ch. XVII (7-1-93 Edition)

TABLE A-1—CONVERSION FROM "PERCENT NOISE EXPOSURE" OR "DOSE" TO "8-HOUR TIME-WEIGHTED AVERAGE SOUND LEVEL" (TWA)—Continued

Dose or percent noise exposure	TWA
820	105.2
830	105.3
840	105.4
850	105.4
860	105.5
870	105.6
880	105.7
890	105.8
900	105.8
910	105.9
920	106.0
930	106.1
940	106.2
950	106.2
960	106.3
970	106.4
980	106.5
990	106.5
999	106.6

APPENDIX B TO § 1910.95—METHODS FOR ESTIMATING THE ADEQUACY OF HEARING PROTECTOR ATTENUATION

This Appendix is Mandatory

For employees who have experienced a significant threshold shift, hearing protector attenuation must be sufficient to reduce employee exposure to a TWA of 85 dB. Employers must select one of the following methods by which to estimate the adequacy of hearing protector attenuation.

The most convenient method is the Noise Reduction Rating (NRR) developed by the Environmental Protection Agency (EPA). According to EPA regulation, the NRR must be shown on the hearing protector package. The NRR is then related to an individual worker's noise environment in order to assess the adequacy of the attenuation of a given hearing protector. This appendix describes four methods of using the NRR to determine whether a particular hearing protector provides adequate protection within a given exposure environment. Selection among the four procedures is dependent upon the employer's noise measuring instruments.

Instead of using the NRR, employers may evaluate the adequacy of hearing protector attenuation by using one of the three methods developed by the National Institute for Occupational Safety and Health (NIOSH), which are described in the "List of Personal Hearing Protectors and Attenuation Data," HEW Publication No. 76-120, 1975, pages 21-37. These methods are known as NIOSH methods #1, #2 and #3. The NRR described below is a simplification of NIOSH method

#2. The most complex method is NIOSH method #1, which is probably the most accurate method since it uses the largest amount of spectral information from the individual employee's noise environment. As in the case of the NRR method described below, if one of the NIOSH methods is used, the selected method must be applied to an individual's noise environment to assess the adequacy of the attenuation. Employers should be careful to take a sufficient number of measurements in order to achieve a representative sample for each time segment.

NOTE: The employer must remember that calculated attenuation values reflect realistic values only to the extent that the protectors are properly fitted and worn.

When using the NRR to assess hearing protector adequacy, one of the following methods must be used:

(i) When using a dosimeter that is capable of C-weighted measurements:

(A) Obtain the employee's C-weighted dose for the entire workshift, and convert to TWA (see appendix A, II).

(B) Subtract the NRR from the C-weighted TWA to obtain the estimated A-weighted TWA under the ear protector.

(ii) When using a dosimeter that is not capable of C-weighted measurements, the following method may be used:

(A) Convert the A-weighted dose to TWA (see appendix A).

(B) Subtract 7 dB from the NRR.

(C) Subtract the remainder from the A-weighted TWA to obtain the estimated A-weighted TWA under the ear protector.

(iii) When using a sound level meter set to the A-weighting network:

(A) Obtain the employee's A-weighted TWA.

(B) Subtract 7 dB from the NRR, and subtract the remainder from the A-weighted TWA to obtain the estimated A-weighted TWA under the ear protector.

(iv) When using a sound level meter set on the C-weighting network:

(A) Obtain a representative sample of the C-weighted sound levels in the employee's environment.

(B) Subtract the NRR from the C-weighted average sound level to obtain the estimated A-weighted TWA under the ear protector.

(v) When using area monitoring procedures and a sound level meter set to the A-weighting network.

(A) Obtain a representative sound level for the area in question.

(B) Subtract 7 dB from the NRR and subtract the remainder from the A-weighted sound level for that area.

Occupational Safety and Health Admin., Labor

§ 1910.95

(vi) When using area monitoring procedures and a sound level meter set to the C-weighting network:

(A) Obtain a representative sound level for the area in question.

(B) Subtract the NRR from the C-weighted sound level for that area.

APPENDIX C TO § 1910.95—AUDIOMETRIC MEASURING INSTRUMENTS

This Appendix is Mandatory

1. In the event that pulsed-tone audiometers are used, they shall have a tone on-time of at least 200 milliseconds.

2. Self-recording audiometers shall comply with the following requirements:

(A) The chart upon which the audiogram is traced shall have lines at positions corresponding to all multiples of 10 dB hearing level within the intensity range spanned by the audiometer. The lines shall be equally spaced and shall be separated by at least ¼ inch. Additional increments are optional. The audiogram pen tracings shall not exceed 2 dB in width.

