



Health and Safety Plan
Beech Creek Superfund Site
Wayne County, Tennessee

Prepared for:
GMO Threshold Timber Tennessee LLC
International Paper Company
Battery Properties, Inc.

Prepared by:
ENVIRON International Corporation
333 West Wacker Drive
Suite 2700
Chicago, Illinois

Date:
April 2014

Project or Version Number:
08-31218A

Table 1A: Emergency Response Telephone Roster

	Office	Cell
CLIENT CONTACT		
Lisa Krogman (as Contractor to Battery Properties, Inc.)	847-646-9613	224-659-9103
ENVIRON PERSONNEL		
Principal In Charge: Alan Fowler	978-449-0308	617-834-5847
Project Manager: Angela DeDolph	312-288-3816	224-659-9102
Designated Site Supervisor: TBD	TBD	TBD
Alternate Site Supervisor: TBD	TBD	TBD
Health & Safety Coordinators: Renee Petersen	312-288-3838	630-743-3915
Marlyn Lozada	312-288-3859	773-895-7239
Corporate H&S Director: Mark Watka	312-288-3875	312-927-1140
Contractors		
TBD	TBD	TBD
Facility/Security		
Site Contact: Lisa Krogman	847-646-9613	224-659-9103
EMERGENCY RESPONSE AGENCIES		
Hospital: Wayne Medical Center	911	
Emergency Fire	911	
Emergency Police	911	
Wayne County Health Department	931-722-3292	
Ambulance Service: Wayne Medical Center Ambulance Service	931-722-2055	
OTHER EMERGENCY ASSISTANCE		
CHEMTREC	800-424-9300	
National Response Center (oil and chemical spills)	800-424-8802	
Poison Control Center	800-222-1222	
Federal Emergency Management Agency	202-646-2500	

OFF-SITE AGENCIES – NON EMERGENCY PHONE NUMBERS		
Police: Waynesboro Police Department	931-722-5486	
Medical Center: Fast Pace Urgent Care	931-722-9099	
Hospital: Wayne Medical Center	931-722-5411	
Fire: Waynesboro Fire Department	931-722-3602	
Ambulance Service: Wayne Medical Center Ambulance Service	931-722-2055	
Tennessee One-Call (public utility locating service)	800-351-1111	
Federal Agency: US Environmental Protection Agency: Region IV Emergency Response & Removal Branch (24-hour phone number)	404-562-8700	
United States Environmental Protection Agency On-Scene Coordinator: Steve Spurlin	731-394-8996	
State Agency: Tennessee Department of Environment and Conservation	888-891-8332	

Potential Chemicals of Concern: *Polychlorinated biphenyls (PCBs) – Aroclor 1248, Aroclor 1254*

Table 1B: Emergency Services Instructions

For Emergency Medical Incidents, Emergency Fire Response, or Hazardous Materials Incidents

Emergency Telephone Numbers:

- Hospital: 911
- Police: 911
- Fire Department: 911
- Site Security/Client: Lisa Krogman 847-646-9613 / 224-659-9103

1. **Remember to speak SLOWLY and CLEARLY. Do NOT hang up first: let the dispatcher conclude the call.**
2. Provide the following information:
 - A Location: **Intersection of Clifton Turnpike and U.S. Highway 64, Waynesboro, Tennessee**
 - B. Your name and phone number
3. Describe nature of Incident:
 - A. Emergency Medical Incident
 - How many victims
 - Type of incident - physical injury, etc.
 - Assessment of victims' condition if known (whether victim is conscious/unconscious, breathing/not breathing, pulse/no pulse, nature of injuries, first aid measures used, etc.)
 - Where incident occurred
 - B. Fire:
 - Location of Fire
 - C. Hazardous Materials Incident:
 - This is a hazardous materials incident requiring dispatch of HAZMAT unit
 - Type of incident (fire, explosion, spill, etc.)
 - Type of material (specific chemicals or general description)
 - Whether there is also a medical emergency
4. Give your location at the Site

Note: Security, Site supervisor, or designee must meet the emergency personnel at the staging area to brief them on the situation.

Route Description and Map to Hospital

Hospital Information:

Hospital Name: Wayne Medical Center

Hospital Address: 103 J.V. Mangubat Drive, Waynesboro, TN 38485

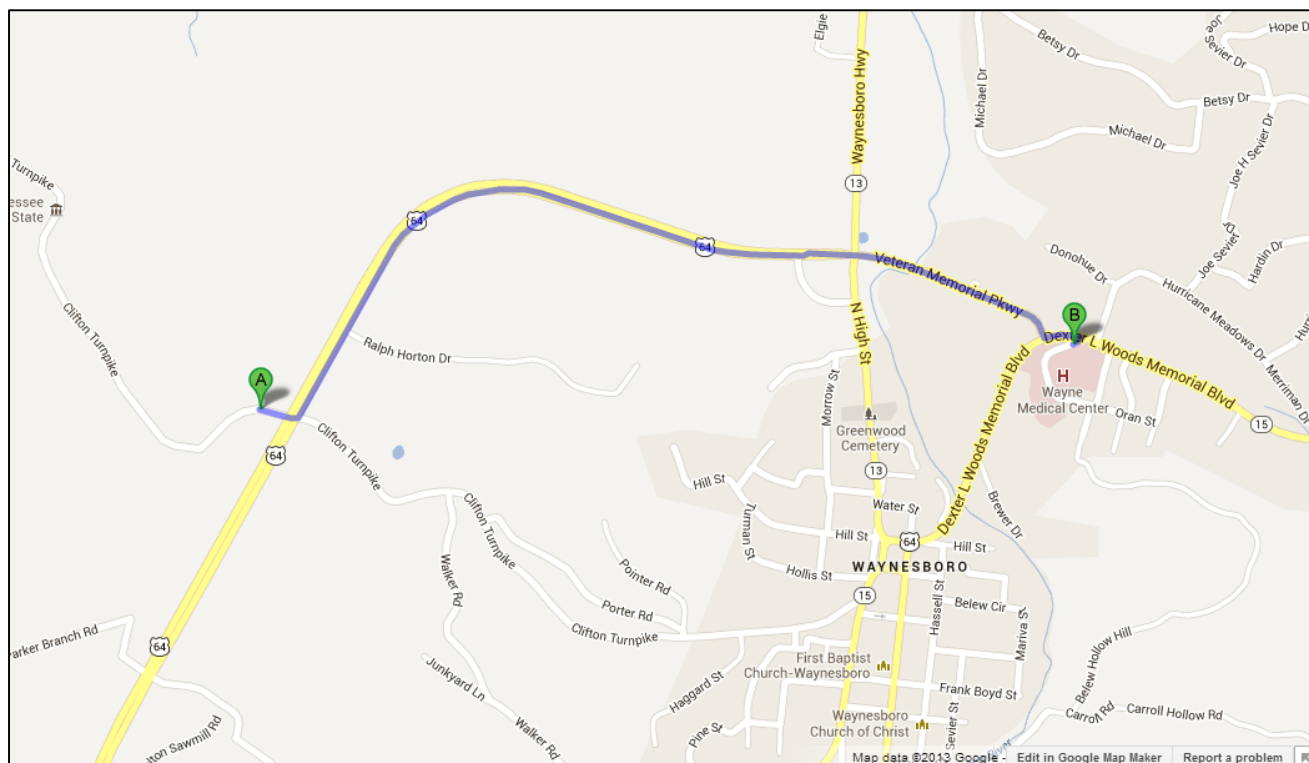
Hospital Phone Number: 931-722-5411

Directions to Area Hospital:

START: Intersection of Clifton Turnpike and U.S. Highway 64, Waynesboro, TN

- Head **east** on **Clifton Turnpike** toward **US-64 Bypass** (75 feet)
- Turn left onto **US-64 Bypass/Veteran Memorial Parkway** (1.7 miles)
- Turn left onto **Dexter L Woods Memorial Blvd** (364 feet)
- Turn right onto **J V Mangubat/Oran St** (112 feet)

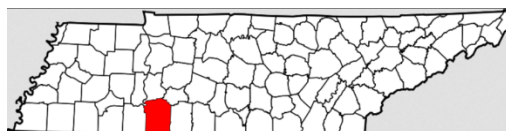
END: 103 J.V. Mangubat Drive, Waynesboro, TN 38485 (destination will be on the left)



Route to Primary and Secondary Rally Points

In the event of an evacuation (e.g., unsafe conditions are observed such as a trespasser present on-site) from the immediate work area, two safe locations (i.e., rally points) have been identified. In the event that the workers must evacuate the area immediately adjacent to Beech Creek, personnel should always migrate to the primary rally point first (i.e., **Rally Point A**). If the primary rally point is determined to be unsafe due to emergency conditions at any time, personnel will evacuate to the secondary rally point (i.e., **Rally Point B**). Once Site personnel have migrated to the specified rally point, the Site Supervisor will account for Site personnel and will report this information to the Project Manager.

Prior to conducting field tasks, the ENVIRON project manager and Site supervisor will consult the National Weather Service (NWS) Flash Flood Guidance (<http://www.srh.noaa.gov/rfcshare/ffg.php>) to review recent, current, and projected future weather conditions in Wayne County, TN where the Beech Creek Site is located (See image to the right). **Personnel may not conduct tasks at the Beech Creek Site when a flash flood warning has been issued for Wayne County or when ground conditions are determined to be unsafe for any other reason.** It will be the Project Manager's and Site Supervisor's responsibility to stay informed of developing weather conditions while personnel are on-site. If storms or heavy rain (equal to or greater than NWS's Flash Flood Guidance intensity values, which vary depending on current soil conditions) commence while conducting a task near Beech Creek, personnel should migrate to **Rally Point A**. If storms are present, personnel should seek shelter in their vehicle. If storms/heavy rain persist or are potentially severe, personnel should leave the Site and seek shelter in a permanent structure (e.g., hotel, restaurant, etc.). **Personnel should also use their common sense when evaluating conditions at the Site. If at any time a worker is uncomfortable concerning the conditions of the creek, personnel should move to Rally Point A and contact the Project Manager and/or local Health and Safety Coordinator for further instructions.** See Appendix H, ENVIRON Standard Practice Instruction Manual 31, Water Safety, for more information.



- **Rally Point A:** Parking area, near current entrance pathway to Beech Creek (intersection of Clifton Turnpike and U.S. Highway 64)
- **Rally Point B:** Wayne County Emergency 911 Office (near intersection of Andrew Jackson Boulevard and U.S. Highway 64)



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Acronyms and Abbreviations

ANSI	American National Standards Institute
APR	air-purifying respirators
AOC	Administrative Settlement Agreement and Order on Consent
CFR	Code of Federal Regulations
CGI	combustible gas indicator
CHSD	corporate health and safety director
CIH	certified industrial hygienist
COC	chemical of concern
CPR	cardiopulmonary resuscitation
dBA	decibels on the “A” weighted scale
°C	degrees Celsius
°F	degrees Fahrenheit
DHHS	Department of Health and Human Services
EKG	electrocardiogram
EL	exposure limit
ENVIRON	ENVIRON International Corporation
ERP	emergency response plan
FID	flame ionization detector
FSP	field sampling plan
GFCI	ground fault circuit interrupter
HASP	health and safety plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HSC	health and safety coordinator
HSE	NEED DEF
HSSC	health and safety site coordinator
IDLH	immediate danger to life and health
IR	infrared
JHA	job hazard analysis
JSA	job safety analysis
kV	kilovolt
LEL	lower explosive limit
LOTO	lockout/tag out

mg/m ³	milligrams per cubic meter
MP	managing principal
MSDS	Material Safety Data Sheet
NIOSH	National Institute for Occupational Safety and Health
NWS	National Weather Service
SF	safety factor
OSHA	Occupational Safety and Health Administration
OVA	organic vapor analyzer
PCB	polychlorinated biphenyl
PELs	permissible exposure limits
PIC	principal in charge
PID	photoionization detector
PM	project manager
PPE	personal protective equipment
ppm	parts per million
QAPP	quality assurance project plan
SCBA	self-contained breathing apparatus
SPI	Standard Practice Instruction
SSC	subsurface clearance
SVOCs	Semivolatile Organic Compounds
TCE	Trichloroethylene
TCRA	time critical removal action
TDEC	Tennessee Department of Environment and Conservation
TLV	threshold limit value
TWA	time-weighted average
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
UV	ultraviolet
VOCs	volatile organic compounds

Health and Safety Plan Review and Approval

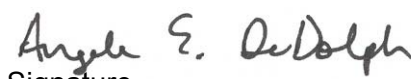
By signing below, it is acknowledged that this health and safety plan (HASP) identifies the activities that are anticipated to be performed in the field. In addition, this HASP identifies the personal protective equipment (PPE) and monitoring equipment that may be necessary to be on-site and be available for use. It is also understood that the provisions of this HASP will be updated if there is a change of a task and/or the addition of tasks and will be approved by the individuals listed below or their designee.

Alan Fowler
Principal-in-Charge


Signature

April 24, 2014
Date

Angela DeDolph
Project Manager


Signature

April 24, 2014
Date

Renee Petersen
Health & Safety Coordinator


Signature

April 24, 2014
Date

TBD
Designated Site Supervisor

Signature


Date

Renee Petersen
Designated HASP Preparer


Signature

April 24, 2014
Date

Kristen Heitman
Designated HASP Reviewer


Signature

April 24, 2014
Date

This form **MUST** be signed prior to starting the on-site work. In addition, a copy of this form should be returned to the office health and safety coordinator prior to leaving for the field. After completion of the project, the original signed HASP must be retained in the project file.

Author's Initials: REP

Typist's Initials: REP

File Name: Beech Creek Superfund Site
Comprehensive HASP

1 Introduction

ENVIRON International Corporation (ENVIRON) has prepared this “Health and Safety Plan” (HASP) for the Beech Creek Superfund Site (the Site). This HASP was prepared on behalf of GMO Threshold Timber Tennessee LLC; International Paper Company; and Battery Properties, Inc. as signatory parties (Respondents) to the administrative settlement agreement and order on consent (AOC) with the United States Environmental Protection Agency (USEPA), effective February 20, 2014 (USEPA 2014). The AOC requires the removal of soil and sediment at the Site based on polychlorinated biphenyl (PCB) concentrations. The Respondents have designated, and the USEPA has approved, ENVIRON to conduct investigations and the time critical removal action (TCRA) required by the AOC.

This HASP has been prepared in accordance with USEPA’s Standard Operating Safety Guide (PUB 9285.1-03, PB 92-963414, June 1992) and currently applicable Occupational Safety and Health Administration (OSHA) regulations found at Title 29 of the Code of Federal Regulations (CFR), Part 1910. This HASP was prepared to inform Site personnel of known or reasonably anticipated potential hazards and safety concerns at this Site. Personnel participating in field activities will be trained in the general and specific hazards associated with the job they are performing and, if applicable, meet recommended medical examination and/or training requirements. Site workers will follow the guidelines, rules, and procedures contained in this site-specific HASP. Site personnel will contact the project manager (PM) if unexpected conditions are encountered at the Site, including but not limited to new processes; changes in operation, products, or services; addition to or changes in the chemicals of concern (COCs); and/or unsafe conditions that were not previously addressed in this HASP.

For purposes of this HASP, “subcontractors” refer to those retained directly or indirectly by ENVIRON and “contractors” refer to other entities working on-site. Each subcontractor and visitor will be expected to review and understand the hazards, risks, and control methods (including emergency procedures) as outlined in this HASP and sign off on the HASP. This review and sign off can be accomplished either during the project planning stage or during the first safety briefing on-site. However, subcontractors will be required to prepare their own HASP to address Site safety and work hazards associated with their proposed Site activities prior to mobilization to the Site. In addition, each subcontractor will be required to provide ENVIRON with their site-specific HASP and communicate the types of hazards and control methods associated with their activities to ENVIRON during the first safety briefing on-site and as conditions change. Each contractor or subcontractor must assume direct responsibility for its own employees’ health and safety.

Copies of the HASPs will be kept on-site for review and reference during Site activities. Upon completion of the project, the finalized and signed copy of this HASP will be placed in the project file.

1.1 Site Location

The Site is located near and to the north of the intersection of Clifton Turnpike and U.S. Highway 64 west of the City of Waynesboro, in unincorporated Wayne County Tennessee. The Site is shown on Figures 1 and 2 in Appendix E. The Site is defined in the AOC as beginning at the fence near the north end of the former Old Waynesboro City Dump and including the creek bed, banks, and floodplain of Beech Creek following Beech Creek 0.6 miles to the north and is

depicted on the map in Appendix 1 to the AOC. Downstream of the Site, Beech Creek continues approximately 17 miles to the Tennessee River.

1.2 Site History

Constituents in Beech Creek are attributed to the alleged disposal of waste liquid PCBs, spent and broken electrical capacitors containing PCBs, and other PCB-contaminated wastes in the Old Waynesboro City Dump between approximately 1969 and 1972. The Old Waynesboro City Dump was closed in 1982. As part of closure activities, the former landfill was covered with a 2-foot clay cap and topsoil and the former landfill and settling pond were fenced.

1.3 Scope and Applicability

ENVIRON has been retained by the Respondents to conduct and/or manage Tasks 1 through 5 (as described below) for the TCRA activities at the Site. A HASP was previously prepared in June 2013 to address the initial investigative Site walkover. This 2014 HASP has been updated to include additional tasks as discussed below in Section 1.4. This HASP may be supplemented by addenda to address future activities at the Site.

ENVIRON views the implementation of a site-specific HASP as a critical management tool necessary to the safety, health, and well-being of Site personnel and the community. Site operations will be performed in such a manner as to minimize the possibility of serious injury or accidents to Site personnel, fire, explosion, or any unplanned or sudden release of contaminants into the environment that could adversely affect local receptors. This HASP is intended to comply with applicable state, federal, and local regulations and is consistent with ENVIRON's commitment to the health and safety of its personnel, subcontractors on the Site, and the surrounding community.

This HASP identifies potential hazards associated with the field activities being conducted at the Site, establishes the minimum procedural and equipment requirements to protect on-site personnel from potential hazards, and requires that on-site activities are conducted in a manner consistent with both accepted professional practice and applicable regulations. The HASP also describes measures to minimize accidents and injuries that may occur during normal daily activities or during adverse conditions.

The HASP is based upon the currently available information regarding the Site. Operating conditions could potentially change as the work progresses, requiring some modification of the HASP. Permanent modifications to the HASP, including changes necessary to correct any potential health and safety issues at the Site will be made only with permission by those individuals listed on the Health and Safety Plan Review and Approval sheet on page xi of this HASP. Approved changes will be added to the HASP as addenda.

Applicability of this HASP extends to ENVIRON personnel and subcontractors at the Site. However, ENVIRON's subcontractors are ultimately responsible for the health and safety of their personnel and representatives and are required to furnish their own HASP. Personnel and visitors entering on-site active fieldwork areas are responsible for reading and complying with the HASP and must sign the form in Section 13, which includes an agreement to comply with the requirements of the HASP.

1.4 Specific Work Activities

The principal features of the field activities include the following work activities or tasks:

- Task 1 – Transportation to and from Site
- Task 2 – Site Walkover
- Task 3 – Subsurface Clearance
- Task 4 – Sampling
- Task 5 – Remedial Construction Activities

Although the tasks have been numbered, these numbers are not meant to imply that the tasks will be performed sequentially or that they will be performed only once. For example, site walkovers may occur both prior to a sampling event and prior to the remedial construction activities. Each of the tasks is further described in the following subsections.

Task 1 – Transportation to and from the Site

This task includes flying to Nashville International Airport and/or driving to and from the Site. The commute is approximately two hours each way from the airport to the Site and will include travel on highways and paved side roads.

Task 2 – Site Walkover

This task includes an observational Site walkover of the property and related areas including the former landfill, settling pond, and Beech Creek.

ENVIRON personnel may not conduct this task alone; a minimum of two people must be present during on-site activities. Additionally, work conducted near the creek must be conducted during daylight hours.

Task 3 – Subsurface Clearance

Prior to conducting invasive Site activities (i.e., Tasks 4 through 5), the local one-call service (i.e., Tennessee 811) will be contacted to request a public utility locate. ENVIRON will also subcontract with a private utility locator to evaluate the Site for the presence of private utilities. If utilities are present within a proposed excavation area, the ENVIRON Principal-in-Charge (PIC) or PM will consult the ENVIRON Corporate Health and Safety Director to determine how to proceed with excavation activities.

ENVIRON personnel may not conduct this task alone; a minimum of two people must be present during on-site activities. Additionally, work conducted near the creek will be conducted during daylight hours.

Task 4 – Sampling

The floodplain soil sampling program includes collecting and analyzing samples from a series of exposure units that surround Beech Creek. Soil borings at the selected locations will be advanced using hand-held equipment from the ground surface to 24 inches below ground surface or until refusal is met, whichever comes first. Sample increments will be analyzed for PCBs.

The sediment sampling program includes collecting and analyzing samples from defined sediment deposits and banks in the creek portion of the Site (i.e., the first 0.6 miles downstream from the fence line at the former landfill). Sediment samples at the selected locations will be collected using hand-held equipment from the defined sediment deposits from the sediment surface to refusal or from the creek banks. Sample increments will be analyzed for PCBs.

Other sampling may include the collection of surface water samples from the creek and soil or water samples during construction (e.g., samples from roll-offs, stockpiles, or aqueous samples from a waste water treatment plant).

A minimum of two people must be present during on-site activities. Additionally, work conducted near the creek must be conducted during daylight hours.

Task 5 – Remedial Construction Activities

ENVIRON will provide oversight to a subcontractor conducting the following construction activities:

- Installation of a temporary construction access road
- Excavation and disposal of soils and sediments from areas where concentrations of total PCBs are greater than 22 mg/kg
- Restoration of excavated areas and areas disturbed by construction activities

ENVIRON personnel will maintain a safe distance from the active construction area. ENVIRON personnel will don high-visibility clothing and stand in areas that are visible to the subcontractor (e.g., will not stand behind or in the blind spot of the subcontractor operating heavy equipment). If it is necessary that ENVIRON personnel walk near the heavy equipment, ENVIRON personnel must make eye contact with the operator and signal for approval prior to proceeding.

Additionally, ENVIRON will verify the subcontractor is employing good management practices to prevent excessive soil/sediment erosion and dust (e.g., contractor will water the excavation area, as needed). If excessive erosion or dust is generated during work activities, ENVIRON will stop activities until the conditions are corrected by the subcontractor.

1.5 Site Safety Requirements

The Site is located along Beech Creek in a wooded valley. The Site is currently accessed by a steep driveway. Terrain around the creek area is steep and uneven; personnel should be cautious when accessing the Site, taking care to avoid slips, trips, and falls. Walking through wet areas will be avoided, if possible. If walking through wet or muddy areas is necessary, personnel should take care to avoid slips, trips, and falls. Additional specific hazards associated with this Site include, but are not limited to the following:

- Seasonal Hunting – See Appendix G for a discussion on how to mitigate the hazard.
- Wildlife in Tennessee – See Appendix F for a discussion on how to mitigate the hazard.
- Trenching and Excavation (Task 5 only) – See Appendix H, ENVIRON Standard Practice Instruction (SPI) Manual 11, for a discussion on how to mitigate the hazard.

- Heat Stress – See Appendix H, ENVIRON SPI Manual 10 for a discussion on how to mitigate the hazard.
- Water Safety – See Appendix H, ENVIRON SPI Manual 31 for a discussion on how to mitigate the hazard.

ENVIRON employees should also be cautious when walking along Beech Creek. Due to the Site topography and dense tree canopy, it is easy to become disoriented as to one's direction/location. Prior to conducting tasks at the Site, ENVIRON will hire a private surveyor to stake out, in, at a minimum, 0.1 mile increments, the area proposed for investigation along Beech Creek. If ENVIRON personnel need to work beyond the surveyed area, a minimum of two people will work together. Both people should have both their cell phones and two-way radios on them. If personnel will be working beyond the surveyed area for an extensive amount of time (i.e., more than 30 minutes), they should check in with the Site supervisor or PM prior to and after accessing the portion of the creek not surveyed. The Site personnel and Site supervisor/PM should also discuss anticipated call-in times. Site personnel should not deviate from the scheduled call-in times. If Site personnel miss a scheduled call-in time and more than one hour has passed since that call in time, the Site supervisor/PM should stop work and attempt to locate the unaccounted for personnel. If personnel cannot be located, the Site Supervisor will contact the local authorities (Waynesboro Police Department at 931-722-5486).

1.6 Applicable Standards

The methods and procedures prescribed in this HASP are intended to conform to established professional practices and applicable federal, state, and local occupational safety and health protection standards based on information that is currently available. Regulations serving as the technical compliance basis for this document may include, but are not limited to, the following:

- U.S. Department of Labor, Occupational Safety and Health Standards for Construction (29 CFR 1926).
 - Hazardous Waste Operations and Emergency Response (29 CFR 1926.65)
 - Hearing Protection (29 CFR 1926.101 and 29 CFR 1926.52)
 - Eye and Face Protection (29 CFR 1926.102)
 - Respiratory Protection (29 CFR 1926.103)
 - Working Over or Near Water (29 CFR 1926.106)
 - Material Handling Equipment (29 CFR 1926.602)
- U.S. Department of Labor, *OSHA Standards for General Industry* (29 CFR 1910).
 - Hazardous Waste Operations and Emergency Response (29 CFR 1910.120)
 - PPE General Requirements (29 CFR 1910.132)
 - Eye and Face Protection (29 CFR 1910.133)
 - Respiratory Protection (29 CFR 1910.134)
 - Head Protection (29 CFR 1910.135)
 - Foot Protection (29 CFR 1910.136)

- Hand Protection (29 CFR 1910.138)
- Medical Services and First Aid (29 CFR 1910.151)
- Portable Fire Extinguishers (29 CFR 1910.157)
- Hazard Communication Standard (29 CFR 1910.1200)
- Control of Hazardous Energy (LOTO) [logout/tag out] (29 CFR 1910.147)
- U.S. Department of Labor, Recording and Reporting Occupational Injuries and Illnesses, (29 CFR 1904).

The following technical documents may have been used as references in the preparation of this HASP. These technical documents may include, but are not limited to the following:

- American National Standards Institute (ANSI), Emergency Eyewash and Shower Equipment, Z358.1 (1981).
- ANSI, Protective Footwear, Z41.1 (1983).
- ANSI, Practice for Occupational and Educational Eye and Face Protection, Z87.1 (1979).
- ANSI, Protective Headgear for Industrial Workers - Requirements, Z89.1 (1986).
- USEPA, Standard Operating Safety Guides, OCLC27155222 (1992).
- National Institute for Occupational Safety & Health (NIOSH)/OSHA/United States Coast Guard (USCG)/ USEPA, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, (October 1985).
- U.S. Department of Health and Human Services (DHHS), NIOSH Sampling and Analytical Methods, DHHS (NIOSH) Publication 84-100.

2 Identification of Key Personnel

An efficient on-site operation requires that key personnel be identified and that their roles and responsibilities be clearly defined. Below is a discussion of the management structure for this project.

2.1 Project Organization

ENVIRON serves as the project coordinator for the Site. ENVIRON is responsible for overseeing activities conducted by ENVIRON personnel and ENVIRON's subcontractors at the Site. ENVIRON also is responsible for compliance with this HASP in the field by ENVIRON personnel. ENVIRON subcontractors may plan, manage, and carry out activities at the Site, including environmental investigation and remediation tasks, and will provide their own health and safety officers and HASPs. As part of ENVIRON's role as project coordinator, ENVIRON will ensure that subcontractors are aware of the ENVIRON HASP and its requirements.

2.2 ENVIRON Personnel

Assigned functions of key ENVIRON project team members and subcontractors are described in Tables 2 and 3, respectively, located at the end of this section. The applicable responsibilities for these individuals are described below.

2.2.1 Principal-in-Charge/Project Manager

Responsibilities of the PIC and the PM include overall coordination of Site activities. The PIC and the PM have overall accountability and responsibility for the safety of operations and the health and safety of personnel. The PIC and PM are also responsible for monitoring the work effort, schedule, costs, and communication. The PIC and PM will ensure that the activities of Site personnel comply with the approved work plans and will recommend or provide disciplinary action, as appropriate, if personnel are noncompliant.

These individuals will also provide the focal point for communications between the regulatory authorities; state and local community, on-site subcontractors, and ENVIRON project staff. This liaison activity will provide a clear line of communication between the parties to minimize the chance for misconceptions concerning any aspect of the project.

Recommended revisions or changes in the HASP will be reviewed by the PIC, PM, and HSC prior to final approval by the CHSD.

2.2.2 Corporate Health and Safety Director

The ENVIRON CHSD will oversee issues related to health and safety and will have final approval authority for deviations from ENVIRON's standard practice instructions.

2.2.3 Project Health and Safety Coordinator

The HSC, along with the CHSD are resources for the development of the site-specific hazard assessments and control mechanisms. The HSC and/or the CHSD will be consulted regarding any changes/modifications/additions that may need to occur to the HASP. The CHSD will make final decisions regarding questions on the hazard assessment and/or the control mechanisms.

Recommended revisions or changes in the HASP will be reviewed by the PIC, PM, and HSC prior to final approval by the CHSD.

2.2.4 Site Health and Safety Officer

For the purposes of this HASP, the ENVIRON health and safety officer and designated Site supervisor are the same individual. For a description of the responsibilities of this individual, see Section 2.2.5.

2.2.5 Designated Site Supervisor

The ENVIRON designated Site supervisor is responsible for overseeing day-to-day Site activities performed by ENVIRON and its subcontractors. The principal responsibility of the designated ENVIRON Site supervisor will be to coordinate and document on-site work necessary to fulfill approved work plans. The ENVIRON Site supervisor and Site health and safety officer are the same individual.

The ENVIRON Site supervisor reports to the PIC, PM, and CHSD. The Site supervisor is responsible for ensuring compliance with the HASP. Activities that the Site supervisor will perform include, but are not limited to

- Ensuring safe work practices
- Controlling Site access
- Establishing work safety zones
- Ensuring use of proper PPE
- Reviewing planned Site activities
- Implementing safety procedures necessary to complete work safely
- Performing daily safety briefings
- Assisting with on-site emergencies
- Acting as technical liaison to regulatory agency personnel

The Site supervisor will report site-related injuries to the PIC, PM, HSC, and/or CHSD, and to other necessary authorities. The Site supervisor will ensure that Site personnel understand their respective emergency response duties. In the instance of emergency or nonemergency incidents concerning Site personnel, the Site supervisor will be contacted and will be responsible for communicating any information regarding Site safety conditions to rescue or emergency personnel.

Any person working on-site has the authority to **stop work** if any operation threatens the health and safety of on-site workers or the surrounding community. In the event that such a situation occurs, the Site supervisor will be notified immediately. ENVIRON's Site supervisor will update the ENVIRON PIC and/or PM on project-related health and safety issues as they arise.

The Site supervisor will be certified in first aid and cardiopulmonary resuscitation (CPR) by the American Heart Association, or equivalent. The Site supervisor will also be Hazardous Waste

Operations and Emergency Response (HAZWOPER) trained for site work in accordance with applicable regulations and will participate in a medical surveillance program.

In the event of an emergency, the ENVIRON Site supervisor will also function as the Site emergency response coordinator and will implement and coordinate emergency response procedures described in this HASP.