(B) It shall be possible to set the stylus manually at the 10-dB increment lines for calibration purposes.

(C) The slewing rate for the audiometer attenuator shall not be more than 6 dB/sec except that an initial slewing rate greater than 6 dB/sec is permitted at the beginning of each new test frequency, but only until the second subject response.

(D) The audiometer shall remain at each required test frequency for 30 seconds (± 3 seconds). The audiogram shall be clearly marked at each change of frequency and the actual frequency change of the audiometer shall not deviate from the frequency boundaries marked on the audiogram by more than ± 3 seconds.

(E) It must be possible at each test frequency to place a horizontal line segment parallel to the time axis on the audiogram, such that the audiometric tracing crosses the line segment at least six times at that test frequency. At each test frequency the threshold shall be the average of the mid-points of the tracing excursions.

APPENDIX D TO § 1910.95—AUDIOMETRIC TEST ROOMS

This Appendix is Mandatory

Rooms used for audiometric testing shall not have background sound pressure levels exceeding those in Table D-1 when measured by equipment conforming at least to the Type 2 requirements of American National Standard Specification for Sound Level Meters, S1.4-1971 (R1976), and to the Class II requirements of American National Standard Specification for Octave, Half-Octave, and Third-Octave Band Filter Sets, S1.11-1971 (R1976).

TABLE D-1—MAXIMUM ALLOWABLE OCTAVE-BAND SOUND PRESSURE LEVELS FOR AUDIO-METRIC TEST ROOMS

Octave-band center frequency (Hz)	500	1000	2000	4000	8000
Sound pressure level (dB)	40	40	47	57	62

APPENDIX E TO § 1910.95—ACOUSTIC CALIBRATION OF AUDIOMETERS

This Appendix is Mandatory

Audiometer calibration shall be checked acoustically, at least annually, according to the procedures described in this appendix. The equipment necessary to perform these measurements is a sound level meter, octave-band filter set, and a National Bureau of Standards 9A coupler. In making these measurements, the accuracy of the calibrating equipment shall be sufficient to determine that the audiometer is within the tolerances permitted by American Standard Specification for Audiometers, S3.6-1969.

(1) Sound Pressure Output Check

A. Place the earphone coupler over the microphone of the sound level meter and place the earphone on the coupler.

B. Set the audiometer's hearing threshold level (HTL) dial to 70 dB.

C. Measure the sound pressure level of the tones at each test frequency from 500 Hz through 6000 Hz for each earphone.

D. At each frequency the readout on the sound level meter should correspond to the levels in Table E-1 or Table E-2, as appropriate, for the type of earphone, in the column entitled "sound level meter reading."

(2) Linearity Check

A. With the earphone in place, set the frequency to 1000 Hz and the HTL dial on the audiometer to 70 dB.

B. Measure the sound levels in the coupler at each 10-dB decrement from 70 dB to 10 dB, noting the sound level meter reading at each setting.

C. For each 10-dB decrement on the audiometer the sound level meter should indicate a corresponding 10 dB decrease.

D. This measurement may be made electrically with a voltmeter connected to the earphone terminals.

(3) Tolerances

When any of the measured sound levels deviate from the levels in Table E-1 or Table E-2 by ± 3 dB at any test frequency between 500 and 3000 Hz, 4 dB at 4000 Hz, or 5 dB at 6000 Hz, an exhaustive calibra-

§ 1910.95

29 CFR Ch. XVII (7-1-93 Edition)

tion is advised. An exhaustive calibration is required if the deviations are greater than 15 dB or greater at any test frequency.