2.2.6 Designated Person

The ENVIRON “designated person” is responsible for conducting the required due diligence prior to conducting subsurface clearance (SSC) activities, as discussed in Section 4.2. For the purposes of this HASP, the term “designated person” is synonymous with “Site supervisor.” The ENVIRON designated person will have sufficient professional or technical training, knowledge, actual experience, and authority to perform assigned duties at the level of responsibility allocated; understand any potential hazards related to the work/equipment, and; detect any technical defect or omissions, recognize health and safety implications caused by those defects/omissions, and specify a remedy to mitigate those implications.

2.2.7 Other Personnel

All other ENVIRON personnel will be certified in first aid and CPR by the American Heart Association, or equivalent, and will also be HAZWOPER trained for site work in accordance with applicable regulations and participate in a medical surveillance program.

ENVIRON's subcontractors, if needed, will prepare their own company HASP which will specifically govern the work performed by its employees. The subcontractor’s HASP will be in conformance with ENVIRON’s HASP.

All subcontractors will also provide a health and safety Site coordinator (HSSC) who will assist ENVIRON’s Site supervisor. The subcontractor HSSC will ensure that their personnel have received appropriate health and safety training and are participating in a medical surveillance program.

Table 2: ENVIRON Personnel Contact Information

Personnel Telephone Roster			
Company/Title	Personnel	Office	Cell
ENVIRON Principal in Charge	Alan Fowler	978-449-0308	617-834-5847
ENVIRON Project Manager	Angela DeDolph	312-288-3816	224-659-9102
ENVIRON Corporate Health and Safety Director	Mark Watka	312-288-3875	312-927-1140
ENVIRON Project Health and Safety Coordinator	Renee Petersen	312-288-3838	630-743-3915
ENVIRON Designated Site Supervisor	TBD	TBD	TBD
ENVIRON Alternate Site Supervisor	TBD	TBD	TBD

Personnel Telephone Roster			
Company/Title	Personnel	Office	Cell
Client Contact	Lisa Krogman	847-646-9613	224-659-9103
Site Contact	Lisa Krogman	847-646-9613	224-659-9103

Table 3: Contractor/Subcontractor Contact Information

Contractor/Subcontractor Telephone Roster			
Company/Title	Personnel	Office	Cell
TBD	TBD	TBD	TBD

3 Hazard Evaluation

The project hazard analysis below identifies the hazards anticipated to be encountered by the project team based on the tasks presented in Section 1.4.

Table 4: Project Hazard Analysis

Chemical Hazards Present: <input type="checkbox"/> None	<input type="checkbox"/> Flammable/combustible <input type="checkbox"/> Compressed gas <input type="checkbox"/> Explosive <input type="checkbox"/> Organic peroxide <input type="checkbox"/> Oxidizer <input type="checkbox"/> Water reactive <input type="checkbox"/> Unstable reactive <input checked="" type="checkbox"/> Dust/fumes/particulates	<input type="checkbox"/> Corrosive <input checked="" type="checkbox"/> Toxic <input type="checkbox"/> Highly toxic <input type="checkbox"/> Irritant <input type="checkbox"/> Sensitizer <input checked="" type="checkbox"/> Carcinogen <input type="checkbox"/> Mutagen <input type="checkbox"/> Other:
Physical Hazards Present: <input type="checkbox"/> None	<input checked="" type="checkbox"/> Heat <input checked="" type="checkbox"/> Cold <input checked="" type="checkbox"/> Walking/working surfaces <input checked="" type="checkbox"/> Visible dust <input checked="" type="checkbox"/> Traffic/vehicles <input checked="" type="checkbox"/> Noise <input type="checkbox"/> Other:	<input type="checkbox"/> Ionizing radiation <input type="checkbox"/> Non-ionizing radiation <input type="checkbox"/> Electricity <input checked="" type="checkbox"/> Severe weather <input checked="" type="checkbox"/> Poor lighting <input checked="" type="checkbox"/> Overhead hazards
Environmental/Mechanical Hazards Present: <input type="checkbox"/> None	<input checked="" type="checkbox"/> Heavy machinery/ drill rigs <input checked="" type="checkbox"/> Trenching/excavation <input type="checkbox"/> Docks-marine operations <input type="checkbox"/> Docks-loading <input type="checkbox"/> Drilling <input type="checkbox"/> Forklifts <input checked="" type="checkbox"/> Operations on water <input type="checkbox"/> Elevated heights (includes fall protection) <input checked="" type="checkbox"/> Overhead/underground utilities <input type="checkbox"/> Confined spaces <input type="checkbox"/> Power tools	<input type="checkbox"/> Cranes/hoists/rigging <input type="checkbox"/> Ladders <input type="checkbox"/> Scaffolding <input type="checkbox"/> Manlifts <input type="checkbox"/> Gas cylinders <input type="checkbox"/> Roadway work <input type="checkbox"/> Railroad work <input type="checkbox"/> Energized equipment (LO/TO) <input type="checkbox"/> Pressurized equipment (LO/TO) <input checked="" type="checkbox"/> Drums and containers <input checked="" type="checkbox"/> Others: Water safety
Biological Hazards Present: <input type="checkbox"/> None	<input type="checkbox"/> Animal/human fluids or blood <input type="checkbox"/> Animal/human tissue(s) <input checked="" type="checkbox"/> Poisonous/irritating plants <input type="checkbox"/> Other:	<input type="checkbox"/> Contaminated needles <input type="checkbox"/> Live bacterial cultures <input checked="" type="checkbox"/> Insects/rodents/snakes <input type="checkbox"/> Other:
Ergonomics Hazards Present: <input type="checkbox"/> None	<input checked="" type="checkbox"/> Repetitive motion <input checked="" type="checkbox"/> Awkward position <input checked="" type="checkbox"/> Heavy lifting <input checked="" type="checkbox"/> Frequent lifting	<input checked="" type="checkbox"/> Limited movement <input checked="" type="checkbox"/> Forceful exertions <input type="checkbox"/> Vibration <input type="checkbox"/> Other:
Personal Safety/Security: <input type="checkbox"/> None	<input checked="" type="checkbox"/> Personal safety <input type="checkbox"/> Security issue <input checked="" type="checkbox"/> Project site in isolated area <input type="checkbox"/> Employees working alone <input checked="" type="checkbox"/> Wild/feral animals	<input checked="" type="checkbox"/> Employees working early/late <input checked="" type="checkbox"/> Potentially dangerous wildlife <input checked="" type="checkbox"/> Guard or stray dogs in area <input checked="" type="checkbox"/> No/limited cell phone service <input type="checkbox"/> Other:

3.1 Specific Chemicals of Concern (COCs)

The chemicals listed in Table 5 below include the identification of chemical contaminants known and/or suspected of being present on-site, the affected media, known concentrations (if applicable), the Permissible Exposure Limit (PEL) or Threshold Limit Value (TLV), and the Action Level (i.e., 50% of the PEL/TLV). In addition, Appendix A contains specific hazardous property information for commonly encountered chemicals. A Material Safety Data Sheet (MSDS) (or equivalent) is also included in Appendix A.

Table 5: Chemicals of Concern

Chemical	Environmental Media¹	Highest Measured Concentration	PEL/TLV²
Aroclor 1248	SED	940 mg/kg (sediment)	--
Aroclor 1254	SO	1.2 mg/kg (soil)	TWA: 0.5 mg/m ³ [skin]

Notes:

?: minimum percent allowed for personal entry space

mg/kg: milligrams per kilogram

mg/m³: milligrams per cubic meter

TWA: time-weighted average

¹ Codes for environmental media: **SL**=Sludge; **GW**=Groundwater; **SW**=Surface Water; **LW**=Liquid Waste; **SO**=Soil; **A**=Air; **SED**=Sediment; **OTH**= Other (Specify)

² PEL: Permissible Exposure Limit/TLV: Threshold Limit Value, use appropriate PEL which would be country or state specific, or if one is not available, may be from a recognized source.

4 Hazard Controls

In order to conduct a task in the safest possible manner, the hazard(s) associated with a task need to be identified so that appropriate hazard control(s) can be implemented and used by personnel conducting the task(s). This process is called a job hazard analysis (JHA) or job safety analysis (JSA). To aid in the JHA/JSA process, the projected task(s) (as outlined in Section 1.4) for which the anticipated hazard is expected to apply, are identified. A relative hazard/risk rating is also provided in order to identify which hazards pose the greatest risk to personnel but more importantly, what hazard controls should be implemented.

Table 6: Control of Hazards Summary

Task Number(s)	Hazards	Relative Hazard /Risk Rating*					Hazard Controls Appendix and/or HASP Section
4,5	Chemical	NA <input type="checkbox"/>	Low <input type="checkbox"/>	Medium <input checked="" type="checkbox"/>	High <input type="checkbox"/>		B1
2-5	Physical	NA <input type="checkbox"/>	Low <input type="checkbox"/>	Medium <input checked="" type="checkbox"/>	High <input type="checkbox"/>		B2
N/A	Mechanical	NA <input checked="" type="checkbox"/>	Low <input type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>		B3
5	Traffic/Equipment	NA <input type="checkbox"/>	Low <input type="checkbox"/>	Medium <input checked="" type="checkbox"/>	High <input type="checkbox"/>		B4
N/A	Electrical Hazards/Safety	NA <input checked="" type="checkbox"/>	Low <input type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>		B5/B20
N/A	Fire/Explosion	NA <input checked="" type="checkbox"/>	Low <input type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>		B6
5	Noise (acoustical)	NA <input type="checkbox"/>	Low <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>		B7
N/A	Ventilation/Oxygen Deficiency	NA <input checked="" type="checkbox"/>	Low <input type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>		B8
2-5	Heat Stress	NA <input type="checkbox"/>	Low <input type="checkbox"/>	Medium <input checked="" type="checkbox"/>	High <input type="checkbox"/>		B9 / Appendix H
2-5	Cold Stress	NA <input type="checkbox"/>	Low <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>		B10
2-5	Insects, Spiders, Snakes	NA <input type="checkbox"/>	Low <input type="checkbox"/>	Medium <input checked="" type="checkbox"/>	High <input type="checkbox"/>		B11 / Appendix F
2-5	Poisonous Plants	NA <input type="checkbox"/>	Low <input type="checkbox"/>	Medium <input checked="" type="checkbox"/>	High <input type="checkbox"/>		B12
2-5	Personal Safety	NA <input type="checkbox"/>	Low <input type="checkbox"/>	Medium <input checked="" type="checkbox"/>	High <input type="checkbox"/>		B13
N/A	Working Alone	NA <input checked="" type="checkbox"/>	Low <input type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>		B14
1-5	Severe Weather	NA <input type="checkbox"/>	Low <input type="checkbox"/>	Medium <input checked="" type="checkbox"/>	High <input type="checkbox"/>		B15
4,5	Above and Underground Utilities	NA <input type="checkbox"/>	Low <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>		B16 & Sections 4.2 - 4.3
5	Trenching/Excavation	NA <input type="checkbox"/>	Low <input type="checkbox"/>	Medium <input checked="" type="checkbox"/>	High <input type="checkbox"/>		B17
2-5	Water Safety	NA <input type="checkbox"/>	Low <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>		B18 / Appendix H
4,5	Material Handling/Ergonomics	NA <input type="checkbox"/>	Low <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>		B19
N/A	Power Tools	NA <input checked="" type="checkbox"/>	Low <input type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>		B20
1-5	Vehicle Use	NA <input type="checkbox"/>	Low <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>		B21
2-5	Seasonal Hunting	NA <input type="checkbox"/>	Low <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>		B22 / Appendix G
N/A	Demolition	NA <input checked="" type="checkbox"/>	Low <input type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>		B23
N/A	Unexploded Ordinances	NA <input checked="" type="checkbox"/>	Low <input type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>		B24
N/A	Closed/Abandoned Mine	NA <input checked="" type="checkbox"/>	Low <input type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>		B25
N/A	Confined Space	NA <input checked="" type="checkbox"/>	Low <input type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>		Section 9
N/A	Spills	NA <input type="checkbox"/>	Low <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>		Section 10

*Relative Hazard/Risk Rating

When evaluating a task against a specific hazard, the evaluator should:

1. **Determine how frequently you will be conducting the task and generally be exposed to the hazard while on-site.**
2. **Determine the duration (i.e., the amount of time) you will spend conducting the task.**
3. **Determine the severity of injury and/or property damage that the task/hazard may cause (use Table 7). When assessing the severity, assume the hypothetical injury was a result of the task being conducted improperly and that PPE was not being worn and use the following as a guide:**
 - **Minimal Severity:** Injury would require first aid and/or the property/equipment damage would be limited to minor wear and tear, scratches, dents (still functional)
 - **Moderate Severity:** Injury would require professional medical attention and/or the property/equipment damage would necessitate repair but not replacement
 - **High Severity:** Injury would require immediate medical attention or is life threatening and/or the property/equipment damage is significant and requires replacement

NOTE: A single hazard maybe listed under several Tasks. In this case, use the highest severity ranking of the tasks evaluated as the overall ranking.

Table 7: *Relative Risk Rating Decision Table

The Hazard	Has No Severity	Has Minimal Severity	Has Moderate Severity	Has High Severity
Is Not Present (i.e., 0% of your on-site time exposes you to this hazard)	NA	NA	NA	NA
Is Rarely Present (i.e., <25% of your on-site time exposes you to this hazard)	NA	LOW	LOW	MED
Is Sometimes Present (i.e., 25% to <50% of your on-site time exposes you to this hazard)	NA	LOW	MED	HIGH
Is Frequently to Constantly Present (i.e., 50% to 100% of your on-site time exposes you to this hazard)	NA	MED	HIGH	HIGH

4.1 General Site Safety

All activities will be conducted in a manner that minimizes hazards and employee exposures to such hazards. The following are some general safety rules that must be followed while on-site:

- All personnel who perform on-site operations with the potential for exposure to hazardous substances are required to meet personnel training requirements and medical surveillance criteria, which are described in this Site HASP.
- All hazardous substances and contaminated soils, liquids, and other residues will be handled, transported, labeled, and disposed of in accordance with accepted material handling procedures.

- Personnel will wear PPE, as required.
- All work on-site, will be planned and supervised by the appropriate personnel to prevent injuries.
- All injuries and accidents will be reported.
- Supervisors will ensure that their employees observe and obey safety rules and regulations required for the safe conduct of work.
- Alcoholic beverages and illegal drugs will not be allowed on-site. Possession of either will be grounds for disciplinary actions.
- No employee will be assigned to a task without first having been instructed on proper methods of carrying out the task.
- Posted safety signs will be obeyed.
- Space around on-site emergency and firefighting equipment will be kept clear.
- Trash and discarded materials will be staged in an orderly fashion and regularly removed from the Site.
- Approval to perform work operations alone must be preapproved by the Site PM and/or PIC and a communication plan must be established.
- Smoking, eating, drinking, and chewing gum or tobacco will not be permitted within the work zones and personnel will follow applicable decontamination procedures prior to eating, drinking, and/or smoking.
- Personnel should keep track of weather conditions and wind direction to the extent these conditions could affect potential exposure.
- Personnel should be alert to any abnormal behavior on the part of other workers that might indicate distress, disorientation, or other ill effects.
- Personnel should never ignore symptoms that could indicate potential exposure to chemical contaminants. Any symptoms should be immediately reported to their supervisor or the Site health and safety officer.
- Visible indicators of potentially immediate danger to life and health (IDLH) conditions include the following:
 - large containers and tanks that must be entered;
 - enclosed spaces such as buildings or trenches that must be entered;
 - potentially explosive or flammable situations (indicated by bulging drums, effervescence, gas generation, or instrument readings);
 - extremely hazardous materials (such as cyanide, phosgene, or radiation sources);
 - visible vapor clouds; and
 - areas where biological indicators such as dead animals or vegetation are located.

4.2 Specific SSC Requirements

The hazards posed by the presence of underground and overhead services are significant. Where there is a requirement for ground penetrating activity, the work will be thoroughly vetted prior to commencing subsurface work. No intrusive work is to be conducted until the hazards associated with the possible presence of underground and overhead services have been properly identified and safe locations for intrusion have been marked and agreed upon. This applies to any intrusive Site work (i.e., any work which will involve the disturbance or penetration of the ground or manmade surface by mechanical or manual means, including the following:

- Trial pit excavations
- Borehole excavations (e.g., shell and auger, rotary, hydraulic, sonic, or percussive drilling)
- Gas spiking
- Manual excavations
- Hand digging
- Intrusion into vertical, indoor, or below ground surfaces
- Any other on-site activity where disturbance of the ground surface is required

If conducting intrusive activities, the following tasks must be completed **and documented** prior to initiating ground disturbance activities (each is summarized below).

4.2.1 Historical Site Information Review

The Site supervisor will obtain the most recent as-built drawings and/or Site plans (including underground storage tank, product and vent lines), as available, and will consider requesting any other Site plot plans, surveys, photographs, and information that might be instructive from the client or other sources. Site information that should be reviewed is specified below in Table 8, SSC Project Planning Checklist.

4.2.2 Plot Plan

The Site supervisor will develop a plot plan that accurately reflects available information and Site conditions as accurately as possible, including the number, locations, and alignments of facilities, pipelines, or utilities. The plot plan will be updated as SSC activities commence to properly capture Site conditions or visual indicators. Intrusive activities will not proceed without an updated plot plan or drawing.

4.2.3 Ground Disturbance Locations Marked Prior to Locate

Whenever feasible, ground disturbance locations and/or areas will be marked using white stakes, white paint, or white flags (or black in cases where snow is on the ground) prior to the public and/or private utility mark-outs. Marking locations provides the line locators with visual boundaries as guidelines in clearing locations and placing their marks.

4.2.4 Line Location Services

In areas where public and private resources are available, **ENVIRON will contact both public and private utility locate services for any project that involves intrusive activities.** In order to give line operators sufficient time to respond to a request to locate, a minimum of 72 business

hours is required prior to the planned start of work. In the event that the driller/excavator retains these services, ENVIRON will conduct a follow-up to confirm utility locate information.

The Site supervisor will meet directly with the private locator and provide them with location plans, if possible and where applicable. If an on-site meeting with the private locator is not possible, the Site supervisor MUST contact the private locator so that they understand the scope of the proposed subsurface work and the extent of their activities.

4.2.5 Site Walkover-Visual Indicators

The Site supervisor MUST conduct a Site walkover and complete the SSC Field Checklist in Appendix C for projects that involve ground disturbance. The Site walkover and visual inspection is most effective when completed during locating activities, but, at a minimum, must be completed PRIOR to ground disturbance. The main intent of the SSC Field Checklist is to identify aboveground indicators which may identify the potential existence of subsurface issue. The checklist will also be used to confirm that common utilities have been accounted for, located, and verified. Any potential underground utilities should be marked on a Site plot plan. The Site walkover should be documented using ENVIRON's SSC Field Checklist.









4.2.6 Utility Mark-Out

All known pipelines and utilities, as noted on the plot plan, pipeline map, or drawing that pass within the search zone must be located, identified, and marked to indicate location and alignment.

A qualified and competent line locator will conduct line-locating practices using available pipeline maps or plot plans for areas within the search zone. Direct connection (clamping on) to possible nearby underground services should be undertaken whenever possible to increase the success rate/reliability of locating. **The specific ground penetration location must be cleared to the edge of the critical zone** (a 5-foot or 1.5-meter area surrounding intrusive locations/areas in every direction) using a search and sweep method to verify maximum detection capabilities.

If anticipated services are not identified or located (anticipated services will be listed in Table 8), drilling or ground disturbance will not be conducted until the service is visually identified.

Commonly used utility mark-out colors and identifiers are listed below:

	WHITE - Proposed Excavation
	PINK - Temporary Survey Markings
	RED - Electric Power Lines, Cables, Conduit, and Lighting Cables
	YELLOW - Gas, Oil, Petroleum, or Gaseous Materials
	ORANGE - Communication, Alarm or Signal Lines, Cables or Conduit
	BLUE - Potable Water
	PURPLE - Reclaimed Water, Irrigation and Slurry Lines
	GREEN - Sewer and Drain Lines

Upon completion of their work (whether the Site supervisor is on-site or not), the private locator **MUST** contact the Site supervisor to present their results. In addition to providing the Site supervisor with an overall summary of their work, **the locator must also inform the Site supervisor of any unique circumstance(s) which limited their ability in locating the potential presence of underground utilities (e.g., the existence of overhead electrical lines); if they encountered any abnormalities (e.g., concrete surfaces with reinforced rebar); and/or any other condition which may have diminished the validity of their results and efforts.**

Where doubt exists over the location of a service, request a Site visit from the appropriate utility provider or abandon locations in the area in question and contact the PM and/or PIC.

4.2.7 Clearance of Ground Disturbance Locations and Critical Zones

After anticipated utilities have been located and marked, the Site supervisor, the PM, and/or the PIC should use the available information, along with regulatory requirements and project objectives, to select final ground disturbance locations.

Each specific ground penetration location must be cleared to the edge of the critical zone (a 5-foot or 1.5-meter area surrounding intrusive locations/areas in every direction) using a search and sweep method to verify maximum detection capabilities. The Site supervisor will ensure that detected services and those featured on location plans are outside of the critical zone of EACH location where intrusive work will occur, using a sweep and search method.

The critical zone takes into account minimum tolerance distances from facility lines (which vary by location) and uncertainties introduced by on-site conditions, human factors, and equipment. **No intrusive activities will take place within a critical zone where there are utilities or visual indicators.** When known utilities intersect ground disturbance critical zones, boring and/or excavation location criteria should be reevaluated by the Site supervisor and PM, and if possible, moved to a precleared alternate location.

In the event that work is required to be conducted in a critical zone containing a marked utility or visual indicator, approval MUST be obtained from the PIC, PM, and CHSD prior to ground penetrating activities.

4.2.8 Overhead Lines

When voltages of overhead electric cables are unknown, ensure that any ground penetrating activities are located a minimum of 28 feet (9 meters) horizontally from any overhead electric cable supported wooden poles or 50 feet (15 meters) horizontally in the case of those supported on metal poles/towers. Where this clearance cannot be achieved, contact relevant electricity provider for guidance as well as the PIC/PM and the CHSD.

When voltages are known, work will be conducted in accordance with OSHA 1926.1501(a)(15). The applicable clearance guidelines are summarized below.

- For lines rated 50 kilovolt (kV) or below, a 10-foot minimum clearance will be maintained between the lines and any part of the drill rig.
- For lines rated over 50 kV, the minimum clearance will be increased by 0.4 inches for each 1kV over 50 kV.
- In transit and with boom lowered, the equipment clearance will be 4 feet for voltages less than 50 kV, 10 feet for voltages from 50 to 345 kV, and 16 feet for voltages greater than 345 kV up to and including 750 kV.
- A person will be designated to observe clearance of the equipment and give timely warning for operations where it is difficult for the operator to maintain the desired clearance by visual means.

Overhead wires will be considered an energized line unless and until the person owning such line or the electrical utility authorities indicate that it is not an energized line and it has been visibly grounded.

4.3 SSC Summary

If the tasks presented in this HASP involve ground penetrating work, Table 8 and the specific procedures outlined in Section 4.2 are applicable and will be followed. Table 8 summarizes the steps required, including justification of any exceptions. This table will be completed in its entirety, by the designated or alternate Site supervisor, prior to conducting subsurface work. If certain requirements are not applicable, a reason will be provided for exemption.

The SSC Project Planning Checklist (Table 8) will be used as a guideline for the anticipated SSC activities. Planned timing and proposed dates (if available) for activities have been included in Table 8 by the HASP preparer, and additional timing information and dates will be added as they become available. If field practices differ from plans proposed and documented on the SSC Project Planning Checklist (e.g., walkover dates or historical documents reviewed change), it is the Site supervisor's responsibility to complete an updated SSC Project Planning Checklist to reflect these changes. Deviations from these requirements must be documented and approved prior to the commencement of ground disturbance activities.

Table 8: Subsurface Clearance (SSC) Project Planning Checklist

SSC Project Planning Checklist Document the steps that must be followed and justify any exceptions. This checklist MUST be completed in its entirety.				
SSC Requirements	Yes	No	NA	Comments
Prequalification of contractor for capability of performing utility locate (see Section 1)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Company: TBD Company Contact: TBD
Designated Person for SSC work assigned (must be on-site)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The Site supervisor is the designated person for SSC Work. Name of designated person: TBD Signature of designated person:
Historical Site Information Review	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Aerial photographs and historic Site utility maps have been reviewed prior to the private utility locate.
Development of site-specific plot plan	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plot plan will be developed prior to starting Tasks 3-5 and attached to Appendix C of this HASP.
Ground penetrating location(s) marked prior to locate(s) and alternate locations chosen	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location of planned soil borings and alternate locations will be marked out by ENVIRON and cleared by the private utility locator contractor prior to intrusive activities.
Service notifications provided to clear/locate public utilities	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	No less than 72 hours prior to planned intrusive activities, ENVIRON will clear public utilities at the Site. To document this clearance of public utilities, the following information will be recorded: List companies notified for public locate: List who contacted One Call: List One Call #: List locate ticket #:
Private locate contracted for on-site utilities	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Contact: TBD
Designated person present during private locating	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The Site supervisor will be present during the private locate.
Underground utilities identified prior to start of intrusive activities as reasonably feasible	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Underground utilities will be identified to the extent available using private/public locators, and marked in the field to designate their location.
Site walkover conducted to assess utility locations, visual indicators and complete SSC Field Checklist	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The ENVIRON Site supervisor will conduct a walkover of planned boring and well locations, will complete the SSC Field Checklist, and will discuss the review of SSC inspections as part of the daily tailgate safety meetings and prior to the initiation of intrusive activities.

SSC Project Planning Checklist Document the steps that must be followed and justify any exceptions. This checklist MUST be completed in its entirety.				
SSC Requirements	Yes	No	NA	Comments
Ground penetration locations(s)/area(s) and critical zones (i.e., the 5-foot or 1.5-meter distance surrounding intrusive activities in every direction) cleared	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The critical zone surrounding each ground disturbance location will be cleared and the suspected location of belowground utilities will be marked in the field. The report of the subsurface clearance activities will be reviewed by the ENVIRON Site supervisor prior to drilling at each location.

5 Personnel Training Requirements

All personnel performing on-site operations with the potential for exposure to hazardous substances or health hazards will meet the personnel training requirements in accordance with applicable regulations. The training policies and procedures ensure that personnel can recognize hazards, understand emergency response procedures, and have the knowledge necessary to enable them to perform their assigned jobs in a manner that ensures employee and public safety. Completion of appropriate health and safety training, as described below, and participation in medical surveillance will be required to gain access to areas of active field work. Required, documented training includes initial 40-hour health and safety training, 8 hours of annual refresher training, supervised field experience, first aid training, and CPR certification.

Specifically, any employee who is or is expected to be directly involved with intrusive sampling of contaminated environmental media or other sampling activities that could reasonably lead to chemical exposure has completed appropriate training, including but not limited to 40-hour HAZWOPER (and 8-hour refresher training), respiratory protection, first aid, and CPR training.

5.1 Initial Training

The following is an outline of the requirements of initial training for on-site work.

5.1.1 Basic Health and Safety Training

A minimum of 24 hours of initial health and safety training off-site is required to obtain access to areas of active field work. Personnel engaged in or supervising activities in the areas of active field work will have a minimum of 40 hours of initial health and safety training off-site, in accordance with applicable regulations. The ENVIRON personnel who will be working at the Site have received 40 hours of initial health and safety training.

5.1.2 Supervised Field Experience

Personnel with 24 hours of initial health and safety training are also required to have a minimum of 1 day of field experience under the direct supervision of an experienced supervisor. Personnel with 40 hours of initial health and safety training are required to have a minimum of 3 days of field experience under the direct supervision of an experienced supervisor. The ENVIRON personnel who will be working at the Site have received 40 hours of initial health and safety training and at least 3 days of field experience under the direct supervision of an experienced supervisor.

5.1.3 Supervisor Training

All on-site managers and supervisors directly responsible for, or who supervise personnel engaged in, invasive Site activities, have received the initial 40-hour health and safety training and at least 8 additional hours of specialized off-site training in accordance with applicable regulations. This specialized training includes, but is not limited to, topics such as regulatory compliance, management of on-site health and safety hazards, and recognition of special personnel training needs. The ENVIRON Site supervisor has received 8 additional hours of specialized health and safety training.

5.1.4 Health and Safety Officer Training

Health and safety officers will be trained to a level required by their job function and responsibility. This will include training in implementation of HASPs and compliance with applicable health and safety requirements.

5.1.5 First Aid and CPR Training

ENVIRON personnel will maintain first aid and CPR training as certified by the American Heart Association (or equivalent) to render first aid and CPR.

5.2 Refresher Training

All personnel who have received 40 hours of initial health and safety training will receive 8 hours of refresher training annually, as specified in accordance with applicable regulations. Topics to be covered in this training program will include those specified in the initial 40-hour health and safety training and/or those specified in the supervisory training course, as well as a critique of incidents that could serve as training examples.

Project-specific refresher training will be provided when the project scope is changed and/or when the hazards change.

5.3 On-Site Training

The on-site training requirements are summarized below.

5.3.1 Site Safety Briefings

Site safety briefings will be conducted prior to the start of each work day or work shift to discuss health and safety issues, changes in work procedures, exposure incidents and other relevant information.

Prior to each change in operations, the meetings will address:

- PPE use and maintenance;
- physical safety hazards from machinery;
- protection from chemical hazards;
- decontamination procedures;
- protection from heat/cold stress; and
- specific safety requirements associated with the new operations.

During safety meetings, on-site personnel qualified to perform first aid and CPR will be identified. Changes to the HASP will be reviewed during the morning safety briefing. A record of the meeting will be written daily, signed by each participant, and included in Section 13.0 of this HASP.

5.3.2 Visitor's Briefing

Visitors will not be permitted to enter areas of active field work unless documentation of training, as described above, is presented to the ENVIRON Site supervisor. Visitors will be provided with applicable site-specific information including but not limited to hazard recognition, personnel

hygiene and Site safety rules, use of PPE, and emergency response procedures. Visitors requesting on-site access to areas of active field work will be required to review and sign off on the HASP to ensure understanding and compliance with the provisions in the HASP. Personnel, contractors, and Site visitors will receive information contained in this HASP and site-specific hazard awareness prior to entry into the area of active field work, as applicable. The training will ensure that personnel can recognize hazards, understand emergency response procedures, and have the knowledge necessary to enable them to perform their assigned jobs in a manner that ensures employee and public safety. Personnel will be required to sign an attendance sheet (Section 13 in this HASP) verifying that they received and participated in a training briefing. Individuals refusing to sign the sheet will not be allowed to enter the area of active field work.

5.4 Hazard Communication

Compliance with Hazard Communication Standard is required for work at this Site. MSDSs for select COCs are included in Appendix A. Personnel will have received training for the identification of hazards associated with the materials in use and the safe use of these materials, as applicable. Hazardous chemical products brought to the Site (other than standard fuels) for use during field activities must be reviewed by the Site supervisor. Subcontractors are responsible for having their own hazard communication program. Subcontractors will supply MSDSs to the Site supervisor for products to be used on-site.

The following procedures related to hazard communication are applicable to this Site. Personnel will be briefed on this program.

5.4.1 Container Labeling

Containers received on-site will be inspected to ensure the following: (1) containers will be clearly labeled as to the contents, (2) the appropriate hazard warnings will be noted, and (3) the name and address of the manufacturer will be listed.

Drums or bins to be shipped off-site will have a label affixed with the following information: (1) the identity of the waste generator, (2) the boring, well or excavation identification and sample depth, (3) the waste matrix (e.g. soil, water, product), and (4) the date of waste generation.

5.4.2 Employee Training and Information

Prior to starting work, each employee will attend a health and safety orientation and will receive information and training on the following:

1. An overview of the requirements contained in the Hazard Communication Standard
2. Hazardous chemicals present in their workplace operations
3. Location and availability of a written hazard communication program
4. How to read labels and review MSDSs to obtain appropriate hazard information
5. Locations of MSDS files and the hazardous chemical inventory
6. Physical and health effects of the hazardous chemicals
7. Methods and observation techniques used to determine the presence or release of hazardous chemicals

8. How to lessen or prevent exposure to these hazardous chemicals through usage of control/work practices and PPE
9. Emergency procedures to follow if they are exposed to these chemicals

ENVIRON employee(s) will inform its subcontractor(s) about the hazardous chemicals brought on-site by ENVIRON, and likewise, subcontractors will inform ENVIRON employees about the same.

5.5 Disciplinary Actions

In the event that personnel do not follow the health and safety rules and/or are conducting operations that are hazardous to themselves or their fellow workers, disciplinary actions will be implemented in accordance with ENVIRON's policies.

5.6 Incident Reporting

Please refer the ENVIRON SPI 19 (Appendix H) Incident Reporting for ENVIRON's complete incident reporting requirements.

Each subcontractor is responsible for maintaining injury and illness records in accordance with applicable regulations and supplying ENVIRON with applicable records in a timely fashion upon request. With respect to incidents, the following types of environmental, health, and/or safety incidents are to be reported to ENVIRON:

- Employee injuries and illnesses that include first aid and/or doctor/hospital visits which may or may not involve restricted work and/or lost time
- Environmental incidents and exposures, such as spills or other unplanned releases to the environment, or nonconformance with operating procedures
- Evacuations (for both false alarms and real emergencies)
- Property damage
- Near miss incidents (a near miss is an unplanned event that did not result in injury, illness or damage, but had the potential to do so) which could have resulted in an injury, an accident, environmental impact, or significant loss of facilities
- Public/third party liability incidents that involve injury, illness, or property damage due to the actions of any non-ENVIRON employee arising out of, or in connection with, the ENVIRON's contracted scope of work, operations, products, or premises

Incidents of the types outlined above MUST be communicated by the ENVIRON Site supervisor to either the PIC/PM and the CHSD and/or HSC as soon as possible following the incident, either in person or via phone, e-mail, or text messaging. The contacted person will then ensure that the other core project members are informed either in person or via phone, e-mail, or text messaging, regardless of time of day. As soon as possible after the incident but no later than 72 hours after the event, the first page of the Incident Investigation Report form will be completed by the Site supervisor or his/her designee and sent to the core project members (i.e., the PIC/PM, CHSD, and HSC), for preliminary root-cause analysis. The root-cause analysis will not be considered complete until input from individuals involved in the incident, applicable witnesses, and input from the core team has been obtained. Similarly, the implementation of

any corrective/preventive actions will NOT be implemented until input from the CHSD (and others as necessary) has been obtained.

6 Medical Surveillance and Recordkeeping

The goals of the medical surveillance program are to monitor the health of potentially exposed personnel through the use of medical examinations and diagnostic laboratory testing, to provide medical care for occupational injury or illness, to keep accurate records for future reference, and to ensure the selection of personnel physically able to safely perform the work assigned. The medical surveillance program supports and monitors the effectiveness of the primary health and safety goal of controlling worker exposure to hazardous substances. Medical examinations will be performed by, or under the supervision of, a licensed physician, preferably one knowledgeable in occupational medicine.

In general, ENVIRON site employees are ENVIRON personnel who work in the field and may be exposed to hazardous substances. ENVIRON's requirement is for site employees to be subject to a medical surveillance program (non-site employees who wear respirators may also be subject to a medical surveillance program). Each employee enrolled in the medical surveillance program will be subject to periodic medical exams, the frequency of which will vary depending on the extent and duration of exposure, the type of chemicals involved, and the individual employee's medical profile. These personnel will receive a medical examination at least once per calendar year.

Documentation of current participation in a medical surveillance program and fitness for duty, including ability to wear respiratory protective equipment, is available for personnel who will work on-site in areas of active field work. However, specific medical information and examination results obtained in the course of administration of the medical surveillance program are maintained by the examining physician as confidential.

6.1 Baseline Medical Examinations

The baseline medical examination serves two major purposes: (1) it determines the individual's fitness for duty, including the ability to work while wearing a respirator and (2) it provides baseline data for comparison with future medical data. The baseline medical examination includes, at a minimum, the following:

- Complete occupational and medical history
- Physical examination
- Blood count and chemistry profile
- Urinalysis with microscopic review
- Chest x-ray
- Pulmonary function tests
- Resting electrocardiogram (EKG)
- Cardiac stress test (at physician's discretion)

Personnel who will be working in areas of active field work have a certification of fitness for duty and ability to wear PPE. However, specific medical information obtained in the course of administration of the medical surveillance program is maintained as confidential.

6.2 Periodic Medical Examinations

Each individual enrolled in the medical surveillance program is subject to periodic medical surveillance examinations. In general, personnel involved in field activities with a frequency of greater than 30 days per year receive medical examinations at least annually. Periodic medical examinations include the parameters included in the baseline examination, with the exception of the chest x-ray and EKG, which are repeated after the baseline examination at the physician's discretion and with agreement of the individual.

6.3 Special Medical Examinations

Special medical examinations or consultations will be arranged for personnel exposed in an emergency situation to hazardous substances at concentrations above the PELs without adequate protection. This will be done as soon as possible after the overexposure has occurred as determined by the Site supervisor, in consultation with the CHSD.

Special medical examinations will also be arranged upon notification by the individual that he/she has developed signs or symptoms indicating a possible overexposure to hazardous substances or if the examining physician determines that a more frequent medical examination is necessary.

6.4 Special Circumstances

Any individual who is on a medication that may interfere with the ability to perform his/her job function or who may require special medical attention, must notify the Site supervisor of these circumstances prior to commencing work at the Site.

6.5 Health and Safety Records

Health and safety records for on-site ENVIRON personnel including but not limited to training, medical clearances, fit testing, and monitoring are kept on file by the CHSD and on-site by the Site supervisor, as necessary. Subcontractor health and safety records will be maintained by the applicable subcontractor and provided to the Site supervisor, if requested. ENVIRON personnel training and medical records are maintained at ENVIRON, 333 West Wacker Drive, Chicago, Illinois.

7 Personal Protective Equipment

This section of the site-specific HASP is a reference for selection of different levels of PPE. The PPE selected for each task in Table 9 is based on the contaminant type(s), concentration(s) in air (if detected), standing liquid (if any), or other applicable matrix, and the known route(s) of entry into the human body. In situations where the type of materials, their concentrations, or exposure potentials are unknown, a decision was made based on professional judgment regarding the use of PPE by the HSC.

7.1 Selection of PPE

The selected PPE should be able to resist degradation, penetration, and permeation by the contaminants present at the Site. In selecting the appropriate protective material, the following were considered: chemical resistance, tear and puncture resistance, flexibility, thermal stress, cleanability, and durability.

PPE were selected, and will be used and maintained in accordance with applicable regulations.

7.2 Levels of PPE

The four levels of PPE are Levels A, B, C, and D, with Level A providing the highest available level of respiratory, skin, and eye protection. A summary of the basic PPE ensemble for Levels A, B, C, and D is provided below in Section 7.5. PPE selection for operations at the Site addresses specific task conditions.

Level A

Level A PPE provides the maximum degree of respiratory, skin, and eye protection. Level A PPE should be used when any one of the following criteria is met:

1. The hazardous substance has been identified and requires the highest level of protection for skin, eyes, and the respiratory system based on either the measured (or potential for) high concentration of atmospheric vapors, gases, or particulates; or the Site operations and work functions involve a high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates of materials that are harmful to skin or capable of being absorbed through the skin.
2. Substances with a high degree of hazard to the skin are known or suspected to be present, and skin contact is possible.
3. Operations must be conducted in confined, poorly ventilated areas, and the presence or absence of conditions requiring Level A have not yet been determined.

Level B

Level B PPE provides the maximum level of respiratory protection. Since chemical-resistant clothing is not considered gas, vapor, or particulate tight, Level B PPE does not provide the maximum skin protection. However, a good quality, hooded, chemical-resistant one-piece garment with taped wrists and ankles provides a reasonable degree of protection against splashes of liquids and lower concentrations of chemicals in ambient air. It is the minimum level recommended for confined space entries and initial site entries until the hazards have been further identified. Level B PPE should be used when **any** one of the following criteria is met:

1. The type and atmospheric concentration of substances have been identified and require a high level of respiratory protection but less skin protection—this includes atmospheres with IDLH concentrations of specific substances that do not represent a severe skin hazard or atmospheres that do not meet the criteria for use of air-purifying respirators (APRs).
2. The atmosphere contains less than 19.5% oxygen.
3. The presence of incompletely identified vapors or gases is indicated by air monitoring instruments but vapors and gases are not suspected of containing high levels of chemicals harmful to skin or capable of being absorbed through the intact skin.

Level C

Level C PPE provides the same level of skin protection as Level B PPE, but a lower level of respiratory protection. Air-purifying respirators can be used only if the substance has adequate warning properties; the individual passes a qualitative fit-test for the mask; an appropriate cartridge/canister is used and its service limit concentration is not exceeded; and Site operations are not likely to generate unknown compounds or excessive concentrations of already identified substances. Level C PPE can be used when **all** of the following conditions are met:

1. Oxygen concentrations are not less than 19.5% or greater than 23.5%.
2. Types of air contaminants have been identified, concentrations measured, and a cartridge or canister is available that can remove the contaminant.
3. Atmospheric contaminant concentrations do not exceed IDLH levels.
4. Job functions do not require a self-contained breathing apparatus (SCBA).

Modified Level D

Modified Level D PPE provides minimal skin protection (i.e., hand/glove protection along with standard work clothes with optional appropriate chemical-resistant coveralls) and no respiratory protection. Modified Level D PPE can be used when the following conditions are met:

1. Atmosphere contains no known hazard.
2. Oxygen concentrations are not less than 19.5% or greater than 23.5%.
3. Work functions include minimal contact with contaminated soil, water, groundwater, and preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.

Level D

Level D PPE provides no skin protection other than standard work clothes and no respiratory protection. Work functions are limited to nonhazardous environments and preclude contact with media that may be potentially contaminated at hazardous levels for any type of chemical.

7.3 Respirator Fit Test

A respirator fit test has been conducted on Site personnel who will perform work operations in areas requiring the use of a respirator. Prior to the initiation of any fit testing, personnel were certified as medically able to wear a respirator. The respirator fit test was conducted to ensure

proper face piece-to-face seal. A secure fit is important with positive-pressure equipment and is essential to the safe functioning of negative-pressure equipment, such as most APRs. Personnel have received instruction on proper wear and maintenance of their respirator.

Qualitative fit tests are conducted annually in accordance with the ANSI Practices for Respiratory Protection, Z88.2-1989. In addition, a negative and positive fit check will be performed each time an employee dons the APR. Documentation of annual respirator fit tests is kept on file by the CHSD.

7.3.1 Negative and Positive Fit Check

A negative and positive pressure fit check will be performed each time an employee dons the APR. The negative pressure fit check involves closing off the inlet openings to the APR cartridges by covering with the palms of the hands. If an inward leakage of air is detected, the APR should be checked for material defects and refitted or replaced with another APR.

The positive pressure fit check is performed by placing the palm of hand over the exhalation valve and gently exhaling for 10 seconds to create positive pressure inside the face piece. If an outward air leak is detected, the APR should be adjusted. If after adjustment leakage still occurs, another APR should be used.

7.4 PPE Inspection Checklist and Maintenance

PPE inspections will be conducted upon receipt of PPE from the factory or distributor; when it is issued to workers; after use or training; and prior to maintenance. Inspections of stored equipment will be conducted routinely, whenever a question arises concerning the appropriateness of the selected equipment, or when problems with similar equipment arise. At a minimum, PPE inspections will include the following:

A. Clothing

Before use:

1. Determine that the clothing material is appropriate for the specified task.
2. Visually inspect for
 - imperfect seams;
 - uniform coatings;
 - tears; and
 - malfunctioning closures.
3. Hold up to light and check for pinholes.
4. Flex product and check for cracks and other signs of shelf deterioration.
5. If the product has been used previously, inspect inside and out for signs of chemical breakthrough or deterioration, such as:
 - discoloration;
 - swelling; or
 - stiffness.

6. During the work task, periodically inspect for
 - evidence of chemical attack such as discoloration, swelling, stiffening, and softening (Keep in mind that chemical permeation can occur without any visible effects);
 - closure failure;
 - tears;
 - punctures; and
 - seam discontinuities.

B. Gloves

Before use, pressurize glove to check for pinholes. Either blow into glove, then roll gauntlet towards fingers or inflate glove and hold under water. In either case, no air should escape.

C. Respirators

SCBA/supplied air/air-purifying:

1. Inspect SCBA/supplied air/air-purifying respirators before and after each use, at least monthly when in storage, and during cleaning. APRs should be inspected before each use to be sure they have been adequately cleaned.
2. Check all connections for tightness, inspect air lines prior to each use for cracks, kinks, cuts, frays, and weak areas.
3. Check for proper setting and operation of regulators and valves (according to manufacturer's recommendations), and check operation of alarms.
4. Check material conditions for:
 - signs of pliability;
 - signs of deterioration; and
 - signs of distortion.
5. Check face shields and lenses for:
 - cracks;
 - crazing (network of fine, surficial cracks that can be seen but not felt); or
 - fogginess.
6. Examine cartridges or canisters to ensure that:
 - they are the proper type for the intended use;
 - the expiration date has not passed; and
 - they have not been opened or used previously.

7.5 Task Specific PPE

This section of the site-specific HASP outlines the selection of the appropriate PPE. The PPE has been selected based on the contaminant type(s), concentration(s) in air (if any), standing liquid (if any), or other applicable matrix (e.g., soil, sludge, sediment, etc.) and the known

route(s) of entry into the human body. Table 9 presents the general level of protection to be used for each task that is anticipated to be conducted on this project.

Table 10 identifies the specific PPE items that are required or recommended to be used on this project. This includes identifying the specific type of hand and body protection (as applicable) for the chemicals that may be encountered while conducting the tasks outlined in this HASP.

Table 9: Task Specific Personal Protection Equipment (PPE)

Task Description as depicted in Section 1.4	Level of Protection					
	A	B	C	Mod D	D	NA
Task 1: Transportation to and from Site	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Task 2: Site Walkover	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Task 3: Subsurface Clearance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Task 4: Sampling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Task 5: Remedial Construction Activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Key:

Level D: Long sleeve shirt*; long pants*; hard hat**; eye protection as needed; hearing protection***; and safety shoes

Level D Modified: Level D protection plus appropriate chemical resistant protective coveralls and/or waders, as needed and appropriate hand protection

Level C: Level D (Modified) protection plus negative pressure respiratory protection with appropriate cartridges; chemical protective coveralls in lieu of general coveralls; use of inner and outer sets of hand protection

Level B: Level C protection plus pressure-demand supplied air respirator with escape bottle in lieu of negative pressure respirator; chemical resistant coveralls with hood; chemical resistant boots

Level A: Level B protection plus fully encapsulating (gas tight) chemically resistant suit

*Clothing made of natural fibers will be worn when a shock or arc flash hazard exists.

**Hard hat is required only when overhead hazards are present.

***Hearing protection is required only when noise hazards are present.

Table 10: Personal Protective Equipment (PPE) and Supplies

Equipment	Req	Rec	NA	Equipment	Req	Rec	NA
Steel-Toe Boots	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SCBA	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Outer Disposable Boots	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Full-Face Airline Resp.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Long Sleeve Shirt and Pants	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Full-Face Negative Pressure Resp.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Flame Retardant Coveralls	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Half-Face Negative Pressure Resp	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Tyvek Suit	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Powered Air Purifying Resp	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Poly-Coated Tyvek / Saranex Suit	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	First Aid Kit	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fully Encapsulated Chemical Suit	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Fire Extinguisher	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Hearing Protection	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Mobile Phones	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Leather Gloves	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Two-Way Radios	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outer Chemical Gloves (Type): Nitrile	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Water or Other Fluid Replenishment	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inner Chemical Gloves (Type):	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Eye Wash	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hard Hat	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sunscreen	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Safety Glasses with Side Shields	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Insect Repellent	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Vented (Splash Proof) Goggles	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Other: High Visibility Shirt/Vest	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other: Waders or Steel-Toe Rubber Boots ¹	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Other: Snake Chaps	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Other: Personal Flotation Device, if conditions warrant	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				

Key: Req = Required; Rec = Recommended; NA = Not Applicable

SCBA: self-containing breathing apparatus

¹If conditions are excessively muddy, ENVIRON personnel will don outer disposable boots. Steel-toe rubber boots may be worn in place of steel-toe boots and outer disposable boots.

8 Air Monitoring/Sampling Procedures

Air samples may be collected during the project to identify and quantify airborne contaminants in order to delineate areas where PPE may be needed; determine the level of PPE necessary; document on-site employees' exposures; assess the potential health effects of exposure; determine the need to implement engineering controls or evacuate the work zone or Site; and determine the need for specific medical monitoring. Some commonly used devices are described below.

Combustible Gas Indicator (CGI) – A CGI measures the concentration of a combustible gas or vapor. An example of a CGI is an oxygen (O₂) / lower explosive limit (LEL) meter. The limitations of a CGI are as follows:

- Its accuracy is, in part, dependent upon on the difference between the calibration and sampling temperatures.
- Oxygen-deficient atmospheres affect accuracy.
- The filament can be damaged by silicones, halides, and tetraethyl lead.
- Its sensitivity is a function of the difference in the chemical and physical properties between the calibration gas and the unknown.

Flame Ionization Detector (FID) – Depending on mode, a FID may detect many organic gases and vapors. An example of a FID is an Organic Vapor Analyzer. The limitations of a FID are as follows:

- It will not detect inorganic gases and vapors.
- It has reduced reliability in high humidity conditions.
- It should not be used when temperatures are below 40°F (4.4°C).

Ultraviolet (UV) Photoionization Detector (PID) – A PID detects a number of organic and some inorganic gases and vapors. An example of a PID is a HNu. The limitations of a PID are as follows:

- It does not detect methane.
- It does not detect a compound if the probe used has a lower energy than the compound's ionization potential.
- It does not readily ionize fully chlorinated materials.
- High and low humidity affect its operation.
- Its response is sensitive to dust or moisture on the lamp.
- Responses will fluctuate when gases are mixed.

Infrared (IR) Spectrophotometer – This instrument measures concentrations of many gases and vapors in the air but is designed to quantify one- or two- component mixtures. An example of an IR spectrophotometer is a Miran. The limitations of an IR spectrophotometer are as follows:

- It is not approved for use in hazardous conditions (e.g., intrinsically safe areas).
- It must make repeated passes to achieve reliable results.
- It is somewhat bulky/heavy.

Direct-Read Colorimetric Tubes – In a colorimetric tube, the compound reacts with the indicator chemical in the tube, producing a stain whose length is proportional to the compound's concentration. An example of a colorimetric tube is a Dräger Tubes. Limitations of colorimetric tubes are as follows:

- The results are affected by temperature, pressure, and humidity.
- Many similar compounds interfere with results.

Personal Air Monitoring – An example of personal air monitoring is quantitative air sampling for nuisance dust, metals, organic compounds, and/or inorganic compounds. When using a personal air monitor, samples are collected using personal air sampling pumps and the appropriate sampling media. Personnel samples are collected in the employees' breathing zones over the duration of the work shift. The specific methods used for the collection of personal air samples will require the involvement of a certified industrial hygienist (CIH) if this type of sampling is conducted.

8.1 Using Monitoring Devices

Conducting an applicable task may necessitate using one or more monitoring devices as listed in Table 11, particularly if gases, vapors, explosion hazards, and/or oxygen-deficient atmosphere are present or are expected. If a monitoring device will be utilized, the corresponding device letter has been placed in the column labeled "Monitoring Instrument Required" in Table 12. In addition, the following information will be recorded in the field log book when using a monitoring device:

1. Instrument name and serial number
2. Date of calibration
3. Frequency/duration of monitoring
4. The monitoring results
5. The actions taken based on the results, even if no actions are required to be taken

Table 11: Monitoring Devices Available

A	PID (10.6 eV)	H	Summa Canister
B	PID (11.7 eV)	I	Heat Stress Monitor
C	FID	J	Air Sampling:
D	OVA	K	Air Sampling:
E	CGI/LEL	L	Radiation Detector
F	Colorimetric Indicator Tubes	M	Gas Multimeter
G	Dust Monitoring	N	Other Device: Heat Stress Meter

Table 12: Required Monitoring

Required Monitoring If monitoring is necessary to identify that a risk is at or above tolerable limits and/or is used in controlling a risk on-site, document the task and the maximum allowable exposure or trigger, and the monitoring instrument required to be used.	Constituent	Task(s)	Trigger (action level)	Monitoring instrument required
	Oxygen	N/A		
	Carbon Monoxide	N/A		
	H ₂ S	N/A		
	C ₂ S	N/A		
	CH ₄	N/A		
	VOCs: Total	N/A		
	SVOCs:	N/A		
	Metals	N/A		
	Dusts*	N/A		
	Others: Heat (seasonal)	2-5	See Appendices B (Section B9) and D (First Aid procedures for heat stress)	N** (recommended)

*ENVIRON will oversee the subcontractor conducting excavation activities. ENVIRON will monitor the activities to ensure the subcontractor will employ best management practices to prevent the production of excessive dust and will visually monitor dust production. A dust control monitoring plan will be developed and presented in the Remedial Construction Work Plan.

**It is recommended that ENVIRON personnel begin monitoring when the adjusted ambient temperature (factors in humidity, direct sunlight, and wind) reaches 75° Fahrenheit. ENVIRON personnel should not solely rely on a heat stress meter when monitoring for heat stress as each person copes with heat differently. It is vital that ENVIRON personnel employ the buddy system, monitoring each other for signs of heat stress.

8.2 Action Level Guidance

In general, this HASP addresses site-specific chemicals with the monitoring noted in Tables 11 and 12. Because the primary constituent of concern is PCBs and these have low volatility, airborne constituents are not likely to be an issue. If dusty conditions are encountered, especially during excavation, dust monitoring may be needed. A dust control monitoring plan will be developed and presented in the Remedial Construction Work Plan. This section discusses possible monitoring that may be implemented if a concern is identified in the field.

However, there are chemicals commonly encountered in the workplace that may not be a chemical targeted for sampling but nonetheless will have adverse health effects. These chemicals are listed in Table 13 below.

Table 13: Action Levels for Commonly Encountered Compounds

Compound	Action Level
VOC (as Benzene)	0.5 ppm MAXIMUM
Methane (CH ₄)	0.5% MAXIMUM or 5000 ppm
Carbon dioxide (CO ₂)	0.25% OR 2500 ppm MAXIMUM
Carbon monoxide (CO)	25 ppm MAXIMUM
Hydrogen Sulfide (H ₂ S)	5 ppm MAXIMUM
Oxygen (O ₂)	19% MINIMUM – 23.5% MAXIMUM

ppm: parts per million

VOC: volatile organic compound

8.2.1 Volatile Organic Compounds

An action level for each chemical or group of chemicals should be based on 50% of the most restrictive (lowest) PEL or TLV. If a sustained (i.e., 1-minute sampling period) total volatile organic compound (VOC) reading within the breathing zone as determined by a PID is above the action level, Site personnel will attempt to mitigate the situation through the use of engineering controls (e.g., move upwind, increase air circulation) as indicated in Table 14. If the readings are still above the action level, personnel will leave the area and contact the PM and HSC for further instructions.

Table 14.: Volatile Organic Compounds

Instrument	Calibration Gas Standard	Frequency/ Duration of Air Monitoring	Action Level⁽¹⁾ Above Background (Breathing Zone)	Action
PID calibrated daily	100 ppm isobutylene	Every 5 to 10 minutes, take a 1-minute reading.	> 5 ppm above background level	Introduce engineering controls (e.g., blower fans) (Level D) Evaluate controls (see below)
After Introduction of Engineering Controls				
PID calibrated daily	100 ppm isobutylene	Every 5 to 10 minutes, take a 1-minute reading.	< 5 ppm	Continue work (Level D)
			5 to 50 ppm above background level	Don respirator (Level C); Contact HSC to evaluate
			> 50 ppm above background level	Discontinue work (Level C)

¹ Action Levels for “known contaminants” should be based upon each contaminant’s Permissible Exposure Limit (PEL) or Threshold Limit Value (TLV).

HSC: health and safety coordinator

PID: photoionization detector

ppm: parts per million

8.2.2 Combustible Gas Indicator (CGI)/Oxygen Meter

Table 15: Combustible Gas Indicator (CGI)/Oxygen Meter

Meter Response	Action/respiratory protection
CGI response <10% LEL	Continue normal operations with regular, periodic monitoring
CGI response > 10% LEL	Discontinue operations; evacuate personnel and prohibit entry; allow to vent until readings are <10%.
Oxygen level <19.5% or >23.5%	Retreat from work area; consult with PM and HSC about upgrading to Level B respiratory protection, adding mechanical ventilation, or possible changes in work practices.

HSC: health and safety coordinator

LEL: lower explosive limit

PM: project manager

8.2.3 Odors

If strong odors are encountered or if a personnel develops headaches, dizziness, or other potential exposure symptoms, the personnel will move from the work area to a well-ventilated area and contact the PM and HSC for further instructions.

8.2.4 Dusts

The permissible exposure levels for total and respirable dusts are 15 and 5 milligrams per cubic meter (mg/m³), respectively. In general, you will not be able to read the face of a wristwatch (with your arm extended) when the total dust concentration reaches 15 mg/m³. Particles of dust in the respirable size range cannot be seen without the aid of a microscope but in aggregate, may be perceived as a haze. More importantly and with few exceptions, when dust is noticeable in the air, more respirable particles will exist than larger particles.

Typically, controlling dusty investigative activities through the use of a water sprayer will control potential exposures. However, in the event that dusty conditions exist that are not related to investigative/remedial activities (e.g., dry, uncovered soils with high winds), personnel will leave the area and contact the PM and HSC for further instructions.

To determine the likelihood of exposure from dusts, a theoretical "Total Dust" concentration in mg/m³ can be calculated to estimate the total dust concentration in which the concentration of the contaminant in the soil could equal and/or exceed its' established exposure limit (EL). This equation is as follows:

$$\text{Total Dust (mg/m}^3\text{)} = (10^6 \text{ mg/kg}) (\text{EL mg/m}^3) / (\text{Conc. of contaminant in soil mg/kg}) (\text{SF})$$

Where:

EL = Exposure limit of the contaminant of concern (e.g., its PEL or TLV in mg/m³)

SF = Safety factor, a number between 1 and 10, used to account for the degree of confidence in the characterization data (a 10 would represent a poor degree of confidence, for example only 1 soil sample was collected/analyzed to characterize the site)

The **SF** is based upon the following assumptions: 1) the concentration of the contaminant in the airborne dust is the same as its' concentration in the sample matrix; 2) the soil data represents worst-case scenario; 3) the monitoring instrument accurately measures the ambient concentration of particulate matter in the air; and 4) a single contaminant of concern is present.

As an example, assume that lead (with an EL of 0.05 mg/m^3) is the COC and a soil concentration of $25,000 \text{ mg/kg}$ has been identified. Depending on the SF used, the theoretical total dust concentration will range between 2 and 0.2 mg/m^3 . This means that when the in situ particulate monitoring device is registering a concentration within the 2 to 0.2 mg/m^3 range, there is a high probability that this dust contains enough lead to equal and/or exceed the EL. Hence, the level of PPE used would be increased until engineering controls are determined to be effective as documented by personal monitoring.

9 Confined Space Entry

ENVIRON's health and safety policy prohibits unauthorized entry into confined spaces. In the event that entry into a confined space is required, ENVIRON employees (or its subcontractor's employees) will need additional training prior to entering the confined space. Without supplemental confined space training, entry into confined spaces is prohibited. In addition, entry authorization will only be given after ENVIRON management has reviewed the nature of the confined space, the hazards present, and the measures needed to ensure safety. Under these circumstances, ENVIRON will work with the host facility/client to determine training requirements, sampling requirements, written program requirements, and equipment needed to safely enter the confined space.

It is not anticipated that confined space entry will be required for this project and/or the tasks listed in this HASP. If confined space entry is required, this HASP will be modified accordingly to adhere to applicable regulations.

10 Spill Response

If warranted, applicable local, state, and/or federal emergency response authorities will be identified and contacted by either the client contact and/or a designated ENVIRON employee before any spill cleanup work is initiated at the Site.

10.1 Reporting and Initial Personnel Safety

Upon discovery of a hazardous substance spill, personnel are to:

- Immediately summon help by notifying the PM and the client contact
- Take action to ensure the safety of nearby personnel
- Proceed to a safe location
- Immediately contact emergency medical services if anyone is seriously injured
- Keep unauthorized personnel out of the area

10.2 Initial Spill Reaction

Factors that limit the employee's response at the location of a spill are:

- Level of training
- Personal safety
- Available PPE
- Knowledge of the substance

Employees should limit their actions to shutting off equipment or pumps and closing valves if possible, feasible, and safe to do so.

10.3 Spill Response Evaluation

The identity and hazards of the spilled material should be determined before decisions regarding spill containment and control are made. The client contact and PM should evaluate the hazards regarding the spill and decide whether project employees or external response organizations should conduct the cleanup.

The PM must contact the PIC and CHSD to discuss the spill incident for further input on deciding how the cleanup can be conducted, including:

- Levels of PPE and safety procedures
- Safety and work zones
- Steps of the response activities
- Most effective procedures or methods for cleanup
- Means of containment
- Leak and spill control
- Decontamination procedures (including emergency decontamination)

11 Decontamination

11.1 Sampling and Construction Equipment Decontamination

Decontaminating involves the orderly controlled removal of contaminants. Reusable sampling equipment and sampling meters (if applicable) will be cleaned prior to use and between each location. Equipment will be decontaminated and allowed to air dry before leaving the Site. Decontaminating may be accomplished using an approved cleaner, water, and/or steam. Subcontractors will be responsible for decontaminating their own equipment used during field operations, as well as disposal of the decontamination fluids. Decontamination fluids will be temporarily stored in sealed, labeled 55-gallon drums and staged at a safe location which is mutually acceptable to ENVIRON and the host facility, pending off-site disposal.

11.2 Personnel Decontamination

Site personnel should minimize contact with contaminants. At a minimum, the gross removal of contaminants from PPE will occur in a designated area. Disposable PPE will be disposed of in garbage bags (including respirator cartridges). Nondisposable PPE, particularly safety boots, will be decontaminated. PPE that cannot be decontaminated should be disposed of along with the waste generated from field operations. Solid waste will be temporarily stored at a secure location on the Site and will be disposed of appropriately off-site. Personnel should wash their hands and face prior to departing from the Site (or as soon as possible after leaving the Site if washing facilities are not available at the Site) and prior to eating, drinking, smoking, and/or applying cosmetics. The decontamination methods are described below.