TABLE E-1—REFERENCE THRESHOLD LEVELS FOR TELEPHONICS—TDH-39 EARPHONES

Frequency, Hz	Reference threshold level for TDH-39 ear-phones, dB	Sound level meter reading, dB
500.....	11.5	81.5
1000.....	7	77
2000.....	9	79
3000.....	10	80
4000.....	9.5	79.5
6000.....	15.5	85.5

TABLE E-2—REFERENCE THRESHOLD LEVELS FOR TELEPHONICS—TDH-49 EARPHONES

Frequency, Hz	Reference threshold level for TDH-49 ear-phones, dB	Sound level meter reading, dB
500.....	13.5	83.5
1000.....	7.5	77.5
2000.....	11	81.0
3000.....	9.5	79.5
4000.....	10.5	80.5
6000.....	13.5	83.5

APPENDIX F TO § 1910.95—CALCULATIONS AND APPLICATION OF AGE CORRECTIONS TO AUDIOGRAMS

This Appendix Is Non-Mandatory

In determining whether a standard threshold shift has occurred, allowance may be made for the contribution of aging to the change in hearing level by adjusting the most recent audiogram. If the employer chooses to adjust the audiogram, the employer shall follow the procedure described below. This procedure and the age correction tables were developed by the National Institute for Occupational Safety and Health in the criteria document entitled "Criteria for a Recommended Standard . . . Occupational Exposure to Noise," ((HSM)-11001).

For each audiometric test frequency;

(i) Determine from Tables F-1 or F-2 the age correction values for the employee by:

(A) Finding the age at which the most recent audiogram was taken and recording the corresponding values of age corrections at 1000 Hz through 6000 Hz;

(B) Finding the age at which the baseline audiogram was taken and recording the corresponding values of age corrections at 1000 Hz through 6000 Hz.

(ii) Subtract the values found in step (i)(B) from the value found in step (i)(A).

(iii) The differences calculated in step (ii) represented that portion of the change in hearing that may be due to aging.

EXAMPLE: Employee is a 32-year-old male. The audiometric history for his right ear is shown in decibels below.

Employee's age	Audiometric test frequency (Hz)				
	1000	2000	3000	4000	6000
26.....	10	5	5	10	5
*27.....	0	0	0	5	5
28.....	0	0	0	10	5
29.....	5	0	5	15	5
30.....	0	5	10	20	10
31.....	5	10	20	15	15
*32.....	5	10	10	25	20

The audiogram at age 27 is considered the baseline since it shows the best hearing threshold levels. Asterisks have been used to identify the baseline and most recent audiogram. A threshold shift of 20 dB exists at 4000 Hz between the audiograms taken at ages 27 and 32.

(The threshold shift is computed by subtracting the hearing threshold at age 27, which was 5, from the hearing threshold at age 32, which is 25). A retest audiogram has confirmed this shift. The contribution of aging to this change in hearing may be estimated in the following manner:

Go to Table F-1 and find the age correction values (in dB) for 4000 Hz at age 27 and age 32.

	Frequency (Hz)				
	1000	2000	3000	4000	6000
Age 32.....	6	5	7	10	14
Age 27.....	5	4	6	7	11
Difference.....	1	1	1	3	3

The difference represents the amount of hearing loss that may be attributed to aging in the time period between the baseline audiogram and the most recent audiogram. In this example, the difference at 4000 Hz is 3 dB. This value is subtracted from the hearing level at 4000 Hz, which in the most recent audiogram is 25, yielding 22 after adjustment. Then the hearing threshold in the baseline audiogram at 4000 Hz (5) is subtracted from the adjusted annual audio-

Occupational Safety and Health Admin., Labor

§ 1910.95

gram hearing threshold at 4000 Hz (22). Thus the age-corrected threshold shift would be 17 dB (as opposed to a threshold shift of 20 dB without age correction).

TABLE F-1—AGE CORRECTION VALUES IN DECIBELS FOR MALES

Years	Audiometric Test Frequencies (Hz)				
	1000	2000	3000	4000	6000
20 or younger.....	5	3	4	5	8
21.....	5	3	4	5	8
22.....	5	3	4	5	8
23.....	5	3	4	6	9
24.....	5	3	5	6	9
25.....	5	3	5	7	10
26.....	5	4	5	7	10
27.....	5	4	6	7	11
28.....	6	4	6	8	11
29.....	6	4	6	8	12
30.....	6	4	6	9	12
31.....	6	4	7	9	13
32.....	6	5	7	10	14
33.....	6	5	7	10	14
34.....	6	5	8	11	15
35.....	7	5	8	11	15
36.....	7	5	9	12	16
37.....	7	6	9	12	17
38.....	7	6	9	13	17
39.....	7	6	10	14	18
40.....	7	6	10	14	19
41.....	7	6	10	14	20
42.....	8	7	11	16	20
43.....	8	7	12	16	21
44.....	8	7	12	17	22
45.....	8	7	13	18	23
46.....	8	8	13	19	24
47.....	8	8	14	19	24
48.....	9	8	14	20	25
49.....	9	9	15	21	26
50.....	9	9	16	22	27
51.....	9	9	16	23	28
52.....	9	10	17	24	29
53.....	9	10	18	25	30
54.....	10	10	18	26	31
55.....	10	11	19	27	32
56.....	10	11	20	28	34
57.....	10	11	21	29	35
58.....	10	12	22	31	36
59.....	11	12	22	32	37
60 or older.....	11	13	23	33	38