11.2.1 Modified Level D Personnel Decontamination

Where activities are performed in Modified Level D PPE, personnel will perform decontamination using the following guidelines:

- Personnel will place tools, instruments, samples, and trash in an appropriate location. The equipment drop area should be clean and dry, and, at a minimum, plastic bags should be available for trash.
- Personnel will inspect equipment, samples, and if applicable, tools for signs of residual amounts of contamination or excessive soil buildup. If present, soils and contamination must be completely cleaned off the equipment, samples, and tools prior to removal from the decontamination areas.
- Personnel will visually check themselves for signs of excessive soils and possible contamination. If observed, soils and contamination will be completely removed before further decontamination is performed.
- Personnel will remove outer work gloves, if used, and place them in an appropriate container designated for waste PPE.
- Personnel will remove outer Tyvek coveralls, if used, and place them in an appropriate container designated for waste PPE.

- Personnel will remove inner protective gloves and place them in an appropriate container designated for waste PPE.
- Personnel will wash hands using soap and water (separate from other decontamination cleaners/solutions).

11.2.2 Level C Personnel Decontamination

Personnel involved in activities that require using Level C PPE will observe the following decontamination guidelines:

- Personnel will place tools, instruments, samples, and trash in an appropriate location. The area should be clean and dry, and, at a minimum, contain plastic bags for trash. Waste PPE will not be placed in the same containers as general trash.
- Personnel will inspect equipment, samples, and, if applicable, tools for signs of residual amounts of contamination or excessive soil buildup. If present, soils and contamination must be completely cleaned off of equipment, samples, and tools prior to removal from the decontamination areas. Personnel will visually check themselves for signs of excessive soils and possible contamination. If observed, soils and contamination will be completely removed before further decontamination is performed.
- Personnel will remove tape from wrists and ankles.
- Personnel will remove outer work gloves and place them in an appropriate container designated for waste PPE.
- Personnel will remove outer Tyvek coveralls and place them in an appropriate container designated for waste PPE.
- Personnel will wipe off and remove respirator mask (also goggles if worn).
- Personnel will remove inner protective gloves and place them in an appropriate container designated for waste PPE.
- Personnel will wash hands using soap and water (separate from other decontamination cleaners/solutions).

During emergencies, the need to quickly respond to an accident or injury must be weighed against the risk to the injured party from chemical exposure. It may be that the time lost decontaminating an individual may cause greater harm to the individual than from the potential for chemical exposure, particularly if the injury is life-threatening. In these instances, an uninjured person needs to inform responding emergency personnel of the potential for chemical contamination on the victim, specifically mentioning the type and expected concentrations.

11.3 Investigation-Derived Material Disposal

Investigation-derived material (e.g., drill cuttings, decontamination solutions, disposable tools and/or PPE) will be handled appropriately. The details for the handling of investigation-derived material will be detailed in the FSP and the excavation and disposal work plan.

12 Emergency Response Plan (ERP)

This ERP describes contingencies and emergency response procedures; defines the responsibilities of key personnel in planning, prevention, and response to emergency situations; identifies agency contacts; specifies medical care procedures; and specifies measures to prevent and respond to emergency situations such as fire or explosion, spill or release of hazardous material, personnel injury or illness, or other adverse events. General emergency guidelines are provided in the following subsections.

12.1 Stop Work Authority

Site employees have the authority and obligation to stop any task or operation where concerns and/or questions regarding the control of environmental, health, and/or safety risks exist, are not clearly established, or are not understood. Management is responsible for creating a culture where stop work authority may be exercised freely, if needed, and without fear of retribution or intimidation.

When an unsafe condition is identified, a stop work intervention will be initiated and treated as a “near miss.” As such, an incident report will be completed in accordance with ENVIRON’s SPI 19 entitled “Incident Reporting” so that the unsafe condition can be documented and reviewed, and corrective actions and preventative measures can be implemented as applicable.

These actions will be coordinated by the Site supervisor, with support from the PM or PIC and the HSC, and affected personnel will be notified of the stop work issue. No work will resume until stop work issues and concerns have been adequately addressed. Most issues can be resolved in a timely manner at the job site, but occasionally additional investigation and corrective actions may be required. Work may resume when it is safe to do so.

12.2 Personnel Involved in Emergency Response

Key personnel involved in Site emergency response include the PM, Site supervisor, the PIC, and contractor project managers. Clear lines of authority have been established within this HASP for implementing emergency response procedures and for ensuring safety compliance. Emergencies and personal injuries will be reported to Site supervisor as soon as possible after the imminent threat has been controlled. The Site supervisor will report the incident to the PIC/PM and CHSD.

12.3 Emergency Response Telephone Roster

The emergency response telephone roster consists of persons and organizations both on- and off-site who would be involved in the emergency response. This roster, provided as Table 1A, will be kept in the ENVIRON Site vehicle. A list of on-site personnel who are trained in first aid and CPR will also be kept in the on-site file. Site personnel will be familiar with the emergency response telephone roster and will understand the proper chain of command. A listing of on- and off-site emergency contacts and key personnel and their alternates will be posted in the Site office or kept in the ENVIRON Site vehicle.

12.4 Emergency Communications

The external communication system between on-site and off-site emergency response personnel is necessary to report and coordinate emergency response. On the Beech Creek

Site, cell phone reception may be poor or nonexistent; two-way radios will be the primary means of internal communication. If emergency external communication is needed (e.g., one of the personnel is injured on-site and requires emergency medical service) and personnel cannot reach outside assistance with a cell phone, personnel will migrate to Rally Point B (i.e., Wayne County Emergency 911 Office). If needed, personnel will use two-way radios and/or air horns to signal to all present personnel to migrate to Rally Point B. If cell phone reception cannot be reached at Rally Point B, personnel should attempt to reach employees within the Wayne County Emergency 911 Office.

12.5 Emergency Medical Care and Treatment

Every injury and exposure will be reported according to the procedures outlined in Section 5.6 of this HASP, regardless of whether the incident appears to be serious or not, or whether any adverse health effects or symptoms are apparent after the exposure. Universal precautions to blood-borne pathogens will be observed while administering first aid.

12.6 Life-Threatening Emergency Response

Incidents are possible that would result in emergencies beyond the on-site emergency response capabilities. Such incidents might include the following:

- Life-threatening injuries
- Injuries/exposures requiring medical treatment
- Fires progressing beyond incipient stage

12.7 Evacuation Routes and Procedures

During Site operations and in the event of an evacuation, a safe location (rally point) will be identified. As part of the Site orientation, on-site personnel will be informed of the evacuation plan and rally points. For purposes of a safe and efficient means of vehicular egress, vehicles will be backed into their designated parking location.

If evacuation is necessary, personnel will determine wind direction. Whenever possible, evacuation should be in the direction perpendicular to the wind direction without passing through a plume, smoke cloud, and/or spilled material, if applicable. Personnel will report to their designated rally point. In the event that a worker's evacuation to their primary rally point is hindered by emergency conditions, workers will evacuate to the secondary rally point. If the on-site PM is not involved in emergency response activities, he/she will assist in accounting for Site personnel, otherwise their designated back-up will account for personnel and will report this information to the Site supervisor.

12.8 Training

Site personnel will review the information in this HASP on the emergency response procedures and the location and use of on-site emergency equipment and will have received emergency response training. During the Site orientation and/or Site safety briefings, Site personnel will be trained in emergency response procedures, on-site communication systems, and evacuation routes, as stated in this HASP. Visitors will be briefed on hazard recognition, safe work practices, and basic emergency procedures by the Site supervisor.

12.9 First Aid Procedures

If an employee is injured, general first aid will be administered. If safety concerns or hazardous conditions are still present (e.g., incipient fire, falling debris), the individual will be moved to avoid further injury or risk. In the event that an employee is injured in a contaminated area, general first aid will be administered and then the employee will be moved to an uncontaminated area for decontamination (if applicable), additional first aid, and preparation for transportation, giving due consideration to which risk will be greater, the spread of contamination or the health/safety of the individual.

First aid kits will be maintained on-site at each project location. The type of first aid kit to be maintained will be for minor emergencies, such as cuts and skin abrasions. Where applicable, first aid supplies will be stored in a waterproof container. The Site supervisor will ensure that adequate first aid supplies (listed below) are maintained.

Minimum List of First Aid Supplies

(1) First Aid Guide*	(6) Burn treatment applications
(1) Absorbent Compress >4"x8"	(4) 3"x3" Sterile gauze pads
(16) 1"x3" Adhesive bandages	(2) Pair medical exam gloves
(1) Adhesive tape 2.5-yard roll	(1) Triangular bandage >40"x40"x56"
(10) Antiseptic treatment applications	(6) Antibiotic ointment applications

* Please see Appendix D First Aid Guidance, print, and store with ANSI-approved first aid kit on-site.

Recommended List of Additional First Aid Supplies

Analgesic (oral, nondrowsy)	Eye covering >1/4" thick
Bandage compress >2"x2"	Eye/face wash
Breathing barrier, single use	Roller bandage >2"x4yards
Cold pack >4"x5"	Hand sanitizer

The contents of the first aid kits will be checked before being sent out to each job and at least weekly on each job to ensure that expended items are replaced. Where the eyes or body of any employee may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body will be available for use.

12.10 Uncovering an Underground Service

In the event of any damage or dislocation of an underground facility/pipeline or utility in connection with ground disturbance activity, work activities will cease in the area of the damaged facility. The Site supervisor will immediately call the applicable emergency phone number. Then, the affected utility and One Call service will be notified, if applicable. The One Call service may be able to assist with contact numbers for notifying member companies in the event of any damage. NO ONE should attempt to repair, clamp, or constrict the damaged utility.

ALWAYS ASSUME THAT AN UNDERGROUND PIPE OR SUBSURFACE LINE IS LIVE!

The following procedures will be followed when an underground facility/pipeline or utility is damaged:

- Stop work; remove tools if safe to do so.
- Clear all persons from the scene.
- Call the emergency number (911).
- Contact the One Call/utility member (800-351-1111) for guidance, if applicable.
- Contact the PM and/or PIC so they can contact the client, managing principal (MP), CHSD, and HSC.

12.11 Striking an Underground Electrical/Telecom Cable

The following procedures will be followed when an underground electrical/telecom cable is struck:

- Stop work.
- Evacuate personnel from the immediate area to a safe distance as site conditions warrant, giving consideration to employees that may not be able to immediately evacuate (e.g., operator seats in excavators are normally electrically isolated, whereas other parts of the excavator may be energized).
- Call the emergency number (911).
- In the event of injuries, provide first aid and summon medical assistance.
- Contact the One Call/utility member (800-351-1111) for guidance, if applicable.
- Contact the PM and/or PIC so they can contact the client, MP, CHSD, and HSC.
- Do not allow anyone to enter the area until the utility provider has made the cable safe.

12.12 Striking a Pressurized Gas Pipeline

The following procedures will be followed when a pressurized gas pipeline is struck:

- Stop work; leave tools in-place but shut off any running equipment, including engines.
- Evacuate the immediate area to a safe distance as site conditions warrant.
- Ensure there are no sources of ignition in the area.
- Call the emergency number (911).
- Contact the pipeline owner and/or One Call (800-351-1111), if applicable.
- Contact the PM and/or PIC so they can contact the client, MP, CHSD, and HSC.
- Do not reenter the immediate area until it is safe to do so.

12.13 Striking a Pressurized Water Main

The following procedures will be followed when a pressurized water main is struck:

- Stop work; remove tools and confine jetting water if safe, necessary, and appropriate to do so.
- Evacuate the immediate area.

- Ensure that water flowing away is not creating potential hazards (e.g., electrical shorting, flooding, contaminant migration, etc.) and where possible warn those likely to be affected.
- Call the emergency number.
- Contact the water utility and/or One Call, if applicable.
- Contact the PM and/or PIC so they can contact the client, MP, CHSD, and HSC.
- Do not reenter the immediate area until it is safe to do so.

12.14 Follow-Up Procedures

If a Site employee is injured on-site and immediate medical treatment beyond first aid is needed, the designated Site supervisor will call 911 and/or the designated emergency phone number and then report the incident to the PM/PIC.

Subcontractor work that results in an injury, illness, incident, near miss, or unsafe act or condition will be verbally communicated by the affected employee or an ENVIRON employee witnessing the incident to either the local HSC, PM, or PIC immediately following the incident. Notification to the regional HR representative, the director of HR, and the CHSD MUST also be made for incidents involving any employee injury and/or illness that happened while on company time including first aid and doctor/hospital visits which may or may not involve restricted work and/or lost time.

As soon as possible after the incident but no later than 72 hours after the event, the first page of the Incident Reporting Form in SPI 19, Incident Reporting, is to be completed by the employee and a witness that was involved in the incident and/or observed the incident (if applicable).

The CHSD will conduct a post-incident investigation and root-cause analysis to discover the circumstances and cause of the incident. Amendments to the HASP will be approved and implemented by the HSC and the CHSD, as needed. Site personnel will be informed of any revisions to the site-specific HASP and the resolution of any outstanding safety concerns prior to returning to their Site functions. The following are the necessary steps to ensure that operations can safely resume:

- Ensure that emergency equipment (e.g., fire extinguisher, communication system, first aid kits, and first aid station) is in functional order.
- Clear all incident-caused debris from the Site, if safe to do so.
- Inspect area and equipment.

NOTE: Specific emergency contact information is contained in the first and last pages of this HASP. Applicable directions to the nearest medical facility are contained in Appendix I, which is the last page to this HASP. In the event that an emergency situation occurs, *SECURE the safety of yourself and those working under your direction and then contact appropriate Site and ENVIRON representatives that are referenced in Table 1A of this HASP.*

13 Health and Safety Plan Field Team Signatures

Below is a signature table attesting that the HASP has been made available and reviewed by the individual prior to entry into the Site and that a health and safety briefing has been provided. Personnel participating in the project must receive initial health and safety orientation. Thereafter, a brief daily tailgate safety meeting is required as deemed necessary by the Site health and safety officer.

13.1 Project Personnel List and Safety Plan Distribution Record

13.1.1 ENVIRON Employees

Project staff must sign indicating they have read and understand the Site HASP and have received an initial health and safety orientation at the Site. A copy of this Site HASP must be made available for their review and readily available at the job site.

Employee Name/ Job Title	Date Distributed	Signature

13.1.2 Subcontractors

A copy of this HASP will be provided to subcontractors who may be affected by activities covered under the scope of this Site HASP for their information only; the subcontractors remain responsible for the safety of their own employees. Subcontractors must comply with applicable country, state, and local government rules and regulations. Subcontractors must sign indicating they have read and understand the Site HASP and have received an initial health and safety orientation at the Site.

Firm Name	Contact Person	Date Distributed

13.2 Health and Safety Meeting

Personnel participating in the project must receive initial health and safety orientation. Thereafter, a brief daily tailgate safety meeting is required as deemed necessary by the Site health and safety officer.

Date	Topics	Name of Attendee	Employee Firm Name	Initials
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

13.3 Visitor

It is ENVIRON'S policy that visitors must furnish their own PPE. Visitors are required to sign the visitor log and comply with HASP requirements. Visitors must sign indicating they have read and understand the Site HASP and have received an initial health and safety orientation at the Site. If the visitor represents a regulatory agency concerned with Site health and safety issues, the Site health and safety officer will also notify the HSC as soon as possible.

Name of Visitor	Firm Name	Date of Visit	Signature
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

14 Safety Meeting Checklist

The Site Supervisor should consider discussing the following topics with field personnel conducting work as part of this HASP, as applicable.

Date and Time of Meeting: _____

Conducted By: _____

CHECK TOPIC(S) DISCUSSED:

HASP Content

- ☐ Chemicals of Concern
- ☐ Tasks to be Performed
- ☐ Location of Tasks
- ☐ Hazards/Risks of Tasks
- ☐ Site Limitations (e.g., cell phone use)

First Aid

- ☐ Facilities
- ☐ Reporting and Records
- ☐ Treatment of _____

Personal Protective Equipment

- ☐ Glasses, Goggles, and Shields
- ☐ Hard Hats
- ☐ Respirators
- ☐ Gloves
- ☐ Other _____

Emergency Procedures

- ☐ Communications
- ☐ Primary Rally Point:
- ☐ Secondary Rally Point:
- ☐ Headcount
- ☐ Hospital Location/Route
- ☐ PPE/Decon
- ☐ Other _____

Special Tools / Equipment

- ☐ Chain saws / Chop saws
- ☐ Other _____
- ☐ Other _____

HASP Content

- ☐ Personnel On-Site (Introductions)
- ☐ Responsibilities
- ☐ Monitoring equipment
- ☐ Other _____
- ☐ Other _____

Industrial Sanitation and Hygiene

- ☐ Drinking water
- ☐ Restrooms/Porta toilets
- ☐ Personal Cleanliness

Housekeeping

- ☐ Waste Containers
- ☐ Waste Materials
- ☐ Other _____

Fire Prevention

- ☐ Extinguisher Locations
- ☐ Designated Smoking Areas
- ☐ Hot Work
- ☐ Flammable Liquids Present
- ☐ Explosives Present
- ☐ Other _____

Vehicles/Heavy Equipment

- ☐ Transportation of Employees
- ☐ Operation and Inspection
- ☐ Preventative Maintenance
- ☐ Other _____

Discussion _____

Appendix A

Chemical Information and Material Safety Data Sheets

Hazardous Property Information

Check if Present	Material (CAS #)	Water Solubility ^{a,b}	Specific Gravity	Flash Point (°F) ^c	Vapor Pressure ^d	LEL UEL	Cal/OSHA PEL- TWA ^f	IDLH Level ^h	Odor Threshold Geometric mean ⁱ (ppm)
Volatile Organic Compounds (VOCs)									
<input type="checkbox"/>	Acetic acid (64-19-7)	Miscible	1.05	103	11 mm	4.0% 19.9%	10 ppm	50 ppm	0.074 (d)
<input type="checkbox"/>	Acetone (67-64-1)	Miscible	0.79	0	180 mm	2.5% 12.8%	250 ppm	2,500 ppm	62 (d) 130 (r)
<input type="checkbox"/>	Acrolein (107-02-8)	40%	0.84	-15	210 mm	2.8% 31%	C 0.1 ppm Skin	2 ppm	1.8 (d)
<input type="checkbox"/>	Acrylonitrile (107-13-1)	7%	0.81	30	83 mm	3% 17%	2 ppm Skin	85 ppm Ca	1.6 (d)
<input type="checkbox"/>	Benzene (71-43-2)	0.07%	0.88	12	75 mm	1.2% 7.8%	1 ppm Skin	500 ppm Ca	61 (d) 97 (r)
<input type="checkbox"/>	Bromodichloro-methane (75-27-4)	4500 mg/l	1.98	--	50 mm	Non-flam	None established	None determined	--
<input type="checkbox"/>	Bromoform (75-25-2)	0.10%	2.89	--	5 mm	Non-flam	0.5 ppm Skin	850 ppm	1.3 ^j
<input type="checkbox"/>	Bromomethane (74-83-9)	2%	1.73	--	1.9 atm	10% 16.0%	1 ppm Skin	250 ppm Ca	80 ^j
<input type="checkbox"/>	Carbon Tetrachloride (56-23-5)	0.05%	1.59	--	91 mm	Non-flam	2 ppm Skin	200 ppm Ca	252 (d)
<input type="checkbox"/>	Chlorobenzene (108-90-7)	0.05%	1.11	82	9 mm	1.3% 9.6%	10 ppm	1000 ppm	1.3 (d)
<input type="checkbox"/>	2-Chloroethyl-vinyl Ether (110-75-8)	0.02%	1.05	61	27 mm	--	None established	None determined	--
<input type="checkbox"/>	Chloroethane (75-00-3)	0.60%	0.92	-58	1000 mm	3.8% 15.4%	100 ppm Skin	3800 ppm	4.2 ^j
<input type="checkbox"/>	Chloroform (67-66-3)	0.50%	1.48	--	160 mm	Non-flam	2 ppm	500 ppm Ca	192 (d)
<input type="checkbox"/>	Chloromethane (74-87-3)	0.50%	0.92	--	5 ATM	8.1% 17.4%	50 ppm	2000 ppm Ca	10 ^j
<input type="checkbox"/>	Dibromo-chloromethane (124-48-1)	2700 mg/l	2.5	--	76 mm	--	None established	None Determined	--
<input type="checkbox"/>	Dibutyl phthalate (84-74-2)	0.001% (77°F)	1.05	315	0.00007 mm	0.5% --	5 mg/m ³	4,000 mg/m ³	--
<input type="checkbox"/>	1,2-Dichlorobenzene (95-50-1)	0.01%	1.3	151	1 mm	2.2% 9.2%	25 ppm Skin	200 ppm	--
<input type="checkbox"/>	1,1-Dichloroethane (75-34-3)	0.60%	1.18	2	182 mm	5.4% 11.40%	100 ppm	3,000 ppm	--
<input type="checkbox"/>	1,1-Dichloroethylene (DCE) (75-35-4)	0.04%	1.21	-2	500 mm	6.5% 15.5%	1 ppm	None determined	190 ^j
<input type="checkbox"/>	1,2-Dichloroethane (107-06-2)	0.90%	1.24	56	64 mm	6.2% 16%	1 ppm	50 ppm Ca	26 (d) 87 (r)
<input type="checkbox"/>	cis-1,2-Dichloroethene	Insoluble	1.28	6	201 mm	9.70% 12.80%	200 ppm	1,000 ppm	--
<input type="checkbox"/>	1,2-Dichloroethylene (540-59-0)	0.40%	1.27	36-39	180-265 mm	5.6% 12.8%	200 ppm	1,000 ppm	17 - 170 ^k
<input type="checkbox"/>	1,2-Dichloropropane (78-87-5)	0.30%	1.16	60	40 mm	3.4% 14.5%	75 ppm	400 ppm Ca	0.26 (d) 0.52 (r)
<input type="checkbox"/>	1,3-Dichloropropene (542-75-6)	0.20%	1.21	77	28 mm	5.3% 14.5%	1 ppm Skin	None Determined Ca	1 ^j
<input type="checkbox"/>	Bis-(2-Ethylhexyl)-phthalate (DEHP) (117-81-7)	0.00%	0.99	420	<0.01 mm	0.3% --	5 mg/m ³	5,000 mg/m ³ Ca	--
<input type="checkbox"/>	Diethyl phthalate (84-66-2)	0.10%	1.12	322	0.002 mm	0.7% --	5 mg/m ³	None Determined	--
<input type="checkbox"/>	Dinitrotoluene (DNT) (25321-14-6)	Insoluble	1.32	404	1 mm	--	0.15 mg/m ³ Skin	50 mg/m ³ Ca	--
<input type="checkbox"/>	Endrin (72-20-8)	Insoluble	1.7	--	0.00001 mm Low	--	0.1 mg/m ³ Skin	2 mg/m ³	--

Health and Safety Plan
Beech Creek Superfund Site, Wayne County, Tennessee

Check if Present	Material (CAS #)	Water Solubility ^{a,b}	Specific Gravity	Flash Point (°F) ^c	Vapor Pressure ^d	LEL UEL	Cal/OSHA PEL- TWA ^f	IDLH Level ^h	Odor Threshold Geometric mean ⁱ (ppm)
<input type="checkbox"/>	Ethyl benzene (100-41-4)	0.01%	0.87	55	7 mm	0.8% 6.7%	100 ppm	800 ppm	2.3 ^j
<input type="checkbox"/>	Hydrazine (302-01-2)	Miscible	1.01	99	10 mm	2.9% 98%	0.01 ppm Skin	50 ppm Ca	3.7 (d)
<input type="checkbox"/>	Methyl ethyl ketone (MEK) (78-93-3)	28%	0.81	16	78 mm	1.4% 11.4%	200 ppm	3000 ppm	16 (d) 17 (r)
<input type="checkbox"/>	Methyl tert-butyl ether (MTBE) (1634-04-4)	5.1 g/100ml	0.7	-18	245 mm	1.6% 8.4%	40 ppm	None determined	0.32 – 0.47mg/m ³ ^l
<input type="checkbox"/>	Methylene chloride (75-09-2)	2%	1.33	--	350 mm	13% 23%	25 ppm	2,300 ppm Ca	160 (d) 230 (r)
<input type="checkbox"/>	Phenol (108-95-2)	9% (77°F)	1.06	175	0.4 mm	1.8% 8.6%	5 ppm Skin	250 ppm	0.06 (d)
<input type="checkbox"/>	1,1,2,2-Tetrachloroethane (79-34-5)	0.30%	1.59	--	5 mm	Non-flam	1 ppm Skin	100ppm Ca	7.3 (d)
<input type="checkbox"/>	Tetrachloroethylene (PCE) (127-18-4)	0.02%	1.62	--	14 mm	Non-flam	25 ppm	150 ppm Ca	47 (d) 71 (r)
<input type="checkbox"/>	Toluene (108-88-3)	0.07% (74°F)	0.87	40	21 mm	1.1% 7.1%	10 ppm Skin	500 ppm	1.6 (d) 11 (r)
<input type="checkbox"/>	1,1,1-Trichloroethane (71-55-6)	0.40%	1.34	--	100 mm	7.5% 12.5%	350 ppm	700 ppm	390 (d) 710 (r)
<input type="checkbox"/>	1,1,2-Trichloro-ethane (79-00-5)	0.40%	1.44	--	19 mm	6% 15.5%	10 ppm Skin	100 ppm Ca	--
<input type="checkbox"/>	1,2,4-Trichlorobenzene (120-82-1)	0.003%	1.45	222	1 mm	2.5% 6.6% (302°F)	C 5 ppm	None Determined	3 ^j
<input type="checkbox"/>	Trichloroethylene (TCE) (79-01-6)	0.1% (77°F)	1.46	--	58 mm	8% 10.5%	25 ppm	1,000 ppm Ca	82 (d) 110 (r)
<input type="checkbox"/>	Trichlorofluoromethane (75-69-4)	0.1% (75°F)	1.47	--	690 mm	Non-flam	C 1,000 ppm	2000 ppm	--
<input type="checkbox"/>	1,1,2-Trichloro-1,2,2-trifluoroethane (76-13-1)	0.02%	1.56	--	285 mm	-- --	1,000 ppm	2,000 ppm	--
<input type="checkbox"/>	1,2,4-Trimethylbenzene (95-63-6)	0.006%	0.88	112	1 mm	0.9% 6.4%	25 ppm	None determined	2.4 (d)
<input type="checkbox"/>	Vinyl Chloride (75-01-4)	0.1% (77°F)	0.91	--	3.3 atm	3.6% 33%	1 ppm Skin	None Determined Ca	--
<input type="checkbox"/>	Xylene (o, p, m, mix) (1330-20-7)	Slightly soluble	0.86-0.88	81-90	7-9 mm	0.9% 7%	100 ppm	900 ppm	20 (d) 40 (r)
Metals									
<input type="checkbox"/>	Aluminum metal and oxide (as Al)	b	2.7	--	0 mm	e	10 mg/m ³ (respirable)	None determined	--
<input type="checkbox"/>	Antimony (7440-36-0)	b	6.69	--	0 mm	e	0.5 mg/m ³	50 mg/m ³	--
<input type="checkbox"/>	Arsenic (inorganic compounds, as As)	b	5.73	--	0 mm	e	0.010mg/m ³	5 mg/m ³ Ca	--
<input type="checkbox"/>	Arsenic (organic compounds, as As)	Properties vary depending upon the specific organic arsenic compound.					0.2mg/m ³	None determined	--
<input type="checkbox"/>	Barium chloride(as Ba) (10361-37-2)	38%	3.86	--	low	Non-flam	0.5 mg/m ³	50 mg/m ³	--
<input type="checkbox"/>	Barium nitrate (as Ba) (10022-31-8)	9%	3.24	--	Low	e	0.5 mg/m ³	50 mg/m ³	--
<input type="checkbox"/>	Beryllium and compounds (as Be)	b	1.85	--	0 mm	e	0.0002 mg/m ³	4 mg/m ³ Ca	--
<input type="checkbox"/>	Cadmium dust (as Cd)	b	8.65	--	--	e	0.005 mg/m ³	9 mg/m ³ Ca	--
<input type="checkbox"/>	Chromium (III) compounds (as Cr)	b	Properties vary depending upon the specific compound.				0.5 mg/m ³	25 mg/m ³	--

Health and Safety Plan
Beech Creek Superfund Site, Wayne County, Tennessee

Check if Present	Material (CAS #)	Water Solubility ^{a,b}	Specific Gravity	Flash Point (°F) ^c	Vapor Pressure ^d	LEL UEL	Cal/OSHA PEL- TWA ^f	IDLH Level ^h	Odor Threshold Geometric mean ⁱ (ppm)
<input type="checkbox"/>	Cobalt metal dust and fume (as Co) (7440-48-4)	Insoluble	8.92	--	0 mm	^e	0.02 mg/m ³	20 mg/m ³	--
<input type="checkbox"/>	Copper dust and mist (as Cu)	^b	8.94	--	0 mm	^e	1 mg/m ³	100 mg/m ³	--
<input type="checkbox"/>	Lead	Insoluble	11.34	--	0 mm	^e	0.05 mg/m ³	100 mg/m ³	--
<input type="checkbox"/>	Manganese, Fume and compounds (as Mn) (7439-96-5)	Insoluble	7.2	--	0 mm	Combustible	0.2 mg/m ³	500 mg/m ³	--
<input type="checkbox"/>	Mercury compounds (as Hg) Except alkyl compound	^b	13.6	--	0.0012 mm	^e	0.025 mg/m ³ Skin	10 mg/m ³	--
<input type="checkbox"/>	Molybdenum (7439-98-7)	Insoluble	10.28	--	0 mm	Combustible	10 mg/m ³ 3 mg/m ³ (resp.)	5,000 mg/m ³	--
<input type="checkbox"/>	Nickel and other compounds (as Ni)	Insoluble	8.9	--	0 mm	^e	1 mg/m ³	10 mg/m ³ Ca	--
<input type="checkbox"/>	Selenium (7782-49-2)	Insoluble	4.28	--	0 mm	Combustible	0.2 mg/m ³	1 mg/m ³	--
<input type="checkbox"/>	Silver, metal dust, and soluble compounds (as Ag)	^b	10.49	--	0 mm	^e	0.01 mg/m ³	10 mg/m ³	--
<input type="checkbox"/>	Thallium (soluble compounds, as Ti)	^b	Properties vary depending upon the specific compound.				0.1 mg/m ³ Skin	15 mg/m ³	--
<input type="checkbox"/>	Vanadium pentoxide dust and Fume (1314-62-1)	0.8%	3.36	--	0 mm	^e	0.05 mg/m ³ (Respirable)	35 mg/m ³	--
<input type="checkbox"/>	Zinc oxide (1314-13-2)	^b	5.61	--	0 mm	^e	5 mg/m ³	500 mg/m ³	--
Miscellaneous									
<input type="checkbox"/>	Ammonia (7664-41-7)	34%	--	--	8.5 atm	15% 28%	25 ppm	300 ppm	17 (d)
<input type="checkbox"/>	Asbestos (1332-21-4)	Insoluble	--	--	0 mm	Non-flam	0.1 fibers/cc	None determined	--
<input type="checkbox"/>	Buffer Solution 4.0	--	--	Not Available	--	Non-flam	None Established	--	--
<input type="checkbox"/>	Buffer Solution 7.0	Miscible	1.0012	Not Available	--	Non-flam	None Established	--	Not Available
<input type="checkbox"/>	Chromic Acid and chromates (1333-82-0)	63%	2.7	--	Very low	Non-flam	0.005 mg/m ³	15 mg/m ³ Ca	--
<input type="checkbox"/>	Cyanide (as CN)	--	--	--	--	Non-flam	5 mg/m ³ Skin	--	--
<input type="checkbox"/>	DDT (50-29-3)	Insoluble	0.99	162-171	0.0000002 mm	--	1 mg/m ³ Skin	500 mg/m ³ Ca	--
<input type="checkbox"/>	Diesel Fuel #2 (68476-34-6)	Insoluble	0.81-0.90	130	--	0.6-1.3 6-7.5	None established	None determined	--
<input type="checkbox"/>	Fluorides, as F	--	--	--	--	--	2.5 mg/m ³	None determined	--
<input type="checkbox"/>	Gasoline (8006-61-9)	Insoluble	0.72-0.76	-45	38-300 mm	1.4% 7.6%	300 ppm	Ca None determined	--
<input type="checkbox"/>	Kerosene (8008-20-6)	Insoluble	0.81	100-162	5 (100°F)	0.7% 5.0%	200 mg/m ³ Skin	None determined	--
<input type="checkbox"/>	Phosphorus (yellow) (7723-14-0)	0.0003%	1.82	--	0.03 mm	--	0.1 mg/m ³	5 mg/m ³	--
<input type="checkbox"/>	Methanol	Easily Soluble	0.7915	60.8	12.3 kPa (@20°C)	6% 36.5%	200 ppm	--	100 ppm
<input type="checkbox"/>	Naphthalene (91-20-3)	0.003%	1.15	174	0.08 mm	0.9% 5.9%	10 ppm	250 ppm	0.038 (d)
<input type="checkbox"/>	PCB (42% chlorine) (53469-21-9)	Insoluble	1.39	--	0.001 mm	Non-flam	1 mg/m ³ Skin	5 mg/m ³ Ca	--
<input checked="" type="checkbox"/>	PCB (54% chlorine) (11097-69-1)	Insoluble	1.38	--	0.00006 mm	Non-flam	0.5 mg/m ³ Skin	5 mg/m ³ Ca	--

Check if Present	Material (CAS #)	Water Solubility ^{a,b}	Specific Gravity	Flash Point (°F) ^c	Vapor Pressure ^d	LEL UEL	Cal/OSHA PEL- TWA ^f	IDLH Level ^h	Odor Threshold Geometric mean ⁱ (ppm)
<input type="checkbox"/>	Phosphorus (yellow) (7723-14-0)	0.0003%	1.82	--	0.03 mm	-- --	0.1 mg/m ³	5 mg/m ³	--
<input type="checkbox"/>	Polycyclic Aromatic Hydrocarbons (PAH)	Properties vary depending upon the specific compound. Listed in NIOSH as Coal Tar Pitch Volatiles					0.2 mg/m ³	80 mg/m ³ Ca	--
<input type="checkbox"/>	Sodium Bisulfate	Easily soluble	2.435	Not available	N/A	N/A	Not Available	Not Available	Not Available

SITE-SPECIFIC SUBSTANCES

(Add hazardous property information on any substances that are of concern at the site but are not listed above.)

PCB (CAS # 12672-29-6) Insoluble / 0.660 g/cm³ / -14.8 deg F / 125 mmHg / 1.2 % LEL & 7.7% UEL / -- / -- / --

EXPLANATIONS AND FOOTNOTES:

^a Water solubility is expressed in different terms in different references. Many references use the term "insoluble" for materials that will not readily mix with water, such as gasoline. However, most of these materials are water soluble at the part per million or part per billion level. Gasoline, for example, is insoluble in the gross sense, and will be found as a discrete layer on top of the groundwater. But certain gasoline constituents, such as benzene, toluene, and xylene, will also be found in solution in the groundwater at the part per million or part per billion levels.

^b Solubility of metals depends on the compound in which they are present.

^c Several chlorinated hydrocarbons exhibit no flash point in a conventional sense, but will burn in the presence of high energy ignition source or will form explosive mixtures at temperatures above 200 °F.

^d Expressed as mm Hg under standard conditions.

^e Explosive concentrations of airborne dust can occur in confined areas.

^f Cal/OSHA Time-weighted Average (TWA) Permissible Exposure Limits (PELs) except where noted in g. The substances designated by "Skin" in the PEL column may be absorbed into the bloodstream through the skin, the mucous membranes and/or the eye, and contribute to the overall exposure. "C" notation indicates the number given is a ceiling value.

^g TLV-TWA adopted by the American Conference of Governmental Industrial Hygienists (ACGIH). Currently, there is no Cal/OSHA PEL.

^h The substances with a "Ca" notation in the IDLH column are considered to be potential occupational carcinogens by NIOSH.

ⁱ Odor thresholds values extracted from "ODOR THRESHOLDS for Chemicals with established Occupational Health Standards", American Industrial Hygiene Association, 1997.

(d) Odor detection threshold: Lowest concentration at which a stimulus is being detected.

(r) Odor recognition threshold: Lowest concentration at which a definite odor character is detected.

^j Values extracted from the U.S. Environmental Protection Agency Technology Transfer Network, Air Toxics website. URL: www.epa.gov/ttn/atw/, 2006

^k Value extracted from "HESIS Guide to Solvent Safety" California Department of Health Services, 2004. URL: http://www.dhs.ca.gov/ohb/HESIS/solv_ch.htm

^l Value extracted from "Chemical Summary For Methyl-Tert-Butyl Ether", U.S. Environmental Protection Agency, Office Of Pollution Prevention and Toxics, August 1994. URL: http://www.epa.gov/chemfact/s_mtbe.txt

SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

Company: AccuStandard, Inc.
 125 Market Street
 New Haven, CT 06513

Date MSDS Printed: 12/13/2010
 Preparation Date: 12/13/2010
 Information Phone Number: 203-786-5290
 Emergency Phone Number: 203-786-5290
 Hours: Mon. to Fri. 8am-5pm

Catalog Number: **C-248S-H-10X**

Product Name: Aroclor 1248

Synonyms: N/A

Formula: N/A

Molecular Weight: N/A

SECTION 2 - COMPOSITION / INFORMATION ON INGREDIENTS

Component(s)	(2)	CAS #	Appr. %	ACGIH-TLV (mg/m3)		OSHA-PEL (mg/m3)	
				TWA	STEL skin	TWA	STEL skin
Aroclor 1248		12672-29-6	0.10				
n-Hexane		110-54-3	99.90	176		1800	3500

Always follow safe Industrial Hygiene practices when handling this product

SECTION 3 - HAZARDS IDENTIFICATION**Health and Environmental Hazards/Symptoms of Exposure:**

Vapors may cause drowsiness and dizziness.

Overexposure may cause reproductive disorders based on tests with laboratory animals.

May cause gastro-intestinal disturbances and lung irritation, chest pain and edema.

Potential Health Effects:

May be irritating to eyes.

May be irritating to skin.

May be harmful if absorbed through the skin.

May be irritating to mucous membrane and upper respiratory system.

Harmful if inhaled.

Harmful if swallowed.

Routes of Entry:

Inhalation, ingestion or skin contact.

Carcinogenicity:

This product is or contains a component that is classified (ACGIH, IARC, NTP, OSHA) as a suspect cancer hazard.

SECTION 4 - FIRST AID MEASURES**Emergency First Aid:**

Get medical assistance for all cases of overexposure.

Skin contact: Wash thoroughly with soap and water. Get medical attention if irritation develops or persists.

Eye contact: Immediately flush with plenty of water. After initial flushing, remove and contact lenses and continue flushing for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers.

Inhalation: Remove to fresh air. If not breathing, give artificial respiration or give oxygen by trained personnel. Seek immediate medical attention.

Ingestion: Do NOT induce vomiting. Call a physician or poison control center immediately. Never give anything by mouth to an unconscious person.

SECTION 5 - FIRE FIGHTING MEASURES**Flammable Properties:**

Flash Point: -14.8 °F (-26 °C) (cc)

Flammable Limits LEL (%): 1.2

Flammable Limits UEL (%): 7.7

Autoignition Temperature: 234 °C

Dangerous fire and explosive hazard.

HMIS® III



NFPA



Vapors can travel to a source of ignition and flash back.

During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

Extinguishing Media:

Use alcohol foam, carbon dioxide, dry chemical, or water spray when fighting fires involving this material.

Fire Fighting Procedures:

As in any fire, wear self-contained breathing apparatus pressure demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

Water spray to cool fire-exposed containers and disperse vapors.

SECTION 6 - ACCIDENTAL RELEASE MEASURES**Spill Response:**

Wear suitable protective equipment listed under Exposure Controls / Personal Protection. Eliminate any ignition sources until the area is determined to be free from explosion or fire hazards. Contain the release and eliminate its source, if this can be done without risk. Dispose as hazardous waste. Comply with Federal, State and local regulations.

SECTION 7 - HANDLING AND STORAGE

Store in a tightly closed container.
Store in a cool area away from ignition sources and oxidizers.
Avoid breathing vapors or mists.
Use with adequate ventilation.
Do not get in eyes, on skin or clothing.
Avoid prolonged or repeated exposure.
This product should only be used by persons trained in the safe handling of hazardous chemicals.

SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls and Personal Protection Equipment (PPE):

Respiratory Protection: If workplace exposure limit(s) of product or any component is exceeded (see TLV/PEL), a NIOSH/MSHA approved air supplied respirator is advised in absence of proper environmental control. OSHA regulations also permit other NIOSH/MSHA respirators (negative pressure type) under specified conditions (see your safety equipment supplier). Engineering and/or administrative controls should be implemented to reduce exposure.

Material must be handled or transferred in an approved fume hood or with equivalent ventilation.

Protective gloves must be worn to prevent skin contact.

(Nitrile or equivalent)

Safety glasses with side shields must be worn at all times.

General Hygiene Considerations:

Wash thoroughly after handling. Do not take internally. Eye wash and safety equipment should be readily available.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Clear liquid
Odor: Characteristic odor
pH: N/A
Vapor Pressure: 125 mmHg (20 °C)
Vapor Density (Air = 1): 3.0 g/L
Boiling Point: 68 - 70 °C
Melting Point: -95 °C (-139 °F)
Solubility in Water: Insoluble
Specific Gravity (H₂O = 1): 0.660 g/cm³
Flash Point: -14.8 °F (-26 °C) (cc)
Explosion Limits (%): 1.2 to 7.7
Autoignition Temperature: 234 °C

Percent Volatile: 99
Evaporation Rate (BuAc = 1): 9.0
Molecular Weight: N/A
Molecular Formula: N/A

SECTION 10 - STABILITY AND REACTIVITY

Stability: Stable
Conditions To Avoid: Heat; Contact with ignition sources
Materials To Avoid: Oxidizers
Chlorine; Fluorine; Magnesium perchlorate
Hazardous Decomposition: Carbon oxides
Hazardous Polymerization: Will not occur

SECTION 11 - TOXICOLOGICAL INFORMATION

See section 3 for specific toxicological information for the ingredients of this product.

SECTION 12 - ECOLOGICAL INFORMATION

By complying with sections 6 and 7 there will be no release to the environment.

SECTION 13 - DISPOSAL CONSIDERATIONS

Recycle or incinerate at any EPA approved facility or dispose in compliance with Federal, State and local regulations. Empty containers must be triple-rinsed prior to disposal.

SECTION 14 - TRANSPORT INFORMATION

DOT UN Number: UN1208 Shipping Class: 3 Packing Group: II FLAMMABLE

SECTION 15 - REGULATORY INFORMATION

In addition to Federal and state regulations, local regulations may apply. Check with your local regulatory authorities.

WARNING: This product contains chemical(s) known to the state of California to cause cancer and to cause birth defects or other reproductive harm.

All components are listed on the TSCA Inventory. For laboratory, research and development use only. Not for manufacturing or commercial purposes.

SECTION 16 - OTHER INFORMATION

This document has been designed to meet the requirements of OSHA, ANSI and CHIPs regulations.

The statements contained herein are offered for informational purposes only and are based on technical data that we believe to be accurate. It is intended for use only by persons having the necessary technical skill and at their own discretion and risk. Since conditions and manner of use are outside our control, we make

NO WARRANTY, EXPRESSED OR IMPLIED, OF MERCHANTABILITY, FITNESS OR OTHERWISE.

Legend : N/A = Not Available ND = Not Determined NR = Not Regulated

*** End of Document ***

SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

Company: AccuStandard, Inc.
125 Market Street
New Haven, CT 06513

Date MSDS Printed: 7/10/2012
Preparation Date: 7/10/2012
Information Phone Number: 203-786-5290
Emergency Phone Number: 203-786-5290
Hours: Mon. to Fri. 8am-5pm

Catalog Number: **C-254S-M-2.85X**

Product Name: Aroclor 1254

Synonyms: N/A

Formula: N/A

Molecular Weight: N/A

SECTION 2 - COMPOSITION / INFORMATION ON INGREDIENTS

Component(s)	(2)	CAS #	Appr. %	ACGIH-TLV (mg/m3)			OSHA-PEL (mg/m3)		
				TWA	STEL	skin	TWA	STEL	skin
Aroclor 1254		11097-69-1	0.01	0.5		x	0.5		x
Methanol		67-56-1	99.99	262	328	x	260		

Always follow safe Industrial Hygiene practices when handling this product

SECTION 3 - HAZARDS IDENTIFICATION**Health and Environmental Hazards/Symptoms of Exposure:**

Over exposure may cause dizziness, nausea, muscle weakness, narcosis and respiratory failure.

After ingestion or inhalation, initial symptoms may be only that of mild intoxication, but may become severe after 12 or 18 hours.

May cause eye, kidney, liver, and skin damage.

May cause central nervous system damage.

POISON: May be fatal or cause blindness if swallowed.

Fetal development abnormalities and effects on embryo or fetus have been reported from prolonged exposure to methanol in laboratory tests involving pregnant rats.

Potential Health Effects:

Irritating to eyes.

Irritating to skin.

Toxic if absorbed through skin.

Irritating to mucous membrane and upper respiratory system.

Harmful if inhaled.

Toxic if swallowed.

Routes of Entry:

Inhalation, ingestion or skin contact.

Carcinogenicity:

Contains one or more components that are classified (ACGIH, IARC, NTP, OSHA) as a suspected cancer hazard in quantities less than 0.1%.

SECTION 4 - FIRST AID MEASURES**Emergency First Aid:**

Get medical assistance for all cases of overexposure.

Skin contact: Immediately wash skin with soap and plenty of water. Remove contaminated clothing. Get medical attention if symptoms occur. Wash clothing before reuse.

Eye contact: Immediately flush with plenty of water. After initial flushing, remove and contact lenses and continue flushing for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers.

Inhalation: Remove to fresh air. If not breathing, give artificial respiration or give oxygen by trained personnel. Seek immediate medical attention.

Ingestion: Do NOT induce vomiting. Call a physician or poison control center immediately. Never give anything by mouth to an unconscious person.

SECTION 5 - FIRE FIGHTING MEASURES**Flammable Properties:**

Flash Point: 52 °F (11 °C) (tcc)

Flammable Limits LEL (%): 6.7

Flammable Limits UEL (%): 36.5

Autoignition Temperature: 385 °C

Dangerous fire and explosive hazard.

HMIS® III



NFPA



Containers can build up pressure if exposed to heat.

Vapors can travel to a source of ignition and flash back.

During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

Extinguishing Media:

Use alcohol foam, carbon dioxide, dry chemical, or water spray when fighting fires involving this material.

Fire Fighting Procedures:

As in any fire, wear self-contained breathing apparatus pressure demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Spill Response:

Wear suitable protective equipment listed under Exposure Controls / Personal Protection. Eliminate any ignition sources until the area is determined to be free from explosion or fire hazards. Contain the release and eliminate its source, if this can be done without risk. Dispose as hazardous waste. Comply with Federal, State and local regulations.

SECTION 7 - HANDLING AND STORAGE

Store in a tightly closed container.
Store in a cool area away from ignition sources and oxidizers.
Avoid breathing vapors or mists.
Use with adequate ventilation.
Do not get in eyes, on skin or clothing.
Avoid prolonged or repeated exposure.
This product should only be used by persons trained in the safe handling of hazardous chemicals.

SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls and Personal Protection Equipment (PPE):

Respiratory Protection: If workplace exposure limit(s) of product or any component is exceeded (see TLV/PEL), a NIOSH/MSHA approved air supplied respirator is advised in absence of proper environmental control. OSHA regulations also permit other NIOSH/MSHA respirators (negative pressure type) under specified conditions (see your safety equipment supplier). Engineering and/or administrative controls should be implemented to reduce exposure.

Material should be handled or transferred in an approved fume hood or with adequate ventilation.

Protective gloves must be worn to prevent skin contact.

(Chloroprene, natural rubber, nitrile, or equivalent)

Safety glasses with side shields must be worn at all times.

General Hygiene Considerations:

Wash thoroughly after handling. Do not take internally. Eye wash and safety equipment should be readily available.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Clear liquid
Odor: N/A
pH: N/A
Vapor Pressure: 97 mmHg (20 °C)

Vapor Density (Air = 1): 1.1 g/L
Boiling Point: 65 °C
Melting Point: -93.9 °C
Solubility in Water: Very soluble
Specific Gravity (H₂O = 1): 0.791 g/cm³
Flash Point: 52 °F (11 °C) (tcc)
Explosion Limits (%): 6.7 to 36.5
Autoignition Temperature: 385 °C
Percent Volatile: 99.9+
Evaporation Rate (BuAc = 1): 5.9
Molecular Weight: N/A
Molecular Formula: N/A

SECTION 10 - STABILITY AND REACTIVITY

Stability: Stable
Materials To Avoid: Acids
Oxidizers
Alkali metals; Reducing agents
Hazardous Decomposition: Oxides of carbon; Formaldehyde
Hazardous Polymerization: Will not occur
Conditions To Avoid: Heat; Contact with ignition sources

SECTION 11 - TOXICOLOGICAL INFORMATION

See section 3 for specific toxicological information for the ingredients of this product.

SECTION 12 - ECOLOGICAL INFORMATION

By complying with sections 6 and 7 there will be no release to the environment.

SECTION 13 - DISPOSAL CONSIDERATIONS

Recycle or incinerate at any EPA approved facility or dispose in compliance with Federal, State and local regulations. Empty containers must be triple-rinsed prior to disposal.

SECTION 14 - TRANSPORT INFORMATION

DOT/IATA UN Number: UN1230 Shipping Class: 3 Packing Group: II Methanol, Flammable liquid

HIGHLY FLAMMABLE

SECTION 15 - REGULATORY INFORMATION

In addition to Federal and state regulations, local regulations may apply. Check with your local regulatory authorities.

This product is subject to SARA section 313 reporting requirements.

WARNING: This product contains chemical(s) known to the state of California to cause cancer and to cause birth defects or other reproductive harm.

All components are listed on the TSCA Inventory. For laboratory, research and development use only. Not for manufacturing or commercial purposes.

SECTION 16 - OTHER INFORMATION

This document has been designed to meet the requirements of OSHA, ANSI and CHIPs regulations.

The statements contained herein are offered for informational purposes only and are based on technical data that we believe to be accurate. The manufacturer will not assume any liability for the accuracy and completeness of this information. Final determination of the suitability of the material is the responsibility of the user. Although certain hazards are described herein, the user should not presume that these are the only hazards that exist.

Since conditions and manner of use are outside of the manufactureres control, we make

NO WARRANTY OF MERCHANTABILITY, EXPRESSED OR IMPLIED, AND ASSUME NO LIABILITY RESULTING FROM ITS USE.

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Appendix B

Control Mechanisms

The following control methods should be implemented for hazards that were identified as part of the tasks that will be conducted as part of this project.

B1 Chemical Hazards – ENVIRON personnel, contractors, subcontractors, and visitors will wear appropriate personal protective equipment (PPE) while performing Site activities. At a minimum, equipment will include safety glasses, steel-toe boots, and hard hats (when overhead work being performed or when overhead hazards exist). Additional PPE requirements are outlined in Section 7 of this site-specific health and safety plan (HASP) and ENVIRON personnel will familiarize themselves with the appropriate health and safety responses for exposure to known on-site chemicals prior to beginning work at the Site. See Appendix A for chemical safety data. Consult with your local health and safety coordinator (HSC) for any personal air monitoring requirements.

B2 Physical Hazards – Floor and wall openings, careless movements, protruding objects, debris, spills, and placement of materials on paths or foot traffic areas present a hazard with regards to slips, trips, falls, and puncture wounds.

ENVIRON personnel will minimize the risk of slips, trips, and falls by keeping the work area clear of excess equipment and cleaning up wet surfaces as soon as possible. In addition, the floor of every workroom will be maintained in a clean and, as much as possible, dry condition. Employees should avoid walking through or on wet and/or cluttered surfaces and be conscious of the fact that wet surfaces could be slippery and could cause injury. Spilled materials should be cleaned up immediately.

Personnel should stay alert at all times and if tired or distracted, take their condition into account when working at the Site. To minimize the possibility of injury:

- Wear sturdy work boots (steel-toe boots are required) with a good tread.
- Do not run.
- Slide feet when walking on slick/wet surfaces.
- Don't walk up or down steep embankments/hills if possible. Otherwise, walk at an angle when going up/down embankments/hills.
- Don't carry items that block your vision.
- Use handrails/grips when available and maintain 3-point contact whenever possible.
- Don't jump down from equipment and look down before you step down.
- Use appropriate fall protection when working at elevation.
- Report any floor openings that are not clearly marked and/or guarded.
- Don't use ladders/scaffolds during high winds or when ice or snow is on the rungs/work surface.
- Don't use ladder substitutes like a box or truck fender, and don't use ladders/scaffolding that is not in good conditions.
- Keep paths and work areas clear of tools, equipment, boxes, cords, etc. Tape or secure cords, wires, etc. to minimize trip/fall hazard.

- If a protruding object cannot be moved, make sure the object can be easily seen or guard/pad the object if possible.
- Use ancillary lighting such as flashlights and headband lights when necessary.

Sufficient illumination should be provided in all areas at all times. Employees should notify the responsible person of conditions where there is an absence of sufficient natural and/or permanent artificial light.

Emergency exit doors will be kept free of obstacles. Employees finding an emergency door blocked should correct the situation and report the condition, if needed. Exit lights and signs will also be maintained in proper condition reported if deficient.

B3 Mechanical Hazards – Working in the vicinity of operating drill rigs poses unique safety concerns such as high-pressure hazards from hoses, pipes, or the well; gas releases; falls from elevation; electrical contact; and improper machine guarding. ENVIRON personnel will not attempt to operate equipment they are not familiar with and/or that is not equipped with protective devices. Personnel will familiarize themselves with the equipment being utilized on-site, and will, at a minimum, know how to stop or turn off the equipment. Although ENVIRON personnel do not operate or have control over the operation of drilling equipment, it is every employees responsibility to recognize potential or existing hazards related to drill rigs and to walk away from any unsafe operations.

Depending upon the work to be done by ENVIRON personnel; a preliminary Site field survey may need to be performed prior to ENVIRON involvement in drilling operations. The survey should include verification that utilities and any hazardous buried material or structures have been located and marked and that the nearest emergency facility has been identified. It may also include information on safe access to the drilling areas, hazards on-site, location of a clean water source, and weather conditions and related shelter areas.

Employee Restrictions and Responsibilities

Under no circumstances will an ENVIRON employee operate a drilling rig, a portion thereof, or any piece of contractor equipment. In addition, employees will not:

- Guide a drill rig to a drill location, assist in the movement of equipment, or participate in the movement or breaking down of any portion of the rig
- Climb on the rig, stand too close to the rig (especially its moving parts), stand below or close to a pipe hoist, walk on drilling rods or casing, or walk on the edge of a mud pit (the distance the personnel should stand away from the rig should at least be equal to the height of the rig)
- Watch a driller arc-weld
- Smoke while at a drilling site
- Refuel an engine while it is still running or hot, siphon gasoline, or park near a rig exhaust
- Wear loose fitting clothing or PPE near the drill rod or stem

ENVIRON employees will not place tools, meters, or other equipment in a position that could create a fall, trip, or slip hazard. As much as is possible, employees will work with the appropriate Site personnel to ensure the area in the vicinity of the drill rig is clean, orderly, and free of slip, trip, and fall hazards.

If the drilling is being done at a hazardous waste site, the PPE requirements will be forwarded as noted in this site-specific HASP. Clean water will be kept available for decontamination, washing, and dust control. Kneeling, lying in, or sitting on contaminated ground or materials will be avoided or a protective barrier will be used. Handling of contaminated materials will be avoided or minimized.

Manual hand trucks should be used whenever feasible to move heavy objects, objects with poor hand holds, or large bulky objects. The following are things to consider:

- Keep the center of gravity of the load as low as possible, and place heavy objects below lighter ones.
- Place loads where the weight of the load will be carried by the axle, not the handles, and where it will not slip, shift, or fall during movement.
- Load only to a height that allows a clear view ahead. Only walk backwards with a hand truck in specific instances such as when going up an incline.
- When going down an incline the hand truck should be in front of the operator and when going up an incline, it should be downhill from the operator.
- Move the hand truck at a safe speed.

B4 Traffic/Heavy Equipment Safety – ENVIRON personnel should not, under any circumstances, operate or ride on heavy equipment that is being used by a subcontractor. Site personnel will maintain a safe distance of at least 20 feet (6.5 meters) or more, depending on circumstances and directives, from heavy equipment in operation. If activities warrant closer proximity to operating equipment, personnel will don brightly colored vests and a second person will stand watch to keep him/her out of the path of equipment while performing the required activity. Eye contact with the equipment operator will be maintained.

Heavy Equipment can represent a substantial hazard to workers. The following procedures should be followed when heavy equipment is in use:

- Do not handle or attempt to operate power tools or motorized vehicles without proper training.
- Use common sense. Do not assume that the equipment operator is keeping track of your whereabouts. Never walk directly in back of or to the side of, heavy equipment without the operator's knowledge.
- Ensure all heavy equipment is shut down during refueling.
- Maintain visual contact with moving equipment at all times.
- Establish hand signal communication when verbal communication is difficult.
- Ensure heavy equipment have backup alarms of some type.

- Use chains, hoists, straps, and any other necessary equipment to aid in safely moving heavy materials.
- Never use a piece of equipment unless you are familiar with its operation. This applies to heavy as well as light equipment (e.g., steam cleaners, hand tools, etc.).
- Be sure that no underground or overhead power lines, sewer lines, gas lines, or telephone lines, will present a hazard in the work area.
- Restrict nonessential people from entering the work area.
- Prohibit loose-fitting clothing or loose long hair around moving machinery.
- Instruct equipment operators to report any abnormalities such as equipment failures, unusual odors, etc.
- Implement an ongoing maintenance program for tools and equipment. Inspect tools and moving equipment regularly to ensure that parts are secured and intact. Promptly repair or replace any defective items.
- Store tools in clean, secure areas so that they will not be damaged, lost, or stolen.
- When an equipment operator must negotiate in tight quarters, provide a second person to ensure adequate clearance.
- Properly level and support heavy equipment prior to use.
- Operate heavy equipment and trucks in specific site control zones and marked traffic lanes.
- Do not throw, toss, or drop materials, tools, or other objects. Always hand off or lower items as needed.

Working near Railroads – In the event that work activities are conducted near and/or adjacent to railroad tracks, the following procedures will be implemented:

- The hazards of working near and/or adjacent to railroads will be included in job briefings prior to the commencement of work activity and subsequently when the activity changes.
- Mounting, dismounting, or crossing over moving locomotives or cars is prohibited.
- Employees will be alert for the movement of cars, locomotives, or equipment at any time, in either direction, on any track and will remain at least 25 feet (8 meters) from the end of standing cars, equipment, or locomotives, except when proper protection is provided (e.g., a flagman is present or the track is taken out of service by the proper authority prior to starting any work on or about the tracks).
- Employees will not cross over coupled, moving freight cars; take refuge under any car, equipment, or locomotive; or attempt to mount, dismount, or cross over moving equipment.

B5 Electrical Hazards – Electricity may pose a particular hazard to site workers due to the use of portable electrical equipment. If wiring or other electrical work is needed, a qualified electrician must perform it.

Electrical equipment should be properly grounded. Personnel should avoid standing in water when operating electrical equipment. Ground fault outlets or adapters will be used for any

electrical equipment. Apparatus, tools, equipment, and machinery will not be repaired while in operation. Lockout/Tagout (LOTO) procedures will be implemented when necessary. If equipment must be connected by splicing wires, electrical work must be performed by a licensed and competent electrician.

General electrical safety requirements are as follows:

- All electrical wiring and equipment must be a type listed by Underwriters Laboratories (UL), Factory Mutual Engineering Corporation (FM), or other recognized testing or listing agency.
- All portable generators or other portable internal combustion type devices used on-site will be grounded. All grounds will be validated twice daily with a multimeter to confirm a resistance of less than 10 ohms.
- All installations must comply with the National Electrical Safety Code (NESC), the National Electrical Code (NEC), or United States Coast Guard regulations.
- Portable and semiportable tools and equipment must be grounded by a multiconductor cord having an identified grounding conductor and a multicontact polarized plug-in receptacle.
- Tools protected by an approved system of double insulation, or its equivalent, need not be grounded. Double-insulated tools must be distinctly marked and listed by UL or FM.
- Live parts of wiring or equipment must be guarded to prevent persons or objects from touching them.
- Electric wire or flexible cord passing through work areas must be covered or elevated to protect it from damage by foot traffic, vehicles, sharp corners, projections, or pinching.
- All circuits must be protected from overload.
- Temporary power lines, switchboxes, receptacle boxes, metal cabinets, and enclosures around equipment must be marked to indicate the maximum operating voltage.
- Plugs and receptacles must be kept out of water unless manufactured with an approved submersible construction.
- All extension cord outlets must be equipped with ground-fault-circuit interrupters (GFCIs).
- Attachment plugs or other connectors must be equipped with a cord grip and be constructed to endure rough treatment.
- Extension cords or cables must be inspected prior to each use and replaced if worn or damaged.
- Cords and cables must not be fastened with staples, hung from nails, or suspended by bare wire.
- Flexible cords must be used only in continuous lengths without splice, with the exception of molded or vulcanized splices made by a qualified electrician.

B6 Fire and Explosion Hazards – The presence of petroleum and solvent-contaminated material presents a potential fire hazard. Smoking and the use of open flames will be prohibited in the presence of fire and explosion hazards. The use of nonsparking tools and equipment will

be implemented if conditions warrant. Where the potential of fire exists, ENVIRON will provide portable fire extinguishers. Where applicable, fire extinguishers will be mounted 4 feet (1.22 meters) from the floor and/or will be readily accessible. Fire extinguishers will be maintained as follows:

- Fully charged and in operable condition
- Clean and free of defects
- Readily accessible at all times

Fire prevention and protection measures include elimination of ignition sources, where feasible; identification of combustion sources and atmospheres; and early detection of and rapid response to fire/explosion situations. In addition to standard operating procedures, the following safe work practices will be implemented:

- Site activities will comply with National Electric Code and explosion proof criteria.
- Smoking will only be allowed in designated areas.
- Appropriate air monitoring procedures will be conducted, when necessary.
- Welding, open flame, or spark-producing operations will not be allowed on-site.
- Solvents with a flash point of less than or equal to 100°F will not be used for cleaning purposes.
- Fire extinguishers will be kept in work vehicles and will:
 - be maintained in a fully charged and operable condition;
 - be visually inspected each month; and
 - undergo a maintenance check each year.