TABLE F-2—AGE CORRECTION VALUES IN DECIBELS FOR FEMALES—Continued

Years	Audiometric Test Frequencies (Hz)				
	1000	2000	3000	4000	6000
30.....	8	6	5	5	9
31.....	8	6	6	5	9
32.....	9	6	6	6	10
33.....	9	6	6	6	10
34.....	9	6	6	6	10
35.....	9	6	7	7	11
36.....	9	7	7	7	11
37.....	9	7	7	7	12
38.....	10	7	7	7	12
39.....	10	7	8	8	12
40.....	10	7	8	8	13
41.....	10	8	8	8	13
42.....	10	8	9	9	13
43.....	11	8	9	9	14
44.....	11	8	9	9	14
45.....	11	8	10	10	15
46.....	11	9	10	10	15
47.....	11	9	10	11	16
48.....	12	9	11	11	16
49.....	12	9	11	11	16
50.....	12	10	11	12	17
51.....	12	10	12	12	17
52.....	12	10	12	13	18
53.....	13	10	13	13	18
54.....	13	11	13	14	19
55.....	13	11	14	14	19
56.....	13	11	14	15	20
57.....	13	11	15	15	20
58.....	14	12	15	16	21
59.....	14	12	16	16	21
60 or older.....	14	12	16	17	22

TABLE F-2—AGE CORRECTION VALUES IN DECIBELS FOR FEMALES

Years	Audiometric Test Frequencies (Hz)				
	1000	2000	3000	4000	6000
20 or younger.....	7	4	3	3	6
21.....	7	4	4	3	6
22.....	7	4	4	4	6
23.....	7	5	4	4	7
24.....	7	5	4	4	7
25.....	8	5	4	4	7
26.....	8	5	5	4	8
27.....	8	5	5	5	8
28.....	8	5	5	5	8
29.....	8	5	5	5	9

APPENDIX G TO § 1910.95—MONITORING NOISE LEVELS NON-MANDATORY INFORMATIONAL APPENDIX

This appendix provides information to help employers comply with the noise monitoring obligations that are part of the hearing conservation amendment.

WHAT IS THE PURPOSE OF NOISE MONITORING?

This revised amendment requires that employees be placed in a hearing conservation program if they are exposed to average noise levels of 85 dB or greater during an 8 hour workday. In order to determine if exposures are at or above this level, it may be necessary to measure or monitor the actual noise levels in the workplace and to estimate the noise exposure or "dose" received by employees during the workday.

WHEN IS IT NECESSARY TO IMPLEMENT A NOISE MONITORING PROGRAM?

It is not necessary for every employer to measure workplace noise. Noise monitoring or measuring must be conducted only when exposures are at or above 85 dB. Factors which suggest that noise exposures in the workplace may be at this level include employee complaints about the loudness of noise, indications that employees are losing

§ 1910.95

29 CFR Ch. XVII (7-1-93 Edition)

their hearing, or noisy conditions which make normal conversation difficult. The employer should also consider any information available regarding noise emitted from specific machines. In addition, actual workplace noise measurements can suggest whether or not a monitoring program should be initiated.

HOW IS NOISE MEASURED?

Basically, there are two different instruments to measure noise exposures: the sound level meter and the dosimeter. A sound level meter is a device that measures the intensity of sound at a given moment. Since sound level meters provide a measure of sound intensity at only one point in time, it is generally necessary to take a number of measurements at different times during the day to estimate noise exposure over a workday. If noise levels fluctuate, the amount of time noise remains at each of the various measured levels must be determined.

To estimate employee noise exposures with a sound level meter it is also generally necessary to take several measurements at different locations within the workplace. After appropriate sound level meter readings are obtained, people sometimes draw "maps" of the sound levels within different areas of the workplace. By using a sound level "map" and information on employee locations throughout the day, estimates of individual exposure levels can be developed. This measurement method is generally referred to as *area* noise monitoring.