All fires and visible smoke that are detected at the Site will be dealt with immediately by the individual recognizing the fire and/or smoke. In the event of visible smoke, fire, or explosion, the following emergency response procedures will be implemented:

- Immediately cease operations
- In emergency situations contact emergency services

For small fires, personnel may attempt to extinguish the fire, if safe to do so and they have been trained. One fire extinguisher ONLY may be used to fight the fire. After one fire extinguisher is depleted, personnel must evacuate the area. For larger fires, perform site evacuation immediately.

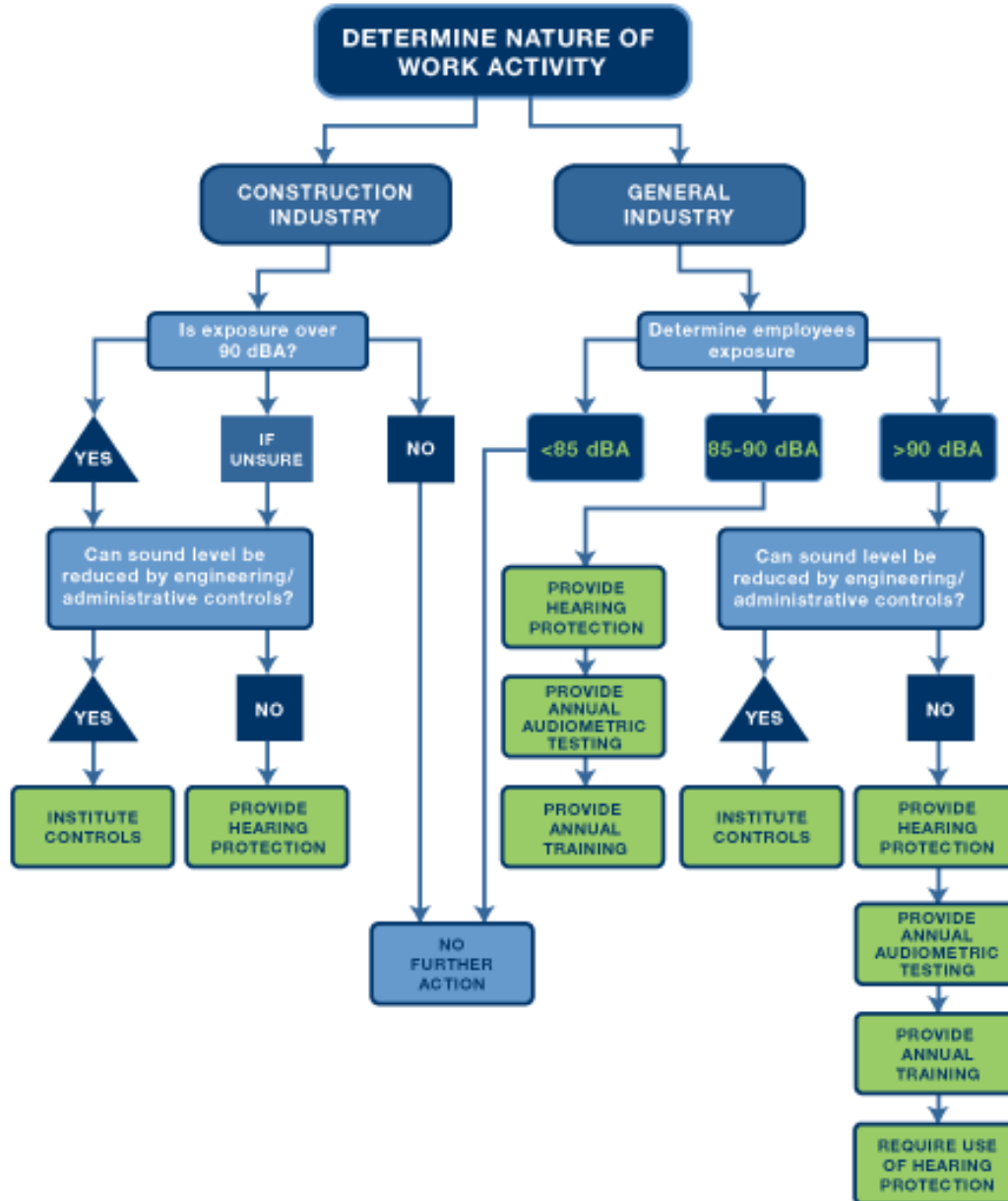
B7 Acoustical Hazards – Hearing protection will be worn by personnel operating or working in the vicinity of equipment when noise is sufficient to interfere with general conversation at a normal speaking volume; when noise levels exceed 85dBA; and/or when manufacturers' requirements indicates that it's usage is mandatory. Personal hearing protectors, such as earplugs or earmuffs, may be used to reduce the amount of noise exposure while the above control measures are being evaluated or if such controls fail to reduce the exposure levels to below the PELs.

Any environmental condition where a person must shout to be heard from a distance of 3 feet indicates a hazardous noise environment. Under these conditions, personnel must be protected through the use of appropriate hearing protective devices.

Hearing protection will be worn, as follows:

- In any situation where normal conversation cannot be heard at a distance of 3 feet regardless of the source of the noise or where noise levels as measured with approved noise monitoring equipment is above 85 dBA.
- When operating gasoline or electric powered machinery.
- When working within 25 feet of operating heavy equipment (e.g., earth working equipment, etc.) as working around this type of equipment can result in exposure to hazardous levels of noise (i.e., levels greater than 90 dBA).

Refer to the decision tree below:



B8 Ventilation/Oxygen Deficiency Hazards – ENVIRON personnel will monitor the work area for oxygen deficiency hazards using monitoring devices that have been appropriately calibrated and are recommended for this specific use, as applicable. If direct air monitoring readings suggest an oxygen deficiency and/or the build-up of harmful substances, leave the area and contact your PM. Implementation of corrective actions may include but are not limited to increasing work zone ventilation or evaluating alternatives (e.g., removing equipment that is generating combustion exhaust or venting the exhaust to the exterior of the building). However, work will not continue until the ventilation/oxygen deficiency hazard has been properly addressed, implemented, and verified.

B9 Heat Stress – Heat stress can be a significant hazard, especially for workers wearing protective clothing. Depending on the ambient conditions and the work being performed, heat stress can occur very rapidly, within as little as 15 minutes. Site personnel will be instructed in the identification of a heat stress victim, the first-aid treatment procedures for the victim, and the prevention of heat stress incidents.

Workers will be encouraged to immediately report any heat-related problems that they experience or observe in fellow workers. Any worker exhibiting signs of heat stress and exhaustion should be made to rest in a cool location and drink plenty of water. Emergency help by a medical professional is required immediately for anyone exhibiting symptoms of heat stroke, such as red, dry skin, confusion, delirium, or unconsciousness. Heat stroke is a life threatening condition that must be treated by competent medical personnel.

ACGIH screening criteria for heat stress exposure in degrees Celsius (°C) for an 8 hour work day 5 days per week with conventional breaks will be used in determining safe exposure for acclimatized and unacclimatized employees.

Allocation of Work in a Work/Rest Cycle	Acclimatized				Action Limit (Unacclimatized)			
	Light	Moderate	Heavy	Very Heavy	Light	Moderate	Heavy	Very Heavy
75 to 100%	31.0°C (87.8°F)	28.0°C (82.4°F)	--	--	28.0°C (82.4°F)	25.0°C (77°F)	--	--
50 to 75%	31.0°C (87.8°F)	29.0°C (84.2°F)	27.5°C (81.5°F)	--	28.5°C (83.3°F)	26.0°C (78.8°F)	24.0°C (75.2°F)	--
25 to 50%	32.0°C (89.6°F)	30.0°C (86°F)	29.0°C (84.2°F)	28.0°C (82.4°F)	29.5°C (85.1°F)	27.0°C (80.6°F)	25.5°C (77.9°)	24.5°C (76.1°F)
0 to 25%	32.5°C (90.5°F)	31.5°C (88.7°F)	30.5°C (86.9°F)	30.0°C (86°F)	30.0°C (86°F)	29.0°C (84.2°F)	28.0°C (82.4°F)	27.0°C (80.6°F)

°C: degrees Celsius

°F: degrees Fahrenheit

Heat Stress Prevention

Whenever possible or within the control of ENVIRON, engineering controls should be utilized to protect workers from heat-related hazards (e.g., isolation from the heat source; ventilation such as open windows, fans, or other methods of creating air flow; and heat shielding such as awnings or umbrellas).

Appropriate work practices can also lessen the chances of heat-related hazards. Some of these include the following:

- Water intake should be about equal to the amount of sweat produced (i.e., drink 5 to 7 ounces of water every 15 to 20 minutes). Electrolyte fluid consumption may also be necessary.

- Whenever possible, gradual exposure to heat is preferred to allow the body's internal temperature to acclimate to the working conditions.
- Whenever possible, adjust the work schedule to reduce the risk of heat stress. For example, perform nonessential or heavier work in the cooler part of the day and perform work in the shade if possible.
- Rotate personnel to reduce the amount of time spent working in direct sun and heat.
- Increase the number and/or duration of rest breaks, and whenever possible, rest break areas should be in a cool area and as close to the work area as is feasible.

Wear appropriate PPE, such as thermally conditioned clothing, self-contained air conditioning in a backpack, and plastic jackets/vests with pockets that can be filled with dry ice or ice. However, the type of work, the location where work is being performed, or other required PPE, may make the use of this PPE impossible or impractical.

Heat-Related Illnesses

Heat Stress: This is the mildest heat-related illness, and prompt action may prevent it from turning into a more severe heat-related illness. Symptoms include irritability, lethargy, significant sweating, headache, or nausea.

Heat Stress First Aid:

- Take the victim to a protected (e.g., shaded, cool) area, remove any excess protective clothing, and provide cool fluids.
- If an air-conditioned spot is available, this is an ideal break location.
- Once the victim shows improvement he/she may resume working, however the work pace and practices (e.g., does fluid intake need to be increased) should be moderated to prevent recurrence of the symptoms.

Heat Exhaustion: This illness usually begins with muscular weakness, dizziness, nausea, and a staggering gait. Symptoms include pale, clammy skin, and profuse sweating, vomiting, and the bowels may move involuntarily. The pulse is weak and fast, breathing is shallow. Fainting can occur.

Heat Exhaustion First Aid:

- Immediately remove the victim from the work area to a shady or cool area with good air circulation, but avoid drafts or sudden chilling – you do not want the victim to shiver.
- Call a physician or emergency service, or transport the victim to medical care.
- Remove protective outerwear.
- If the victim is conscious, it may be helpful to give him/her sips of water.

Heat Stroke: Heat stroke is a severe medical condition requiring first aid and emergency treatment by a medical professional as death can occur without appropriate care. Heat stroke represents the collapse of the body's cooling mechanisms. As a result, body temperatures often rise to between 105 and 110°F. As the victim progresses toward heat stroke, symptoms include

hot and usually dry, red, and spotted skin; headache; dizziness; nausea; mental confusion; delirium; possible convulsions; and loss of consciousness.

Heat Stroke First Aid:

- Immediately remove the victim from the work area to a shady or cool area with good air circulation, but avoid drafts or sudden chilling – you do not want the victim to shiver.
- Summon emergency medical help to provide on-site treatment and transportation to a medical facility.
- Remove protective outerwear and loosen personal clothing.
- Apply cool wet towels, ice bags, etc. to the head, armpits, and thighs. Sponge off the bare skin with cool water or even place the victim in a tub of cool water.

Skin Hazards

Sunburn and prickly heat are both symptoms of skin irritation/damage produced through exposure to sunlight and operating in hot work environments.

- Protect exposed skin with an appropriate sunscreen. A sunscreen with a sun protection factor (SPF) of 15 or greater is required for work in the sun with reapplication at breaks and lunch.
- Heat rash, also known as prickly heat, can be prevented by the application of a hydrophobic, water-repellent barrier cream such as Kerodex 71.

B10 Cold Stress – The four environmental conditions that cause cold-related stress are low temperatures, high/cool winds (i.e., wind chill), dampness, and cold water. One or any combination of these factors can cause cold-related hazards. Cold stress, including frostbite and hypothermia, can result in severe health effects.

A dangerous situation of rapid heat loss may arise for any individual exposed to high winds and cold temperatures. Major risk factors for cold-related stresses include:

- **Wearing inadequate or wet clothing**, which increases the effects of cold on the body
- **Taking certain drugs or medications** such as alcohol, nicotine, caffeine, and medication that inhibits the body's response to the cold or impairs judgment
- **Having a cold or certain diseases**, such as diabetes, heart, vascular, and thyroid problems, which may make a person more susceptible to the winter elements
- **Being male** because men experience far greater death rates due to cold exposure than women, perhaps due to inherent risk-taking activities, body-fat composition, or other physiological differences
- **Becoming exhausted or immobilized**, especially due to injury or entrapment, which may speed up the effects of cold weather
- **Age** because the elderly are more vulnerable to the effects of harsh winter weather

TABLE 2. Cooling Power of Wind on Exposed Flesh Expressed as Equivalent Temperature (under calm conditions)*

Actual Temperature Reading (°F)												
Estimated Wind Speed (in mph)	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
Equivalent Chill Temperature (°F)												
calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little additional effect.)	LITTLE DANGER			INCREASING DANGER				GREAT DANGER				
	In < hr with dry skin. Maximum danger of false sense of security			Danger from freezing of exposed flesh within one minute.				Flesh may freeze within 30 seconds.				
	Trenchfoot and immersion foot may occur at any point on this chart.											

*Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA.

Equivalent chill temperature requiring dry clothing to maintain core body temperature above 36°C (96.8°F) per cold stress TLV

Cold Stress Prevention

Engineering controls should be utilized whenever possible to protect workers from cold-related hazards. For example, on-site heat sources, heated shelters, work areas shielded from drafty or windy conditions, and the use of thermal insulating material on equipment handles.

Effects arising from cold exposure will be minimized by the following control measures:

- Personnel will be trained to recognize cold stress symptoms.
- Field activities will be curtailed or halted if the equivalent chill temperature is below 20°F.
- As much as possible, work that exposes personnel to the cold will be done during the warmest hours of the day.
- Inactivity in cold conditions will be kept to a minimum.
- Frequent short breaks in warm, dry shelters will be taken.
- Vehicles will be equipped with supplies in case the vehicle becomes inoperable (e.g., blanket, dry clothing, water, food, a shovel, etc.).

The following PPE will be provided during work in cold environments

- Workers will be provided with insulated dry clothing when the equivalent wind chill temperature is less than 30°F.
- Feet, hands, the face, and the head should be protected (40% of the body's heat can be lost when the head is exposed).
- Foot and hand wear may also need to be waterproof.

- Clothing should be layered so that adjustments can be made to changing environmental temperatures and conditions. For example, an outer layer to break the wind, a middle layer that will absorb sweat and retain insulation when wet, and an inner layer that allows ventilation.

Cold-Related Illness

Hypothermia: Hypothermia occurs when the body temperature falls to a level where normal muscular and cerebral functions are impaired. Although it usually occurs in freezing air and water temperatures, it can occur in any climate if a person's internal body temperature falls below normal. Symptoms should not be ignored, and a supervisor should be notified as soon as hypothermia is suspected.

Initially, symptoms may include shivering, an inability to do complex motor functions, sluggishness and mild confusion as the body temperature drops to around 95°F. As the body temperature falls, speech may become slurred, behavior may be irrational, simple motor functions may be difficult, and a state of "dazed consciousness" may exist. In a severe state (below 90°F), heart rate, blood flow, and breathing will slow. Unconsciousness and full heart failure can occur.

Hypothermia First Aid:

On land:

- Call for emergency, and then help move the victim (unless other injuries prohibit the victim from being moved) to a warm, dry area and replace wet clothing with warm, dry clothing or a blanket. Move the person carefully because movement can increase the irritability of the heart.
- If the victim is conscious and lucid, warm liquids can be provided, but never alcohol or caffeinated drinks. If possible, have the victim move his or her arms and legs to create muscle heat.
- If the victim is unconscious or unable to assist, place warm bottles/packs in the victim's armpits, groin, neck and head areas.
- Do not rub the victim's body or place them in warm water.

In water:

- Call for emergency help and get the victim out of the water. Move the victim carefully because movement can increase the irritability of the heart.
- If it is you in the water, do not swim unless a floating object or person can be reached quickly as swimming uses the body's heat and reduces survival time by about 50%.
- If you are in the water, conserve body heat by folding arms across the chest, keeping thighs together, bending knees and crossing ankles, if another person is in the water with you, huddle together.
- If you are in the water, do not remove clothing, rather button, buckle, zip, and tighten collars, cuffs, shoes, and hoods as the water trapped next to the body provides a layer of insulation that may slow the loss of heat.

Frostbite: Frostbite occurs when the skin freezes, and deep frostbite can affect deeper tissues such as tendons and muscles. Frostbite usually occurs when temperatures drop below 30°F, but wind chill effects can cause frostbite at above-freezing temperatures. The ears, fingers, toes, cheeks, and nose are the most commonly affected body parts. Initially, symptoms include an uncomfortable sensation of coldness. Tingling, stinging or an aching feeling of the exposed area is followed by numbness. Frostbitten areas appear white and cold to the touch and with deeper frostbite, the area becomes numb, painless, and hard and can turn black.

Frostbite First Aid:

- Seek medical attention as soon as possible and treat any existing hypothermia first.
- Warm liquid can be provided, but not alcohol or caffeinated drinks such as tea and coffee.
- Do not rub the affected areas, instead cover them with dry, sterile gauze or soft, clean bandages.
- Do not try rewarming the affected area if you have not been specifically trained to do so and/or if there is a chance the affected area will get cold again.

Trench Foot: Trench Foot is caused by a continuous exposure to a wet, cold environment. Symptoms include tingling and/or itching sensation, burning pain and swelling and, in more extreme cases, blisters.

Trench Foot First Aid:

- Seek medical attention as soon as possible and move the victim to a warm, dry area.
- Affected tissue can be treated with careful washing, drying, and slight elevation. Do not try rewarming the affected area if you have not been specifically trained to do so.

TABLE 3. Threshold Limit Values Work/Warm-up Schedule for Four-Hour Shift*

Air Temperature— Sunny Sky		No Noticeable Wind		5 mph Wind		10 mph Wind		15 mph Wind		20 mph Wind	
°C (approx.)	°F (approx.)	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks
-26° to -28°	-15° to -19°	(Norm. Breaks) 1		(Norm. Breaks)		75 min	2	55 min	3	40 min	4
-29° to -31°	-20° to -24°	(Norm. Breaks) 1		75 min	2	55 min	3	40 min	4	30 min	5
-32° to -34°	-25° to -29°	75 min	2	55 min	3	40 min	4	30 min	5	Non-emergency work should cease	
-35° to -37°	-30° to -34°	55 min	3	40 min	4	30 min	5	Non-emergency work should cease			
-38° to -39°	-35° to - 39°	40 min	4	30 min	5	Non-emergency work should cease					
-40° to -42°	-40° to -44°	30 min	5	Non-emergency work should cease							
-43° & below	-45° & below	Non-emergency work should cease									

Notes for Table 3

- Schedule applies to moderate to heavy work activity with warm-up breaks of ten (10) minutes in a warm location. For Light-to-Moderate Work (limited physical movement): apply the schedule one step lower. For example, at -35°C (-30°F) with no noticeable wind (Step 4), a worker at a job with little physical movement should have a maximum work period of 40 minutes with 4 breaks in a 4-hour period (Step 5).
- The following is suggested as a guide for estimating wind velocity if accurate information is not available:
5 mph: light flag moves; 10 mph: light flag fully extended; 15 mph: raises newspaper sheet; 20 mph: blowing and drifting snow.
- If only the wind chill cooling rate is available, a rough rule of thumb for applying it rather than the temperature and wind velocity factors given above would be: 1) special warm-up breaks should be initiated at a wind chill cooling rate of about 1750 W/m²; 2) all non-emergency work should have ceased at or before a wind chill of 2250 W/m². In general the warm-up schedule provided above slightly under-compensates for the wind at the warmer temperatures, assuming acclimatization and clothing appropriate for winter work. On the other hand, the chart slightly over-compensates for the actual temperatures in the colder ranges, since windy conditions rarely prevail at extremely low temperatures.
- TLVs apply only for workers in dry clothing.

*Adapted from Occupational Health & Safety Division, Saskatchewan Department of Labour.

B12 Poisonous Plants – Plants poison on contact, through ingestion, or by absorption or inhalation. They cause painful skin irritations upon contact and can cause internal poisoning when eaten.



Poison Ivy



Poisonous Sumac



Giant Hogweed



Poison Pacific Oaks



First Aid for poisonous plants:

- Wash exposed areas with cold running water as soon as you can.
- When possible, wash your clothing.
- Relieve itching by taking cool showers and applying topical anti-itch medications or hydrocortisone.
- The rash is often arranged in streaks or lines where you brushed against the plant.
- In a few days, the blisters become crusted and take 10 days or longer to heal.
- If the reaction is severe or worsens, seek medical attention.

B13 Personal Safety – If it is determined that a work site is in an area where an employee's personal safety may be at risk from potential criminal acts, wild animals, or other hazards, the risks will be evaluated and preventive measures will be implemented to minimize the risk. Informational resources such as the client, local law enforcement officials, Park or Wildlife Service, and Animal Control may be utilized to assess the risk and to ensure the safest possible work environment. For example, local law enforcement can be present or make frequent drive-bys while work is being done, outside security can be hired, work can occur only during certain times of the day, or work may not proceed at all. Some general guidelines are provided here, but each situation is different and actions must be taken based on the specifics of each.

In areas of risk, employees will communicate via cell phones or two-way radios, and will check-in at predetermined times throughout each workday. If employees do not call in to the PM or designated representative, the team will be contacted, and if unsuccessful, local law enforcement will be notified.

If you see wild animals while driving, stay in your vehicle. Never get out for a photo or a closer look. Keep windows up and don't try to keep the animal from crossing a road with your vehicle. If you see a wild animal while on foot, never approach the animal. If the animal has not seen you, go back the way you came. Do NOT turn your back and run, which could evoke their natural predator instinct. Instead, keep facing the animal and back away at a steady pace. Let it be known you are human by talking in a low voice and waving your hands slowly. If you are near a car or building, get inside. In addition, in areas of higher risk (e.g., contacted local officials have indicated that wild animals are a nuisance), employees may want to consider carrying pepper spray.

If, despite precautions, an employee feels that his or her personal safety is at risk, he or she will cease work, leave the work area and immediately report his or her concerns so that appropriate steps can be taken.

B14 Working Alone and Working in Isolated Areas – Site and operations employees will assess the risk of working alone as outlined in Section 4 of this HASP. Whenever possible, employees will not work alone in isolated areas. If the isolated area involves hiking/walking into areas that are unmarked or if there is potential to become directionally disoriented (e.g., no trails, unmarked trails, forested areas, or highly vegetated areas), employees will be trained on the use of a compass and trail/topography maps and, if necessary, will take wilderness safety training. The employee will work with the Park or Wildlife Service on what emergency planning is necessary (e.g., unexpected weather, animal attack, and search/rescue).

Communicating through cell phones or two-way radios will be utilized whenever possible. Employees will check-in at predetermined times throughout each workday, and as the risk rating increases, employees will check-in more frequently. If employees do not call in to the PM or designated representative, the team will attempt to be contacted. If contacting the employee is unsuccessful, the appropriate authorities will be notified. In addition, and especially if communication is not possible during the day, the planned start and estimated finish times for the day will be communicated, and employees will check in at the beginning and end of the work day.

If employees will be moving from isolated area to isolated area, there will be established beginning and ending locations, planned start and estimated finish times, and planned routes that will be followed throughout the day. Employees will not deviate from this schedule without first contacting the appropriate personnel. It may also be necessary to notify the client, law enforcement, or Park or Wildlife officials of these schedules.

Local authorities should be contacted about any hunting season that may be in session and if it is possible that hunters may be present in the area in which ENVIRON personnel will be working. If so, employees will wear brightly colored hardhats/hats and reflective vests, will not work before dawn, and will cease working 30 minutes before dusk.

If it is not possible to complete work during daylight hours, employees will wear appropriate reflective apparel and have appropriate lighting (e.g., portable lighting, flashlights, or headlamps, as appropriate) for the activity being conducted. Personal security will be assessed and measures taken as discussed above, if appropriate.

B15 Severe Weather – Severe weather conditions include high winds, electrical storms, and heavy rain. At a minimum, all work outdoors will cease during these events. When lightning is spotted, site personnel should use the following steps to avoid injury:

- Workers should note the flash-boom ratio (i.e., count the number of seconds between when the lightning was seen and when the thunder was heard).
- By counting the seconds between seeing lightning and hearing thunder and dividing by 5, you can estimate your distance from the storm (in miles). If the storm is 6 miles (9.6 kilometers) away or less (30 seconds between when lightning was seen and thunder was heard), workers must stop work and take shelter.
- If the storm is more than 6 miles (9.6 kilometers) away (greater than 30 seconds between lightning and thunder), the Site supervisor should monitor the storm and be prepared to cease work if the storm approaches an unsafe distance. Since storms can travel at varying speeds and the amount of time it takes to cease and secure operations will also vary, prudent judgment should be exercised when storms are in the vicinity and/or developing (e.g., darkening skies, increasing wind speeds, etc.).
- Workers should not stay in exposed areas (e.g., outdoors on the ground, on a roof, in an aerial lift, on a steel truss, on an ungrounded steel structure, in a golf cart, unsided building, etc.) after lightning has been witnessed. All personnel must move to a safe location.
- Workers should wait 30 minutes from the last sight of lightning or sound of thunder before returning to work.
- Those required to travel from one building to another during the 30-minute wait time should do so only by enclosed vehicle.
- Once the 30-minute wait time has elapsed and no additional lightning or thunder has been seen or heard, individuals may resume normal work.

B16 Aboveground and Underground Utilities – Various forms of underground and aboveground utility lines or pipes (carrying water, wastewater, gas, and/or electricity) may be encountered during work activities. Every effort will be made to locate and mark underground utilities prior to the start of intrusive work. At a minimum, ENVIRON will conduct a historical site review to develop a plot plan with the most up to date utility information, contact the appropriate One Call service (where available), contract a private utility locating service (where available), and clear the critical zone around any intrusive location to 5 feet (1.3 meters) in every direction. Please reference Section 4 of this site-specific HASP and SPI 27, Subsurface Clearance, for more information.

Work involving machinery with high extensions (backhoes, etc.) will remain **at least** 10 feet (3.3 meters) from overhead power lines. As line voltage increases, your safe working distance will also increase. If overhead lines are present, call the utility company and find out what voltage is on the lines so the safe working distance can be calculated, or stay at least 28 feet (9 meters) from cables supported on wooden poles, and 50 feet (15 meters) from cables supported on metal poles.

Should any operations cause equipment to come into contact with utility lines, the appropriate authority will be notified immediately and an incident report will be completed. Work will be suspended until the appropriate actions for the particular situation can be taken.

B17 Trenching/Excavation – An excavation is any manmade cut, cavity, trench, or depression in the ground surface, formed by earth removal. A trench is a narrow excavation (in relation to its length) made below the surface of the ground. The following safe operating guidelines apply to open trenches or excavations exceeding 4 feet (1.3 meters) in depth **or** of any depth if in unstable soil conditions.

- Excavated materials will be stored and retained at least 2 feet (0.6 meters) from the edge of the excavation. This procedure must be observed even when excavation/trench entry will not occur.
- Trees, boulders, and other surface encumbrances that create a hazard will be removed or made safe before excavation is begun.
- Special precautions will be taken in sloping or shoring the sides of excavations adjacent to a previously backfilled excavation.
- Except in hard rock, excavations below the level of the base of the footing of any foundation or retaining wall will not be permitted, unless the wall is underpinned and all other precautions have been taken to ensure the stability of the adjacent walls.
- Excavations will be inspected at least daily, or more often as conditions warrant, by a **competent person** to ensure that changes in temperature, precipitation, shallow groundwater, overburden, nearby building weight, vibrations, or nearby equipment operation have not caused weakening of sides, faces, and flows. Before an employee enters an excavation greater than 4 feet (1.3 meters) in depth (or less if soil is deemed unstable by a competent person), the atmosphere must be tested to ensure that an oxygen deficient or hazardous atmosphere does not exist. If the concentration of any airborne contaminant exceeds one-half its permissible exposure limit (PEL) or other applicable occupational exposure limit (OEL), the airborne oxygen concentration is less than 19.5% or above 23.5%, or explosivity exceeds 10% of the lower explosive limit (LEL), then no personnel will be permitted to enter the excavation until engineering controls or other hazard controls are instituted to eliminate or control the hazard.
- Diversion ditches, dikes, or other suitable means will be used to prevent water from entering an excavation and for drainage of the excavation.
- When mobile equipment is used or allowed adjacent to excavations, stop logs, or barricades will be installed. The grade will always be away from the excavation.
- A means of egress (e.g., ladder, ramps, stairways, etc.) will be accessible at any location inside the excavation without requiring more than 25 feet (8.3 meters) of lateral travel distance.
- Dust conditions during excavation will be kept to a minimum. Wetting agents will be used when appropriate.
- Field personnel will not enter any excavation, without specific direction, for any reason except to rescue injured individuals who have fallen into the excavation.

- Excavations will be marked and protected to ensure site personnel, visitors, or unauthorized personnel do not enter without permission or fall into the trench.
- Personnel will work in pairs when working around an excavation of 2 feet (0.6 meters) or more.

B18 Water Safety –Personnel and visitors near water (i.e., within 4 feet [1.22 meters]), over water, wading in water, on any vessel, or where the danger of drowning exists, must wear a USCG-approved personal floatation device (PFD). This PFD must be properly secured to the wearer. The PFD must be free of defects including rips, tears, and stress, and be kept clean and free of excessive dirt and oil. Several factors are relevant to determining whether a danger of drowning exists. These include the type of water body (e.g., a pool, river, or canal), depth, presence or absence of a current, height above the water surface, and the use of fall protection when working above a water body.

Depending on the factors present, there are some circumstances where a drowning hazard could exist when workers are near or over water that is relatively shallow (i.e., less than 2 feet [0.6meters] in depth). For example, where workers are not using fall protection and are 10 feet above a river, a worker may fall and be knocked unconscious. Without the use of a life jacket or buoyant work vest, a worker in such a scenario could drown.

A life ring equipped with 90 feet of solid braid polycarbonate line, or equivalent must remain close to the working area and accessible for use.

USCG boating safety guidelines or equivalent should be adhered to when operating a boat during sampling activities. Boats must be equipped with the required running lights for night-time or poor visibility conditions. Boats must be equipped with an anchor and alternate means of locomotion (e.g., extra motor and floatable oars).

B19 Material Handling/Ergonomics – Handling and storing materials involves diverse operations such as hoisting with a crane, driving a truck loaded with materials, carrying bags or materials manually, and stacking materials such as drums, barrels, or lumber. When moving materials manually, employees should attach handles or holders to loads in addition to wearing appropriate PPE and using proper lifting techniques.

Employees should seek help when handling loads that are too bulky to grasp or lift, when employees cannot see around or over a load, or when they cannot safely handle a load for any other reason. PPE should be worn when moving materials to prevent needless injuries. Hand and forearm protection, such as gloves should be worn when working with loads that have sharp or rough edges. Blocking materials can be used to manage and move loads, but ensure the materials are large and strong enough to support the load safely.

When mechanical equipment is used to move materials, allow the weight, shape, and size of the material to dictate the type of equipment used to move it, based on its rated capacity and making sure not to overload. Equipment-rated capacity should be displayed on each piece of equipment in use. When picking up items with a powered truck, center the load as close to the mast as possible, avoid overloading, do not put extra weight on the rear to counterbalance the equipment, adjust the load to the lowest possible safe position when traveling, and always follow the manufacturer's operational instructions.

Lifting, carrying and lowering objects represents a potential physical hazard to ENVIRON personnel. Therefore, it is every employee's responsibility to realistically evaluate the object to determine if the weight and size exceeds the employee's ability to lift, lower, or carry it. To eliminate or minimize the risk of lifting hazards, utilize proper techniques, such as keeping the back straight and legs bent. Objects should always be lifted, lowered, and carried as close to the body as possible. If the equipment cannot be lifted in this manner, it is too heavy to lift alone. Call other personnel, or use a mechanical device for aid in lifting. Mechanical aids like hand trucks and carts or the buddy system should be used to move heavy objects, objects with poor handgrips or large bulky objects. Some other things to consider:

- Evaluate the object for the presence of any physical hazards such as pinch points, sharp or jagged edges, burrs, or rough and slippery surfaces.
- The route in which the object will be moved should be free from obstructions that could cause difficulty in moving the object.
- Assess other hazards such as stairs before you move the object and consider smaller loads with multiple trips as a safe alternative.
- If an object is stored at a level higher than 5 feet, or on the floor, an appropriate mechanical device may be necessary to move the object.
- Recognized lifting hazards should be designed out of the work process whenever possible.

Proper lifting and lowering techniques should be followed even if the object or material to be lifted is of lighter weight. Keep the objects as close to the body as possible and incorporate the following:

- Establish a firm footing with feet at approximately shoulder width and one foot slightly ahead of the other. This posture will aid in keeping good balance and will establish a stable lifting base.
- Always bend at the knees, not at the waist when lifting or lowering an object.
- Obtain a good secure grip on the object.
- When beginning to lift, tighten your stomach muscles and use your legs to lift the object, as leg muscles are generally stronger than back muscles.
- Lift slowly and smoothly.
- If you need to turn as you lift, do not twist at the waist, but instead pivot with the feet.
- When lowering the object, reverse the procedure.

B20 Power Tools – Power tools can be hazardous when improperly used since these types of tools use energy (e.g., electric, liquid fuel, hydraulic, pneumatic, and powder-actuated). The following precautions will be taken by employees to prevent injury:

- Power tools will always be operated within their design limitations, and only by employees who have been appropriately trained in the use, operation, and proper handling of such tools.

- Guards are not to be removed or rendered inoperative.
- Eye protection, gloves, and safety footwear are recommended during operation.
- Store tools in an appropriate dry location when not in use.
- Work only in well-illuminated locations.
- Tools will not be carried by the cord or hose, and the cord or hose will not be yanked to disconnect it from the receptacle.
- Cords and hoses will be kept away from heat, oils, sharp edges, and any other object that could result in damage.
- Tools will be disconnected when not in use, before servicing, and when changing accessories such as blades, bits, and cutters.
- Observers will be kept at a safe distance at all times from the work area.
- Tools will be maintained in a clean manner in accordance with the manufacturer's guidelines. Periodic inspection of hand and portable power tools should occur.
- Ensure that the work area is kept clean to maintain proper footing and good balance.
- Ensure that proper apparel is worn. Loose clothing, ties, or jewelry can become caught in moving parts.
- Tools that are damaged will be removed from service immediately and tagged "Do Not Use."

B21 Vehicle Use – Work areas and site conditions must be considered when designating and selecting a vehicle for use. The vehicle will be maintained in safe working order as required by the manufacturer. This includes a routine preventive maintenance schedule for servicing and checking of safety-related equipment. Special consideration should be taken when weather conditions reduce the safety and visibility while driving. Appropriate measures should be taken while driving during inclement weather including snow, ice, high winds, hail, heavy rains, debris, or other impairments to safe driving caused by natural weather.

Special-use vehicles (e.g., all-terrain vehicles [ATV], snowmobiles, etc.) are vehicles with a light engine or electric motor, other than construction equipment, and are not intended and/or allowed for highway use. These vehicles may **not** have seat belts or **do not** have substantial roll protection (e.g., roll-over protective structure [ROPS], falling object protective structure [FOPS], steel roll-cage, etc.). In addition, the following general practice will be followed when operating special-use vehicles:

- All vehicles will be operated in accordance with the manufacturer's requirements and specifications.
- Drivers should use prudent judgment and proceed cautiously when driving on unpaved roads.
- Operators of special-use vehicles will be trained by a competent person. At a minimum, training will be hands-on by a competent person and the operator will demonstrate basic skills. Individuals are required to meet training requirements before use.

- Vehicles will be used on flat surfaces and will not be operated on slopes steeper than a 30% grade.
- Daily inspections of vehicles for safety and maintenance will be required (e.g., fluid leaks/levels, tire pressure, tire surfaces, lights, fuel levels, brakes, etc.).
- Speed will be limited to safe operating speeds.
- Make sure the engine is turned off before dismounting the vehicle.
- Avoid driving over any extreme obstacles (e.g., wood/logs, fences, boulders, etc.).
- Watch for pedestrians and other vehicles.
- Only drive during daylight hours.
- Do not carry passengers.
- Slow down before coming to a stop.
- Shut engine down prior to refueling.
- Each driver will have a valid driver's license.
- Operators will wear:
 - safety glasses, goggles, or face-shield when moving;
 - leather boots;
 - a **PROPERLY FITTED** DOT/ANSI/SNELL approved helmet; and
 - leather gloves.

B22 Seasonal Hunting Hazards – During recreational hunting seasons, field personnel will wear appropriate clothing, such as fluorescent orange Hi-Vis vests, so as to be visible to hunters and not blend in with the landscape. Field personnel should also use whistles, air horns and/or other means to make their presence known to hunters and wildlife alike. The schedule of the hunting season, if applicable, will be included as an addendum to this HASP in order to inform personnel of the type of game (e.g., deer, pheasant, duck, etc.) that is being hunted and the type of weapon being used (e.g., bow & arrow, shotgun, single-shot rifle, etc.). Be aware that even if “No Trespassing” and/or “No Hunting Allowed” signs are posted, trespassers and/or hunting may still be on site. At no point should field personnel or contractors confront trespassers.

B23 Demolition – Personnel will not be permitted in any area that can be adversely affected by mechanical demolition operations. Only those workers necessary for the performance of the operations will be permitted in the area. The area will be barricaded as necessary to prevent unauthorized personnel or anyone not associated with the demolition operation from entering the area.

All roof cornices or other ornamental stonework will be removed prior to removing the walls. When removing walls or portions thereof, affected steel members will be cut prior to wall removal. During demolition, a competent person will make continuing inspections as the work progresses to detect hazards resulting from the weakened or deteriorated floors, walls, or loosened material. No employee will be permitted to work where such hazards exist until they are corrected by shoring, bracing, or other effective means.

B24 Unexploded Ordinances – Some sites (e.g., mines, firing ranges, ordinance manufacturing facilities, etc.) may have old explosives, blasting caps, or other types of unexploded ordinances that may be stored on-site (e.g., in mines, in structures surrounding the mine, or buried on-site). Individuals must take immediate action in the event of finding and/or suspecting that explosives may be present. These include not touching or disturbing suspected explosives or making loud noises in their immediate vicinity. Slowly retreat from the area and immediately reported to the PIC/PM, HSC, and CHSD so that ordinance experts can be contacted.

B25 Closed / Abandoned Mines – The underground mine and associated buildings and equipment may not have been maintained over the years. The structural soundness of the mine, buildings, and equipment may be compromised and could collapse. Personnel are to avoid contact with mine or building supports. Personnel are not to venture into mines or perform any work in areas should they appear structurally unstable. These conditions are to be immediately reported to the PC, HSC, and CHSD.

Appendix C

Subsurface Clearance Field Checklist and Plot Plan



SUBSURFACE CLEARANCE (SSC) FIELD CHECK LIST

(Use this form to document & identify field elements of SSC. Retain the completed form with the project file)

Site Name/Project No.: _____

Designated Person: _____

Walkover Date: _____

PIC/PM: _____

Intrusive Locations Surveyed: _____

(ENVIRON MANAGED SUBSURFACE CLEARANCE ACTIVITIES)	Yes	No	N/A	Comments
1. The potential for unexploded ordnance (UXO) has been assessed and a UXO survey performed, if applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Public utility markings are present for all utility companies notified. List the companies with public utilities present on-site and cross check with expected utilities and on-site indicators:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Natural gas/oil/petroleum lines and associated tanks:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Electric:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Potable water pipes, hydrants:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sewers (storm/process water/sanitary) and/or Manways/Grates/Culverts:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Public lighting (street and traffic):	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Telephone and Data Lines:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Other underground utilities:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Private utilities marked and scope discussed with/provided to locator	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Subcontractor Name: _____ Contact #: _____
Alternate intrusive locations chosen in case of refusal or presence of utilities/indicators in Critical Zone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Describe nonconformity or unexpected conditions found by locator	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. Site Walkover performed to confirm utility markouts and assess the presence of Visual Indicators. If visual indicators are present, note location in comments/Plot Plan:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Indication of underground storage tank/piping and dispenser islands	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Non-native soils, surface depressions, new/dead vegetation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Saw cuts, patched surfaces, warning tape or other surficial indicators of below ground work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Pumps, pump galleries, piping manifolds and/or racks, process equipment, compressors, etc.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
On or below-grade transformers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Fuel oil lines, tanks, fill ports, observation wells, vent stacks, hydraulic lift systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Adjacent/supplemental buildings with no apparent utility feeds (electricity, water, gas)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Other:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. Plot Plan updated to reflect most accurate site SSC information. Describe any on-site additions/changes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. Ground Disturbance location(s) and Critical Zones (5ft/1.5m distance in every horizontal direction surrounding disturbance locations) cleared of utilities and visual indicators	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Contact PIC/PM and H&S Director if utilities pass through the Critical Zone of a planned ground disturbance location
A mark has been placed on each intrusive location and radial marks extending to the edge of the Critical Zone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Intrusive locations and Critical Zones cleared of utilities using sweep and search method or other applicable SSC investigative methods.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Once evaluated and cleared of utilities, intrusive locations cannot be moved and a Critical Zone must be maintained around the locations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Alternative intrusive locations used due to obstructions within Critical Zone. Describe abandoned and alternative locations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7. Pre-start H&S meeting conducted and SSC risk/hazards discussed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Locate results and intrusive locations/Critical Zones understood by all parties involved	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Form completed by: _____
name

_____ date

_____ signature

Appendix D

First Aid Guidance



First Aid Guidance

Prepared for:
ENVIRON International Corporation
Chicago, Illinois

On behalf of:
Ultimate Client (if applicable)
Location City

Date:
July 2011

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1 Insect Bites and Stings

Care will be taken by all site workers to avoid stinging or biting insects such as ticks, spiders, bees, wasps, hornets, and yellow jackets. Workers allergic to any particular insect sting or bite should seek medical attention if stung or bitten and may need to carry emergency medicine prescribed by their doctor.

Care should always be taken to avoid these insects and increased vigilance is necessary during high infestation seasons, when opening protective casings of monitoring wells, and when walking through areas of heavy vegetation or areas known to be infested.

To minimize the chance of bites/stings:

- Wear appropriate PPE such as light colored clothing so you can see insects, long pants tucked into boots, long sleeves when possible, a hat, and gloves if you are cutting brush or need to handle or move vegetation.
- Check your body and clothing for insects, shower after work and wash/dry clothes at as high a temperature as possible.
- Don't swat at insects and don't eat in areas where there are insects.
- Avoid sweet smelling personal hygiene products and, unless contraindicated by the work being performed (e.g., sampling, data collection), wear EPA approved repellants such as those containing DEET.

1.1 Spider Bites

Spider bites generally cause only localized reactions such as swelling, pain, and redness. However, bites from a Black Widow or Brown Recluse, or if you are allergic to spiders, can cause symptoms that are more serious.



Black Widow Spider



Brown Recluse Spider

1.1.1 First Aid for spider and scorpion bites and stings.

- Clean the bite area with soap and water and place a cold pack over the bite area to reduce swelling.
- Monitor for allergic reactions. If the victim has more than minor pain or if nausea, vomiting, difficulty breathing, or swallowing occurs: medical attention should be sought immediately. CALL 911.

1.2 Ticks

Ticks are common, especially in the warmer weather months and may carry diseases such as Rocky Mountain Spotted Fever and Lyme disease.



Tick



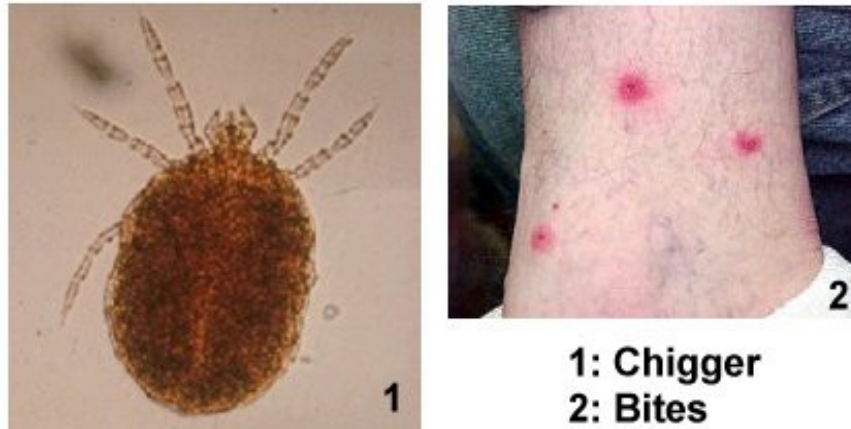
Removing a tick

1.2.1 First Aid for tick bites

- Use a fine tipped tweezers, grasp tick firmly as close to skin as possible and pull the body away from skin. Avoid crushing the body and don't twist.
- If parts of the tick remain in the skin, don't be alarmed as the mouth will dislodge as skin sloughs off.
- Wash area with soap and water and apply antiseptic or antibiotic ointment to prevent infection.
- If unexplained symptoms develop such as severe headaches, fever, or rash within 10 days of the bite, seek medical attention.
- If possible, contain tick in an air tight container for identification purposes, in the event that a serious illness results

1.3 Chiggers

Chiggers are tiny, 8-legged wingless organisms that grow up to become a type of mite. They are found in tall grass and weeds and their bites cause severe itching.



1.3.1 First Aid for chiggers:

- Reduce discomfort and prevent infection
- The affected area should be kept clean by washing with soap and water
- A topical hydrocortisone cream, antihistamine, or local anesthetic may be of value in reducing the itching
- The wounds should not be scratched, if possible
- If signs of infection occur, consult your physician

1.4 Bees and wasps

Bees and wasps belong to the phylum Arthropod family, and they are crucially important to the pollination of plants, specifically flowers, fruits, and vegetables. A sting from a bee or wasp will cause itching, irritation, redness and/or swelling at the sting site.



A small percentage of people are allergic to stings and a sting can be fatal, caused by a disruption to breathing and circulatory systems called anaphylactic shock. If the sting is followed by severe symptoms, seek medical attention immediately. Allergic people should never be alone for outdoor activities since help may be needed for prompt emergency treatment. Allergic people should have an identification bracelet as well as carry something like an “EpiPen” for immediate treatment for anaphylactic shock.

1.4.1 First Aid for bee stings:

- Remove the stinger as quickly as possible - venom continues to enter the skin from the stinger for 45 to 60 seconds following a sting – using a flat dull object, like a credit card. Slid the flat object in the opposite direction of the stinger to remove it from the skin.
- Wash the wound using soap and water
- Apply ice for swelling and pain
- A topical hydrocortisone cream, antihistamine, or local anesthetic may be of value in reducing the itching
- If the sting occurs on the neck or mouth, seek medical attention immediately, swelling in these areas may cause suffocation

1.5 Fire ants

Fire ants are a variety of stinging ants with over 280 species worldwide. Typically, a colony produces large mounds in open areas, and feeds mostly on young plants, seeds, and insects. They nest in the soil, often near moist areas such as river banks and pond edges. Unlike other ants which bite and then spray acid on the wound, fire ants bite only to get a grip and then sting, injecting toxic alkaloid venom. This results in a painful stinging sensation, similar to what a fire burn feels like.



1.5.1 First Aid for Fire ant bites:

- Move rapidly away from the nest
- Quickly remove or kill ants on skin and clothing to prevent further stings
- Wash the area gently with soap and water to rid the skin of any venom.
- Place cool cloth or ice cloth on sites for 15 minutes, and to relieve pain, dab the area with calamine lotion, a topical (cortisone) or oral antihistamine (e.g., Benadryl) to help with swelling
- Do not scratch the blister because this can lead to infection
- Allergic response is rare, but symptoms are difficulty breathing, light headedness, and weakness. Immediate medical attention is required.

2 Snakes

Snakes serve as an important role as predators in the ecosystem, and help maintain populations of rodents and other prey.

2.1 First Aid for venomous snake bites:

- Wash and immobilize the injured area, keeping it lower than the heart if possible
- Seek medical attention immediately
- DO NOT apply ice, cut the wound, or apply a tourniquet
- Do not cut or suck the bite
- Remain calm and try not to move the bitten body part
- Remove jewelry or other items that may be affected by rapid swelling of affected body parts
- Try to identify the type of snake: note color, size, patterns, and markings
- The bite will be painful and have two distinct puncture wounds
- If venom is injected there will be burning and swelling
- ONLY FOR CORAL SNAKE BITES: apply a mild wrapping on the bite wound



Water Moccasin
(aka cotton mouth)



Rattlesnake



Coral Snake



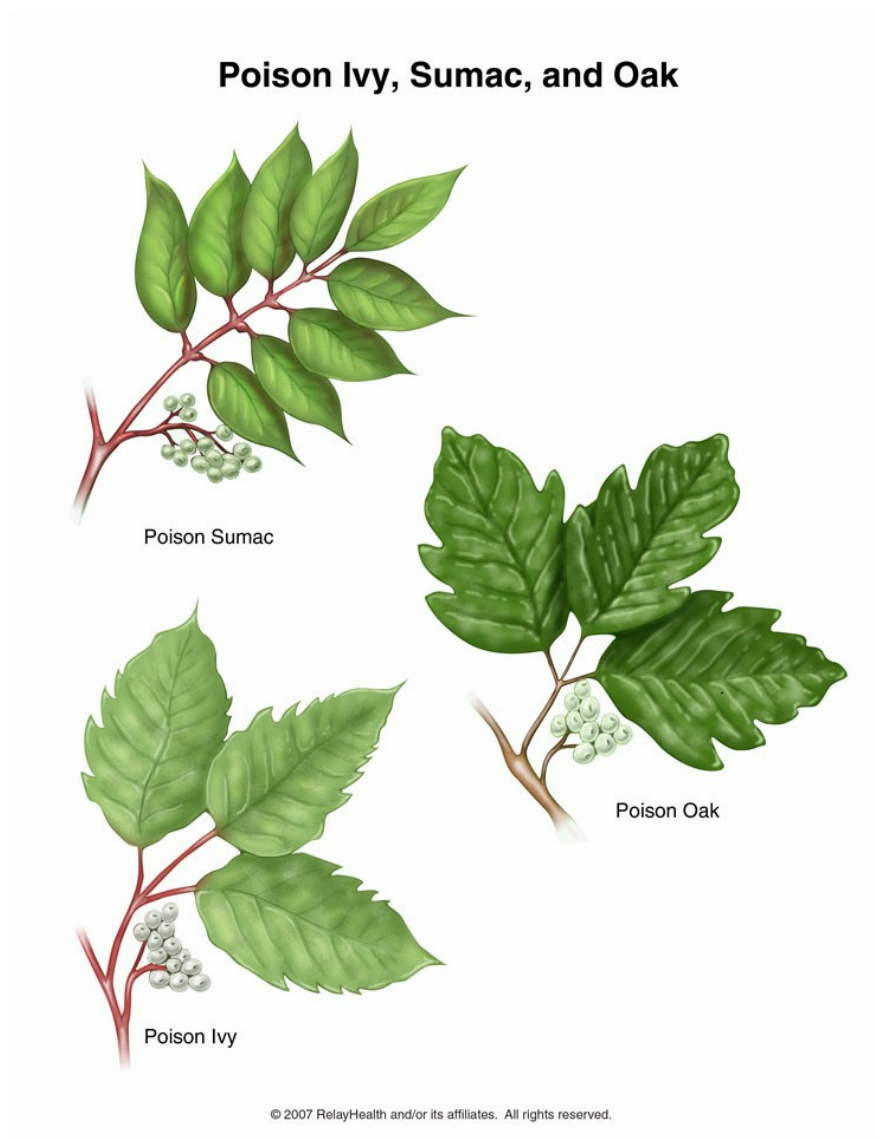
Copperhead

3 Poisonous Plants

Poisonous Plants – Plants poison on contact, through ingestion, or by absorption or inhalation. They cause painful skin irritations upon contact and can cause internal poisoning when eaten.

3.1 First Aid for poisonous plants:

- Wash exposed areas with cold running water as soon as you can
- When possible, wash your clothing
- Relieve itching by taking cool showers and applying topical anti-itch medications or hydrocortisone
- The rash is often arranged in streaks or lines where you brushed against the plant
- In a few days, the blisters become crusted and take 10 days or longer to heal
- If the reaction is severe or worsens, seek medical attention



POISON IVY



POISON SUMAC



POISON OAK



GIANT HOGWEED



4 Heat Stress

Heat stress can be a significant hazard, especially for workers wearing protective clothing.

Depending on the ambient conditions and the work being performed, heat stress can occur very rapidly, within as little as 15 minutes. Site personnel will be instructed in the identification of a heat stress victim, the first-aid treatment procedures for the victim and in the prevention of heat stress incidents.

Workers will be encouraged to immediately report any heat-related problems that they experience or observe in fellow workers. Any worker exhibiting signs of heat stress and exhaustion should be made to rest in a cool location and drink plenty of water. Emergency help by a medical professional is required immediately for anyone exhibiting symptoms of heat stroke, such as red, dry skin, confusion, delirium, or unconsciousness. Heat stroke is a life threatening condition that must be treated by competent medical authority.

ACGIH screening criteria for heat stress exposure in degrees Celsius for an 8 hour work day 5 days per week with conventional breaks will be used in determining safe exposure for acclimatized and unacclimatized employees.

Allocation of Work in a Work/Rest Cycle	Acclimatized				Action Limit (Unacclimatized)			
	L i g	Mo der ate	H e a	V e r	L i g	Mo der ate	H e a	V e r
75-100%	3 1	2 8.	- -	- -	2 8	2 5	- -	- -
50-75%	3 1	2 9.	2 7	- -	2 8	2 6.	2 4	- -
25-50%	3 2	3 0	2 9	2 8	2 9	2 7.	2 5	2 4
0-25%	3 2	3 1.	3 0	3 0	3 0	2 9.	2 8	2 7

4.1 Heat Stress Prevention

Whenever possible or within the control of ENVIRON, engineering controls should be utilized to protect workers from heat related hazards (e.g., heat shielding such as using awnings or umbrellas). Appropriate work practices can also lessen the chances of heat related hazards. Some of these include:

- Water and/or electrolyte fluids should be about equal to the amount of sweat produced (i.e., drinking 5-7 ounces (150 -200 mL) of water every 15-20 minutes). Ideally, fluids should be at room temperature to allow for quicker absorption. Consider keeping water at room temperature and electrolyte fluids chilled. Do NOT chill both.
- Whenever possible, gradual exposure to heat is preferred to allow the body's internal temperature to acclimate to the working conditions.
- Whenever possible, adjust the work schedule to reduce risk of heat stress. For example, postpone nonessential or heavier work to the cooler part of the day and perform work in the shade if portable.
- Rotate personnel to reduce the amount of time spent working in direct sun and heat.
- Increase the number and/or duration of rest breaks, and whenever possible, rest break areas should be in a cool area and as close to the work area as is feasible.

Wear appropriate PPE when necessary, such as thermally conditioned clothing, self-contained air conditioning in a backpack, and plastic jackets/vests with pockets that can be filled with dry ice or ice. However, based on the type of work being done, where work is being performed, or other required PPE, these options may be prohibited or make the use of this PPE impossible or impractical.

4.2 Heat Related Illnesses

4.2.1 Heat Stress:

This is the mildest heat-related illness, but prompt action may prevent it from turning into a more severe heat-related illness. Symptoms include irritability, lethargy, significant sweating, headache, or nausea. The following guidance can be used in the identification and treatment of heat related illness.

4.2.2 Heat Stress First Aid:

- Take victim to a protected (e.g., shaded, cool) area, remove any excess protective clothing, and provide cool fluids.
- If an air-conditioned spot is available, this is an ideal break location.
- Once the victim shows improvement he/she may resume working, however the work pace and practices (e.g., does fluid intake need to be increased) should be moderated to prevent recurrence of the symptoms.

4.2.3 Heat Exhaustion:

Usually begins with muscular weakness, dizziness, nausea, and a staggering gait. Symptoms include pale, clammy skin, and profuse sweating, vomiting, and the bowels may move involuntarily. The pulse is weak and fast, breathing is shallow. Fainting can occur.

4.2.4 Heat Exhaustion First Aid:

Immediately remove the victim from the work area to a shady or cool area with good air circulation (avoid drafts or sudden chilling – you do not want the victim to shiver).

- Call a physician or emergency service, or transport the victim to medical care.
- Remove all protective outerwear.
- If the victim is conscious, it may be helpful to give him/her sips of water.

4.2.5 Heat Stroke:

Heat stroke is a severe medical condition requiring first aid and emergency treatment by a medical professional as death can occur without appropriate care. Heat Stroke represents the collapse of the body's cooling mechanisms. As a result, body temperatures often rise to between 105° – 110° F (40.5° – 43.3° C). As the victim progresses toward heat stroke symptoms include hot and usually dry, red and spotted skin, headache, dizziness, nausea, mental confusion, delirium, possible convulsions and loss of consciousness.

4.2.6 Heat Stroke First Aid:

- Immediately remove the victim from the work area to a shady or cool area with good air circulation (avoid drafts or sudden chilling – you do not want the victim to shiver).
- Summon emergency medical help to provide on-site treatment and transportation to a medical facility.
- Remove all protective outerwear and loosen personal clothing.
- Apply cool wet towels, ice bags, etc. to the head, armpits, and thighs. Sponge off the bare skin with cool water or even place the victim in a tub of cool water.

4.2.7 Skin Hazards

Sunburn and prickly heat are both symptoms of skin irritation/damage produced through exposure to sunlight and operating in hot work environments.

- Protect exposed skin with an appropriate sunscreen. A sunscreen with a sun protection factor (SPF) of 15 or greater is required for work in the sun with reapplication at breaks and lunch.
- Heat rash, also known as prickly heat, can be prevented by the application of a hydrophobic, water repellent barrier cream such as Kerodex 71.

5 Cold Stress

The four environmental conditions that cause cold-related stress are low temperatures, high/cool winds (wind chill), dampness, and cold water. One or any combination of these factors can cause cold-related hazards. Cold stress, including frostbite and hypothermia, can result in severe health effects.

A dangerous situation of rapid heat loss may arise for any individual exposed to high winds and cold temperatures. Major risk factors for cold-related stresses include:

- Wearing inadequate or wet clothing increases the effects of cold on the body.
- Taking certain drugs or medications such as alcohol, nicotine, caffeine, and medication that inhibits the body's response to the cold or impairs judgment.
- Having a cold or certain diseases, such as diabetes, heart, vascular, and thyroid problems, may make a person more susceptible to the winter elements.
- Being male increases a person's risk to cold-related stresses. Men experience far greater death rates due to cold exposure than women, perhaps due to inherent risk-taking activities, body-fat composition, or other physiological differences.
- Becoming exhausted or immobilized, especially due to injury or entrapment, may speed up the effects of cold weather.
- Aging -- the elderly are more vulnerable to the effects of harsh winter weather.

TABLE 2. Cooling Power or Wind on Exposed Flesh Expressed as Equivalent Temperature (under calm conditions)*

Estimated Wind Speed (in mph)	Actual Temperature Reading (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (°F)											
calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little additional effect.)	LITTLE DANGER In < hr with dry skin. Maximum danger of false sense of security				INCREASING DANGER Danger from freezing of exposed flesh within one minute.				GREAT DANGER Flesh may freeze within 30 seconds.			
	Trenchfoot and immersion foot may occur at any point on this chart.											

*Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA.

■ Equivalent chill temperature requiring dry clothing to maintain core body temperature above 36°C (96.8°F) per cold stress TLV

5.1 Cold Stress Prevention

Engineering controls should be utilized whenever possible to protect workers from cold related hazards. For example, on-site heat sources, heated shelters, work areas shielded from drafty or windy conditions, and the use of thermal insulating material on equipment handles. Effects arising from cold exposure will be minimized by the following control measures:

- Personnel will be trained to recognize cold stress symptoms.
- Field activities will be curtailed or halted if the equivalent chill temperature is below 20 F (7C).
- As much as possible, work that exposes personnel to the cold will be done during the warmest hours of the day.
- Inactivity in cold conditions will be kept to a minimum.
- Frequent short breaks in warm, dry shelters will be taken.
- Vehicles will be equipped with supplies in case the vehicle becomes inoperable (e.g., blanket, dry clothing, water, food, a shovel, etc).

TABLE 3. Threshold Limit Values Work/Warm-up Schedule for Four-Hour Shift*

Air Temperature— Sunny Sky		No Noticeable Wind		5 mph Wind		10 mph Wind		15 mph Wind		20 mph Wind	
°C (approx.)	°F (approx.)	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks
−26° to −28°	−15° to −19°	(Norm. Breaks) 1		(Norm. Breaks)		75 min	2	55 min	3	40 min	4
−29° to −31°	−20° to −24°	(Norm. Breaks) 1		75 min	2	55 min	3	40 min	4	30 min	5
−32° to −34°	−25° to −29°	75 min	2	55 min	3	40 min	4	30 min	5	Non-emergency work should cease	
−35° to −37°	−30° to −34°	55 min	3	40 min	4	30 min	5	Non-emergency work should cease			
−38° to −39°	−35° to − 39°	40 min	4	30 min	5	Non-emergency work should cease					
−40° to −42°	−40° to −44°	30 min	5	Non-emergency work should cease							
−43° & below	−45° & below	Non-emergency work should cease									

Notes for Table 3

1. Schedule applies to moderate to heavy work activity with warm-up breaks of ten (10) minutes in a warm location. For Light-to-Moderate Work (limited physical movement): apply the schedule one step lower. For example, at -35°C (-30°F) with no noticeable wind (Step 4), a worker at a job with little physical movement should have a maximum work period of 40 minutes with 4 breaks in a 4-hour period (Step 5).
2. The following is suggested as a guide for estimating wind velocity if accurate information is not available:
5 mph: light flag moves; 10 mph: light flag fully extended; 15 mph: raises newspaper sheet; 20 mph: blowing and drifting snow.
3. If only the wind chill cooling rate is available, a rough rule of thumb for applying it rather than the temperature and wind velocity factors given above would be: 1) special warm-up breaks should be initiated at a wind chill cooling rate of about 1750 W/m²; 2) all non-emergency work should have ceased at or before a wind chill of 2250 W/m². In general the warm-up schedule provided above slightly under-compensates for the wind at the warmer temperatures, assuming acclimatization and clothing appropriate for winter work. On the other hand, the chart slightly over-compensates for the actual temperatures in the colder ranges, since windy conditions rarely prevail at extremely low temperatures.