A dosimeter is like a sound level meter except that it stores sound level measurements and integrates these measurements over time, providing an average noise exposure reading for a given period of time, such as an 8-hour workday. With a dosimeter, a microphone is attached to the employee's clothing and the exposure measurement is simply read at the end of the desired time period. A reader may be used to read-out the dosimeter's measurements. Since the dosimeter is worn by the employee, it measures noise levels in those locations in which the employee travels. A sound level meter can also be positioned within the immediate vicinity of the exposed worker to obtain an individual exposure estimate. Such procedures are generally referred to as *personal* noise monitoring.

Area monitoring can be used to estimate noise exposure when the noise levels are relatively constant and employees are not mobile. In workplaces where employees move about in different areas or where the noise intensity tends to fluctuate over time, noise exposure is generally more accurately estimated by the personal monitoring approach.

In situations where personal monitoring is appropriate, proper positioning of the microphone is necessary to obtain accurate measurements. With a dosimeter, the microphone is generally located on the shoulder and remains in that position for the entire workday. With a sound level meter, the microphone is stationed near the employee's head, and the instrument is usually held by an individual who follows the employee as he or she moves about.

Manufacturer's instructions, contained in dosimeter and sound level meter operating manuals, should be followed for calibration and maintenance. To ensure accurate results, it is considered good professional practice to calibrate instruments before and after each use.

HOW OFTEN IS IT NECESSARY TO MONITOR NOISE LEVELS?

The amendment requires that when there are significant changes in machinery or production processes that may result in increased noise levels, remonitoring must be conducted to determine whether additional employees need to be included in the hearing conservation program. Many companies choose to remonitor periodically (once every year or two) to ensure that all exposed employees are included in their hearing conservation programs.

WHERE CAN EQUIPMENT AND TECHNICAL ADVICE BE OBTAINED?

Noise monitoring equipment may be either purchased or rented. Sound level meters cost about \$500 to \$1,000, while dosimeters range in price from about \$750 to \$1,500. Smaller companies may find it more economical to rent equipment rather than to purchase it. Names of equipment suppliers may be found in the telephone book (Yellow Pages) under headings such as: "Safety Equipment," "Industrial Hygiene," or "Engineers-Acoustical." In addition to providing information on obtaining noise monitoring equipment, many companies and individuals included under such listings can provide professional advice on how to conduct a valid noise monitoring program. Some audiological testing firms and industrial hygiene firms also provide noise monitoring services. Universities with audiology, industrial hygiene, or acoustical engineering departments may also provide information or may be able to help employers meet their obligations under this amendment.

Free, on-site assistance may be obtained from OSHA-supported state and private consultation organizations. These safety and health consultative entities generally give priority to the needs of small businesses. See the attached directory for a listing of organizations to contact for aid.

ATTACHMENT 8.1.1
 CODE OF FEDERAL REGULATIONS, SUBSECTION 1910.95
 PAGE THIRTEEN

Occupational Safety and Health Admin., Labor		§ 1910.95
OSHA ONSITE CONSULTATION PROJECT DIRECTORY		
State	Office and address	Contact
Alabama	Alabama Consultation Program, P.O. Box 6005, University, Alabama 35486.	(205) 348-7136, Mr. William Weems, Director.
Alaska	State of Alaska, Department of Labor, Occupational Safety & Health, 3301 Eagle St., Pouch 7-022, Anchorage, Alaska 99510.	(907) 276-5013, Mr. Stan Godsoe, Project Manager (Air Mail).
American Samoa	Service not yet available.	
Arizona	Consultation and Training, Arizona Division of Occupational Safety and Health, P.O. Box 19070, 1624 W. Adams, Phoenix, AZ 85005.	(602) 255-5795, Mr. Thomas Ramaley, Manager.
Arkansas	OSHA Consultation, Arkansas Department of Labor, 1022 High St., Little Rock, Ark. 72202.	(501) 371-2992, Mr. George Smith, Project Director.
California	CAL/OSHA Consultation Service, 2nd Floor, 525 Golden Gate Avenue, San Francisco, CA 94102.	(415) 557-2870, Mr. Emmett Jones, Chief.
Colorado	Occupational Safety & Health Section, Colorado State University, Institute of Rural Environmental Health, 110 Veterinary Science Building, Fort Collins, CO 80523.	(303) 491-6151, Dr. Roy M. Buchan, Project Director.
Connecticut	Division of Occupational Safety & Health, Connecticut Department of Labor, 200 Folly Brook Boulevard, Wethersfield, Conn. 06109.	(203) 566-4550, Mr. Leo Alix, Director.
Delaware	Delaware Department of Labor, Division of Industrial Affairs, 820 North French Street, 6th Floor, Wilmington, DE 19801.	(302) 571-3908, Mr. Bruno Salvadori, Director.
District of Columbia	Occupational Safety & Health Division, District of Columbia, Department Employment Services, Office of Labor Standards, 2900 Newton Street NE., Washington, DC 20018.	(202) 832-1230, Mr. Lorenzo M. White, Acting Associate Director.
Florida	Department of Labor & Employment Security, Bureau of Industrial Safety and Health, LaFayette Building, Room 204, 2551 Executive Center Circle West, Tallahassee, FL 32301.	(904) 488-3044, Mr. John C. Glenn, Administrator.
Georgia	Economic Development Division, Technology and Development Laboratory, Engineering Experiment Station, Georgia Institute of Technology, Atlanta, GA 30332.	(404) 894-3806, Mr. William C. Howard, Assistant to Director, Mr. James Burson, Project Manager.
Guam	Department of Labor, Government of Guam, 23548 Guam Main Facility, Agana, Guam 96921.	(671) 772-6291, Joe R. San Agustin, Director.
Hawaii	Education and Information Branch, Division of Occupational Safety and Health, Suite 910, 677 Ala Moana, Honolulu, HI 96813.	(808) 548-2511, Mr. Don Alper, Manager (Air Mail).
Idaho	OSHA Onsite Consultation Program, Boise State University, Community and Environmental Health, 1910 University Drive, Boise, ID 83725.	(208) 385-3929, Dr. Eldon Edmundson, Director.
Illinois	Division of Industrial Services, Dept. of Commerce and Community Affairs, 310 S. Michigan Avenue, 10 Floor, Chicago, IL 60601.	(800) 972-4140/4216 (Toll-free in State), (312) 793-3270, Mr. Stan Czwinski, Assistant Director.
Iowa	Bureau of Labor, 307 E. Seventh Street, Des Moines, IA 50319.	(515) 281-3606, Mr. Allen J. Meier, Commissioner.
Indiana	Bureau of Safety, Education and Training, Indiana Division of Labor, 1013 State Office Building, Indianapolis, IN 46204.	(317) 633-5845, Mr. Harold Mills, Director.
Kansas	Kansas Dept. of Human Resources, 401 Topeka Ave., Topeka, KS 66603.	(913) 296-4086, Mr. Jerry Abbott, Secretary.
Kentucky	Education and Training, Occupational Safety and Health, Kentucky Department of Labor, 127 Building, 127 South, Frankfort, KY 40601.	(502) 564-6895, Mr. Larry Potter, Director.
Louisiana	No services available as yet (Pending FY 83).	
Maine	Division of Industrial Safety, Maine Dept. of Labor, Labor Station 45, State Office Building, Augusta, ME 04333.	(207) 289-3331, Mr. Lester Wood, Director.
Maryland	Consultation Services, Division of Labor & Industry, 501 St. Paul Place, Baltimore, Maryland 21202.	(301) 659-4210, Ms. Ileana O'Brien, Project Manager, 7(c)(1) Agreement.
Massachusetts	Division of Industrial Safety, Massachusetts Department of Labor and Industries, 100 Cambridge Street, Boston, MA 02202.	(617) 727-3567, Mr. Edward Noseworthy, Project Director.

ATTACHMENT 8.1.1
 CODE OF FEDERAL REGULATIONS, SUBSECTION 1910.95
 PAGE FOURTEEN

§ 1910.95		29 CFR Ch. XVII (7-1-93 Edition)
OSHA ONSITE CONSULTATION PROJECT DIRECTORY—Continued		
State	Office and address	Contact
Michigan (Health).....	Special Programs Section, Division of Occupational Health, Michigan Dept. of Public Health, 3500 N. Logan, Lansing, MI 48909.	(517) 373-1410, Mr. Irving Davis, Chief.
Michigan (Safety).....	Safety Education & Training Division Bureau of Safety and Regulation, Michigan Department of Labor, 7150 Harris Drive, Box 30015, Lansing, Michigan 48909.	(517) 322-1809, Mr. Alan Harvie, Chief.
Minnesota.....	Training and Education Unit, Department of Labor and Industry, 5th Floor, 444 Lafayette Road, St. Paul, MN 55101.	(612) 296-2973, Mr. Timothy Tierney, Project Manager.
Mississippi.....	Division of Occupational Safety and Health, Mississippi State Board of Health, P.O. Box 1700, Jackson, MS 39205.	(601) 982-6315, Mr. Henry L. Laird, Director.
Missouri.....	Missouri Department of Labor and Industrial Relations, 722 Jefferson Street, Jefferson City, MO 65101.	1-(800) 392-0208, (314) 751-3403, Ms. Paula Smith, Mr. Jim Brake.
Montana.....	Montana Bureau of Safety & Health, Division of Workers Compensation, 815 Front Street, Helena, MT 59601.	(406) 449-3402, Mr. Ed Gatzemeier, Chief.
Nebraska.....	Nebraska Department of Labor, State House Station, State Capitol, P.O. Box 94600, Lincoln, NB 68509.	475-8451 Ext. 258, Mr. Joseph Carroll, Commissioner.
Nevada.....	Department of Occupational Safety and Health, Nevada Industrial Commission, 515 E. Muffer Street, Carson City, NV 89714.	(702) 885-5240, Mr. Allen Traenkner, Director.
New Hampshire.....	For information contact.....	Office of Consultation Programs, Room N3472 200 Constitution Avenue, NW, Washington, DC 20210, Phone: (202) 523-8985.
New Jersey.....	New Jersey Department of Labor and Industry Division of Work Place Standards, CN-054, Trenton, NJ 08625.	(609) 292-2313, FTS-8-477-2313, Mr. William Clark, Assistant Commissioner.
New Mexico.....	OSHA Consultation, Health and Environment Department, Environmental Improvement Division, Occupational Health & Safety Section, 4215 Montgomery Boulevard, NE., Albuquerque, NM 87109.	(505) 842-3387, Mr. Albert M. Stevens, Project Manager.
New York.....	Division of Safety and Health, New York State Department of Labor, 2 World Trade Center, Room 6995, New York, NY 10047.	(212) 488-7746/7, Mr. Joseph Alleva, Project Manager, DOSH.
North Carolina.....	Consultation Services, North Carolina Department of Labor, 4 West Edenton Street, Raleigh, NC 27601.	(919) 733-4885, Mr. David Pierce, Director.
North Dakota.....	Division of Environmental Research, Department of Health, Missouri Office Building, 1200 Missouri Avenue, Bismarck, ND 58505.	(701) 224-2348, Mr. Jay Crawford, Director.
Ohio.....	Department of Industrial Relations, Division of Onsite Consultation, P.O. Box 825, 2323 5th Avenue, Columbus, OH 43216.	(800) 282-1425 (Toll-free in State), (614) 466-7485, Mr. Andrew Doehrel, Project Manager.
Oklahoma.....	OSHA Division, Oklahoma Department of Labor, State Capitol, Suite 118, Oklahoma City, OK 73105.	(405) 521-2461, Mr. Charles W. McGlon, Director.
Oregon.....	Consultative Section, Department of Workers' Compensation, Accident Prevention Division, Room 102, Building 1, 2110 Front Street NE., Salem, OR 97310.	(503) 378-2890, Mr. Jack Buckland, Supervisor.
Pennsylvania.....	For information contact.....	Office of Consultation Programs, Room N3472, 200 Constitution Avenue NW., Washington, DC 20210, Phone: (202) 523-8985.
Puerto Rico.....	Occupational Safety & Health, Puerto Rico Department of Labor and Human Resources, 505 Munoz Rivera Ave., 21st Floor, Hato Rey, Puerto Rico 00919.	(809) 754-2134, Mr. John Cinque, Assistant Secretary, (Air Mail).
Rhode Island.....	Division of Occupational Health, Rhode Island Department of Health, The Cannon Building, 206 Health Department Building, Providence, RI 02903.	(401) 277-2438, Mr. James E. Hickey, Chief.

ATTACHMENT 8.1.1
 CODE OF FEDERAL REGULATIONS, SUBSECTION 1910.95
 PAGE FIFTEEN

Occupational Safety and Health Admin., Labor		§ 1910.95
OSHA ONSITE CONSULTATION PROJECT DIRECTORY—Continued		
State	Office and address	Contact
South Carolina	Consultation and Monitoring, South Carolina Department of Labor, P.O. Box 11329, Columbia, SC 29211.	(803) 758-8921, Mr. Robert Peck, Director, 7(c)(1), Project.
South Dakota	South Dakota Consultation Program, South Dakota State University, S.T.A.T.E.-Engineering Extension, 201 Pugsley Center-SDSO, Brookings, SD 57007.	(605) 688-4101, Mr. James Ceglian, Director.
Tennessee	OSHA Consultative Services, Tennessee Department of Labor, 2nd Floor, 501 Union Building, Nashville, TN 37219.	(615) 741-2793, Mr. L. H. Craig Director.
Texas	Division of Occupational Safety and State Safety Engineer, Texas Department of Health and Resources, 1100 West 49th Street, Austin, TX 78756.	(512) 458-7287, Mr. Walter G. Martin, P.E. Director.
Trust Territories.....	Service not yet available.	
Utah	Utah Job Safety and Health Consultation Service, Suite 4004, Crane Building, 307 West 200 South, Salt Lake City, UT 84101.	(801) 533-7927/8/9, Mr. H. M. Bergeson, Project Director.
Vermont.....	Division of Occupational Safety and Health, Vermont Department of Labor and Industry, 118 State Street, Montpelier, VT 05602.	(802) 828-2765, Mr. Robert Mcleod, Project Director.
Virginia.....	Department of Labor and Industry, P.O. Box 12064, 205 N. 4th Street, Richmond, Va. 23241.	(804) 786-5875, Mr. Robert Beard, Commissioner.
Virgin Islands.....	Division of Occupational Safety and Health, Virgin Islands Department of Labor, Lagoon Street, Room 207, Frederiksted, Virgin Islands 00840.	(809) 772-1315, Mr. Louis Llanos, Deputy Director-DOSH.
Washington.....	Department of Labor and Industry, P.O. Box 207, Olympia, WA 98504.	(206) 753-6500, Mr. James Sullivan, Assistant Director.
West Virginia.....	West Virginia Department of Labor, Room 451B, State Capitol, 1900 Washington Street, Charleston, WV 25305.	FTS 8-885-7890, Mr. Lawrence Barker, Commissioner.
Wisconsin (Health).....	Section of Occupational Health, Department of Health and Social Services, P.O. Box 309, Madison, WI 53701.	(608) 266-0417, Ms. Patricia Natzke, Acting Chief.
Wisconsin (Safety).....	Division of Safety and Buildings, Department of Industry, Labor and Human Relations, 1570 E. Moreland Blvd., Waukesha, WI 53186.	(414) 544-8686, Mr. Richard Michalski, Supervisor.
Wyoming.....	Wyoming Occupational Health and Safety Department, 200 East 8th Avenue, Cheyenne, Wyo. 82002.	(307) 777-7786, Mr. Donald Owsley, Health and Safety Administrator.

<p>APPENDIX H TO § 1910.95—AVAILABILITY OF REFERENCED DOCUMENTS</p> <p>Paragraphs (c) through (o) of 29 CFR 1910.95 and the accompanying appendices contain provisions which incorporate publications by reference. Generally, the publications provide criteria for instruments to be used in monitoring and audiometric testing. These criteria are intended to be mandatory when so indicated in the applicable paragraphs of § 1910.95 and appendices.</p>	<p>It should be noted that OSHA does not require that employers purchase a copy of the referenced publications. Employers, however, may desire to obtain a copy of the referenced publications for their own information.</p> <p>The designation of the paragraph of the standard in which the referenced publications appear, the titles of the publications, and the availability of the publications are as follows:</p>
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Paragraph designation	Referenced publication	Available from—
Appendix B	"List of Personal Hearing Protectors and Attenuation Data," HEW Pub. No. 76-120, 1975. NTIS-PB267461.	National Technical Information Service, Port Royal Road, Springfield, VA 22161.
Appendix D	"Specification for Sound Level Meters," S1.4-1971 (R1976).	American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.
§ 1910.95(k)(2), appendix E	"Specifications for Audiometers," S3.6-1969.	American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.

217