4. TLVs apply only for workers in dry clothing.

*Adapted from Occupational Health & Safety Division, Saskatchewan Department of Labour.

5.2 Cold-Related Illness

5.2.1 Hypothermia:

Hypothermia occurs when the body temperature falls to a level where normal muscular and cerebral functions are impaired. Although it usually occurs in freezing air and water temperatures, it can occur in any climate if a person's internal body temperature falls below normal. Symptoms should not be ignored, and a supervisor should be notified as soon as hypothermia is suspected.

Initially, symptoms may include shivering, an inability to do complex motor functions, sluggishness and mild confusion as the body temperature drops to around 95 F. As the body temperature falls, speech may become slurred, and behavior may be irrational, simple motor functions may be difficult to do and a state of "dazed consciousness" may exist. In severe state (below 90 F or 32 C), heart rate, blood flow, and breathing will slow. Unconsciousness and full heart failure can occur.

5.2.2 Hypothermia First Aid:

5.2.2.1 On land:

- Call for emergency, and then help move the victim (unless other injuries prohibit their being moved) to a warm, dry area and replace wet clothing with warm, dry clothing or a blanket. Move the person carefully because movement can increase the irritability of the heart.
- If the person is conscious and lucid, warm liquids can be provided, but never alcohol or caffeinated drinks. If possible, have them to move their arms and legs to create muscle heat.
- If the person is unconscious or unable to assist, place warm bottles/packs in the person's arm pits, groin, neck and head areas.
- Do not rub the person's body or place them in warm water.

5.2.2.2 In water:

- Call for emergency help and get the victim out of the water. Move them carefully because movement can increase the irritability of the heart.
- If it is you in the water, do not swim unless a floating object or person can be reached quickly as swimming uses the body's heat and reduces survival time by about 50%.
- If you are in the water, conserve body heat by folding arms across the chest, keeping thighs together, bending knees and crossing ankles, if another person is in the water with you, huddle together.
- If you are in the water, do not remove clothing-button, buckle, zip, and tighten collars, cuffs, shoes, and hoods as the water trapped next to the body provides a layer of insulation that may slow the loss of heat.

5.2.3 Frostbite:

Frostbite occurs when the skin literally freezes, and deep frostbite can affect deeper tissues such as tendons and muscles. Frostbite usually occurs when temperatures drop below 30 F (1

C), but wind chill effects can cause frostbite at above-freezing temperatures. The ears, fingers, toes, cheeks, and nose are the most commonly affected body parts. Initially, symptoms include an uncomfortable sensation of coldness. Tingling, stinging or an aching feeling of the exposed area is followed by numbness. Frostbitten areas appear white and cold to the touch and with deeper frostbite, the area becomes numb, painless, and hard, and can turn black.

5.2.4 Frostbite First Aid:

- Seek medical attention as soon as possible and treat any existing hypothermia first.
- Warm liquid can be provided, but not alcohol or caffeinated drinks such as tea and coffee.
- Do not rub the affected areas, but cover them with dry, sterile gauze or soft, clean bandages.
- Do not try rewarming the affected area if you have not been specifically trained to do so and/or if there is a chance the affected area will get cold again

6 Small Chemical Spills

Chemical hazards present in environmental samples or in the environment being sampled are NOT the only “chemicals of concern”. Toxic chemicals may also be brought onto a site as part of the sampling event in the form of sample preservatives. In general, sample preservation is required for most water samples. Two practices exist for adding a preservative: 1) addition of the preservative to the samples in the field; and 2) addition of the preservative to the sampling containers prior to sending the samplers into the field. In either case, EXTREME caution MUST be exercised when adding a preservative to a sample vial or using vials which already contain a preservative since these preservatives will vary in concentration and type. Some examples of the type of preservatives which may be encountered include sodium thiosulfate to remove chlorine; hydrochloric acid or ammonium chloride to stabilize pH and reduce biological activity; or sodium bisulfate.

6.1 Chemical First Aid (Body):

In the event that you suspect that you have been exposed to a chemical, whether or not you were wearing PPE, you should:

- Remove yourself or the victim from the accident area.
- Remove any contaminated clothing.
- Wash the injured area to dilute or remove the substance, using large volumes of water.
- Wash for at least 20 minutes, taking care not to allow runoff to contact unaffected parts of your body.
- Gently brush away any solid materials, again avoiding unaffected body surfaces.
- Especially wash away any chemical in your eye. Sometimes the best way to get large amounts of water to your eye is to step into the shower.

6.2 Chemical First Aid (Eye):

For all chemical injuries to the eye, the first thing you should do is immediately irrigate the eye copiously. Ideally, specific eye irrigating solutions should be used for this, but if none are available regular tap water will do just fine.

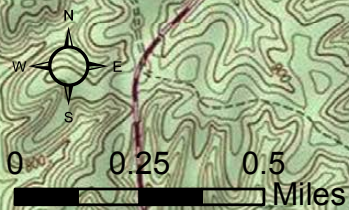
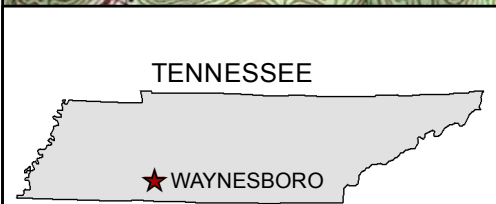
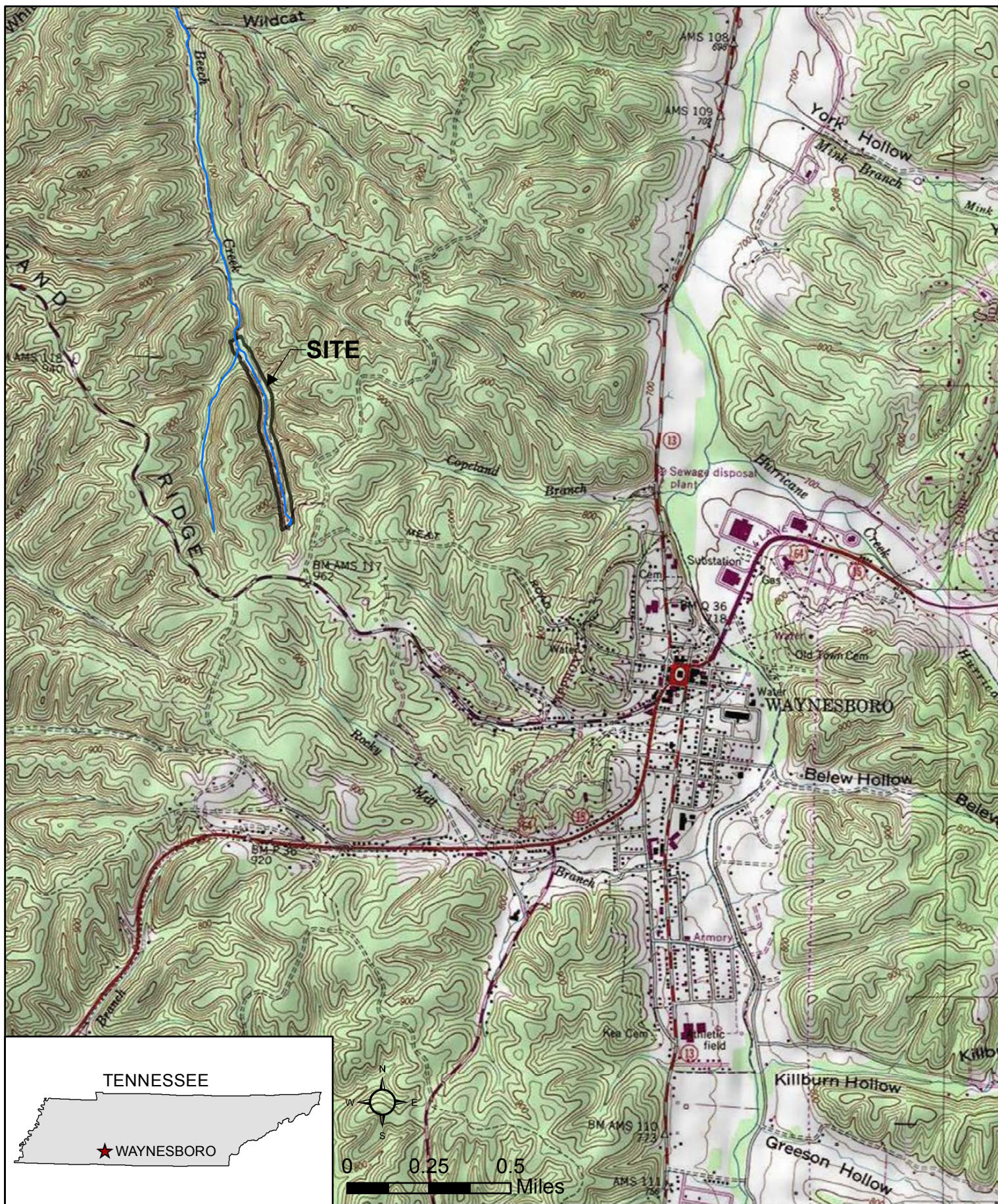
- Begin washing your eye before taking any other action and continue for at least 10 minutes. The longer a chemical is in your eye, the more damage will occur. Diluting the substance and washing away any particles that may have been in the chemical are extremely important.
- Ideally, in a work setting, you would be placed in an emergency eyewash or shower station and your eye washed with sterile isotonic saline solution. If sterile saline is not available, use cold tap water.

- All acid or alkali eye burns require immediate treatment and evaluation by a doctor. You should be taken immediately to the closest emergency department. If you suspect a serious injury may have occurred or are otherwise not able to make the trip to the emergency room quickly, then you should call an ambulance to shorten transport time. Take the Materials Safety Data Sheet (MSDS) on the chemical you were exposed to with you to the hospital. Further Reading:
 - Chemical Eye Burns
 - Corneal Flash Burns
 - Wilderness: Eye Injuries Treatment
 - Chemical Burns Treatment
 - Corneal Flash Burns Treatment
 - Chemical Eye Burn Treatment
 - Burns to the Eye-Emergencies
 - See All Eye Burns Topics
 - Top Picks
 - See Pinkeye and Learn to Treat It
 - Symptoms of Styes in the Eyes
 - Choosing an Eye Doctor
 - Men's Super Foods Including Eye Health Boosters
 - Learning to Live With Blindness
 - Correcting Double Vision After Brain Injury

Any time you experience pain, tearing, redness, irritation, or vision loss, go to a hospital's emergency department for immediate evaluation, even if you believe the chemical is only a mild irritant.

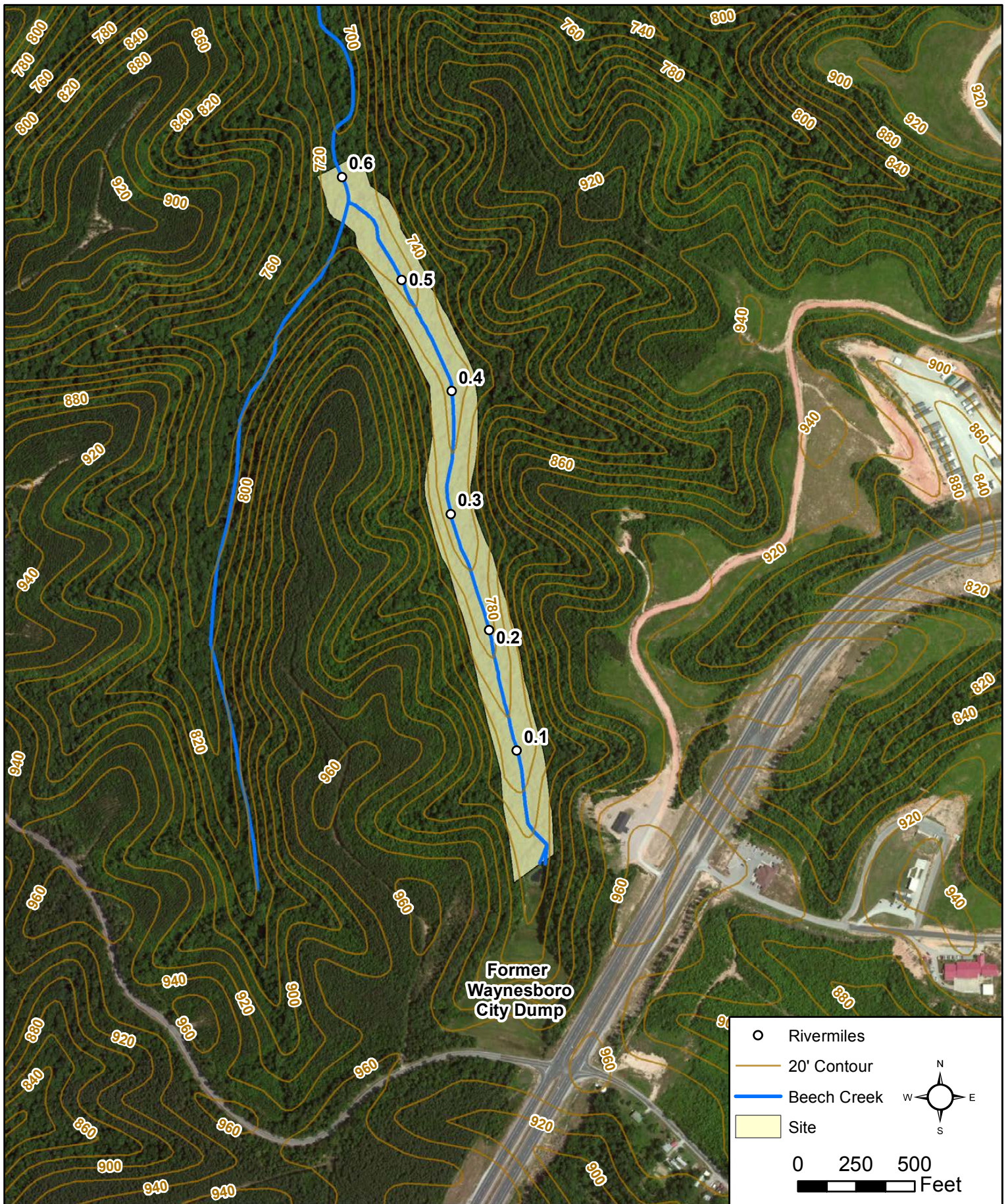
Appendix E

Site Figures



Site and Vicinity
Beech Creek Superfund Site
Wayne County, TN

Figure
1



Site Location
Beech Creek Superfund Site
Wayne County, TN

Figure
2

Appendix F

Wildlife in Tennessee

Wildlife State of Tennessee

For more information concerning wildlife in the state of Tennessee, please visit the Tennessee Wildlife Resources Agency website (<http://www.tn.gov/twra/>).

1 Insects

Care will be taken by all site workers to avoid stinging or biting insects such as ticks, spiders, bees, wasps, hornets, and yellow jackets. Workers allergic to any particular insect sting or bite should seek medical attention if stung or bitten and may need to carry emergency medicine prescribed by their doctor.

Care should always be taken to avoid insects and increased vigilance is necessary during high infestation seasons, when opening protective casings of monitoring wells, and when walking through areas of heavy vegetation or areas known to be infested.

To minimize the chance of bites/stings:

- Wear appropriate PPE, such as light colored clothing so you can see insects, long pants tucked into boots, long sleeves when possible, a hat, and gloves if you are cutting brush or need to handle or move vegetation.
- Check your body and clothing for insects, shower after work, and wash/dry clothes at as high of a temperature as possible.
- Don't swat at insects and don't eat in areas where there are insects.
- Avoid sweet smelling personal hygiene products and, unless contraindicated by the work being performed (e.g., sampling, data collection), wear USEPA-approved repellants such as those containing DEET.

1.1 Ticks

Ticks are common, especially in the warmer weather months and may carry diseases such as Rocky Mountain Spotted Fever and Lyme disease.



Tick



Removing a tick

First Aid for tick bites:

- Using a fine tipped tweezers, grasp tick firmly as close to skin as possible and pull the body away from skin. Avoid crushing the body and don't twist.
- If parts of the tick remain in the skin, don't be alarmed as the mouth will dislodge as skin sloughs off.
- Wash the area with soap and water and apply antiseptic or antibiotic ointment to prevent infection.
- If unexplained symptoms develop such as severe headaches, fever, or rash within 10 days of the bite, seek medical attention.
- If possible, contain tick in an air tight container for identification purposes in the event of a serious reaction.

1.2 Chiggers

Chiggers are tiny, 8-legged wingless organisms that grow up to become a type of mite. They are found in tall grass and weeds and their bites cause severe itching.



1: Chigger
2: Bites

First Aid for chiggers:

- Reduce discomfort and prevent infection.
- Keep the affected area clean by washing with soap and water.
- Apply a topical hydrocortisone cream, antihistamine, or local anesthetic as needed to reduce itching.
- Do not scratch the wounds, if possible.
- If signs of infection occur, consult your physician.

1.3 Arthropods (e.g., bees and wasps)

Bees and wasps belong to the phylum Arthropod family, and they are crucially important to the pollination of plants, specifically flowers, fruits, and vegetables. A sting from a bee or wasp will cause itching, irritation, redness and/or swelling at the sting site.



First Aid for bee stings:

- Remove the stinger as quickly as possible – venom continues to enter the skin from the stinger for 45 to 60 seconds following a sting – using a flat dull object, like a credit card. Slid the flat object in the opposite direction of the stinger to remove it from the skin.
- Wash the wound using soap and water.
- Apply ice for swelling and pain.
- Apply a topical hydrocortisone cream, antihistamine, or local anesthetic as needed to reduce itching.
- If the sting occurs on the neck or mouth, seek medical attention immediately because swelling in these areas may cause suffocation

A small percentage of people are allergic to stings and a sting can be fatal, when it causes a disruption to breathing and circulatory systems called anaphylactic shock. If the sting is followed by severe symptoms, seek medical attention immediately. Allergic people should never be alone for outdoor activities since help may be needed for prompt emergency treatment. Allergic people should have an identification bracelet as well as carry an “EpiPen,” or similar device, for immediate treatment for anaphylactic shock.

1.4 Fire Ants

Fire ants are a variety of stinging ants with over 280 species worldwide. Typically, a colony produces large mounds in open areas, and feeds mostly on young plants, seeds, and insects. They nest in the soil, often near moist areas such as river banks and pond edges. Unlike other ants, which bite and then spray acid on the wound, fire ants bite only to get a grip and then sting, injecting toxic alkaloid venom. This results in a painful stinging sensation, similar to what a fire burn feels like.



First Aid for fire ant bites:

- Move rapidly away from the nest.
- Quickly remove or kill ants on skin and clothing to prevent further stings.
- Wash the area gently with soap and water to rid the skin of any venom.
- Place cool cloth or ice cloth on sites for 15 minutes; to relieve pain, dab the area with calamine lotion or a topical (cortisone); or take an oral antihistamine (e.g. benadryl) to help with swelling.
- Do not scratch the blister because this can lead to infection.
- An allergic response is rare; symptoms include difficulty breathing, light headedness, and weakness. Immediate medical attention is required.

2 Spiders

Spider bites generally cause only localized reactions such as swelling, pain, and redness. However, if you are bit by a Black Widow or Brown Recluse, or if you are allergic to spiders, symptoms can be more serious.



Black Widow Spider



Brown Recluse Spider

First Aid for spider bites:

- Clean the bite area with soap and water and place a cold pack over the bite area to reduce swelling.
- Monitor for allergic reactions. If victim has more than minor pain, or if nausea, vomiting, difficulty breathing, or difficulty swallowing occurs, medical attention should be sought immediately.

3 Predatory Animals

3.1 Snakes

Snakes serve as an important role as predators in the ecosystem, and help maintain populations of rodents and other prey.

First Aid for venomous snake bites:

- Wash the bite with soap and water and immobilize the injured area, keeping it lower than the heart if possible.
- Seek medical attention immediately.
- DO NOT apply ice, cut the wound, apply a tourniquet, or suck the bite.
- Remain calm and try not to move the bitten body part.
- Remove jewelry or other items that may be affected by rapid swelling of affected body parts.
- Try to identify the type of snake: note color, size, patterns, and markings.
- The bite will be painful and have two distinct puncture wounds.
- If venom is injected there will be burning and swelling.
- ONLY FOR CORAL SNAKE BITES: apply a mild wrapping on the wound.

Venomous Snakes of Tennessee*



Copperhead



Pygmy Rattlesnake



Timber Rattlesnake



Western Cottonmouth (aka Water Moccasin)

*Photos courtesy of Snakes of Tennessee (www.tennsnakes.org)

Venomous Snakes of Tennessee*

Other Snakes (not specifically native to Tennessee)



Rattlesnake



Coral Snake

3.2 Bears

Bears are active between mid-March and early November. Bears will naturally shy away from humans and are rarely encountered. The American Black Bear is the most common species of bear in the United States. Although called a black bear, their fur can vary between honey-colored, blond, brown, and black. Depending on the season, food supply and gender, black bears may weigh anywhere from 100 to 450 pounds. Black bears measure about 3 feet high when on all four feet. They can be 5 feet tall when standing on back legs.



If encountering a bear:

- If you surprise a bear, stand still and stay calm. Let the bear identify you and leave. Talk in a normal tone of voice and be sure to leave the bear an escape route.
- If a bear doesn't leave, wave your arms slowly overhead and talk calmly. If the bear stands up, they are trying to identify you. If it huffs, pops its jaw or stomps it needs its space and step off the trail to the downhill side and keep looking at the bear.

If the bear approaches:

- Stand your ground, yell and throw rocks in the direction of the bear
- If you are attacked, do not play dead. Fight back with anything available.

The black bear has short claws (approximately four centimeters), which may not be easily visible in the tracks. The toe imprints are close together, though often there is a definitely space between the toes. The grizzly bear has longer claws (between 5 and 10 centimeters) that are often more visible in their tracks. The grizzly bear toes are closer together and are usually touching.



Bear Track (front right paw and right hind paw, respectively)

3.3 Coyote

The coyote is the size and shape of a small shepherd dog, about four feet in length with a full, black-tipped tail about 14 inches long. Typically weighs between 30 and 40 pounds. Their long hair varies in color with geography and season from pale grayish buff to rich reddish brown. The ears are rusty red behind.



Coyotes typically walk or trot in an alternating pattern; less common gaits include the two-print trot and a lope or gallop in a four-print pattern. Oval tracks are 2.5 to 3.5 inches long, and usually show foot pads (approximately 1/3 of entire print) and claw marks for at least the front two toes. Trails may meander, but are often straight-line routes.



3.4 Bobcat

The bobcat is active throughout the year but secretive and seldom seen. The bobcat is most abundant in foothills, canyons, mesas, and plateaus, where brush and woodland provide suitable habitat. Bobcats tend to avoid open prairies, tundra, heavy sub-alpine timber, and wetlands.



Bobcats are 32–37 inches long with a tail about 6 inches in length. Bobcats are similar in appearance to their cousin, the lynx. Bobcats or lynx are easily confused with mountain lion kittens, which are also spotted. The mountain lion kittens can be deciphered as they have much longer tails.



Bobcats walk in an alternating pattern, making prints about twice the size of a house cat's (2 to 2.5 inches long). Tracks could be confused with coyote or fox tracks — for bobcat, look for lack of claw marks, prints as wide as or wider than long, and lack of foot drag marks. As with lynx, hind legs sink in deep snow to make a “handle” at the back of the print. Bobcat trails meander rather than run directly.

Appendix G

Hunting Season Schedule

2013 – Spring 2014 Seasonal Hunting Schedule State of Tennessee

The seasonal hunting schedule is only valid through the spring of 2014. Prior to conducting site activities, please verify this seasonal hunting schedule is still valid (update this appendix, as needed). For more information concerning hunting in the state of Tennessee, visit the most current Tennessee Hunting and Trapping Guide (<http://www.eregulations.com/tennessee/hunting/>). When on site, ENVIRON personnel should wear appropriate clothing (i.e., fluorescent orange Hi-Vis vests) all year, in the event a hunter is hunting out of season. If hunters seem close to the work area (off and on site), make your presence known. Yell loudly or if near your car, honk your horn. Once a hunter is aware of your presence, don't make unnecessary noise to disturb wildlife. Avoid confrontations.

Be aware that even if "No Trespassing" and/or "No Hunting Allowed" signs are posted on site, trespassers and/or hunting may still be present on site. At no point should field personnel or contractors confront trespassers. In the event a trespasser is observed on site, ENVIRON personnel should vacate the site immediately and call their PM and HSC for further instructions. If warranted (e.g., the trespasser appears threatening), ENVIRON personnel should migrate to Rally Point B (911 Call Center, intersection of Andrew Jackson Drive and Route 64) and contact the local sheriff's department immediately (Waynesboro Police Department: 931-722-5486).

2013 – 2014 (winter only) Deer Hunting Schedule

Season Type	Season Dates	Antlerless Bag Limits			Antlered Bag Limit
		Unit L	Unit A	Unit B	Statewide
Archery	Sept. 28–Oct. 25, 2013 Oct. 28–Nov. 8, 2013	3/day	4	4	3 (one antlered deer per day, not to exceed 3 for the year)
Muzzleloader/Archery	Nov. 9–22, 2013	3/day	4	1	
Gun/Muzzleloader/Archery	Nov. 23, 2013–Jan. 5, 2014	3/day*	See Antlerless Gun Hunts on page 26.*	See Antlerless Gun Hunts on page 26.*	
Young Sportsman** Gun/Muzzleloader/Archery	Oct. 26–27, 2013	3/day	2	1	
	Jan. 11–12, 2014	3/day	2	1	

* A Type 094 permit is required to hunt antlerless deer during this season **except** for landowners hunting under the landowner exemption (as described in TCA 70-2-204), Annual Sportsman license holders, Lifetime Sportsman, and hunters who possess a Type 167 permit. See Antlerless Table on page 26.

** Youths 6–16 years of age may participate. Young sportsman must be accompanied by a non-hunting adult, 21 years of age or older, who must remain in a position to take immediate control of the hunting device and who must also comply with fluorescent orange regulations, as specified for legal hunters. Multiple youths may be accompanied by a single qualifying adult.

2013-2014 Small Game Hunting Schedule

Species	Opens	Closes	Daily Bag
Squirrel (fox, red, gray)	Aug. 24	Feb. 28	10
Spring squirrel (2014)	May 10	June 8	10
Grouse (closed W. of I-65)	Oct. 12	Feb. 28	3
Rabbit	Nov. 2	Feb. 28	5
Quail	Nov. 2	Feb. 28	6

Migratory bird seasons are subject to change by federal framework;
check TWRA website for updates. Proposed seasons are:

Species	Opens	Closes	Daily Bag
Dove ¹ (Opens at noon on Sept. 1)	Sept. 1	Sept. 26	15 ²
	Oct. 12	Oct. 27	15 ²
	Dec. 19	Jan. 15	15 ²
Woodcock ¹	Oct. 26	Dec. 9	3
Wilson snipe ¹	Nov. 14	Feb. 28	8
Crow (Fri./Sat./Sun.)	June 1	Feb. 28	no limit
Canada goose ¹	Sept. 1	Sept. 15	5
Wood duck/Teal ¹	Sept. 14	Sept. 18	4 ³

1. Tennessee Migratory Bird Permit required (see page 9).

2. No limit on collared dove. Doves not readily identifiable as collared doves will be considered to be mourning doves and will count toward the mourning dove daily bag limit.

3. Not to exceed 2 wood ducks. Total bag of 4 ducks.

2013-2014 Turkey Hunting (Shotgun/Archery) Schedule

2013 Fall Turkey Hunting (Shotgun/Archery) – October 12–25

County	Turkey Bag Limits	County	Turkey Bag Limits	County	Turkey Bag Limits
Anderson	2	Hamblen	2	Morgan	1
Bedford	6	Hamilton	1	Obion	1
Benton	1	Hancock	2	Overton	1
Blount	2	Hardeman	1	Perry	1
Campbell	2	Hardin	1	Pickett	1
Cannon	3	Hawkins	3	Putnam	1
Carroll	3	Henderson	1	Rhea	1
Carter	2	Henry	3	Roane	1
Cheatham	6	Hickman	6	Robertson	6
Chester	1	Houston	1	Rutherford	6
Claiborne	2	Humphreys	1	Scott	2
Clay	1	Jackson	1	Sequatchie	1
Cocke	3	Jefferson	2	Sevier	2
Coffee	3	Johnson	2	Smith	6
Cumberland	1	Knox	2	Stewart	1
Davidson	6	Lawrence	1	Sullivan	3
Decatur	1	Lewis	3	Sumner	6
DeKalb	2	Lincoln	3	Trousdale	6
Dickson	6	Macon	6	Union	2
Fayette	1	Madison	1	Van Buren	1
Fentress	1	Marion	2	Warren	3
Franklin	6	Marshall	6	Washington	2
Gibson	1	Maury	6	Wayne	1
Giles	1	McNairy	1	Weakley	3
Grainger	2	Meigs	1	White	2
Greene	3	Montgomery	6	Williamson	6
Grundy	1	Moore	3	Wilson	6

2013-2014 Elk Hunting Schedule

Elk Bag Limits, Season Dates, and Quotas

Season Type	Season Dates	Permits	Bag Limit
Gun/ Muzzleloader/Archery	Oct. 21–25	5	1 antlered elk per permit
Youth – Gun/ Muzzleloader/Archery	Oct. 26–27	1	1 antlered elk per permit

2013-2014 Bear Hunting Schedule

2013 Statewide Bear Seasons (See WMA Section for WMA Bear Seasons)

Bear reserves are closed to bear hunting.

County	Dogs Permitted							No Dogs Permitted		Youth (No Dogs Permitted)
	Sept. 30 –Oct. 7 G/M/A	Oct. 5–13 G/M/A	Oct. 28 –Nov. 1 G/M/A	Nov. 4–8 G/M/A	Nov. 29 –Dec. 23 G/M/A	Dec. 2–15 G/M/A	Dec. 31 –Jan. 3 G/M/A	Sept. 28 –Oct. 25 Archery Only	Nov. 23–26 G/M/A	Oct. 26–27 G/M/A
Blount	open		open		open	All Listed Counties Open		All Listed Counties Open	All Listed Counties Open	Youth 6–16 years may participate; must be accompanied by a non-hunting adult.
Carter			open		open					
Cocke (south of I-40)	open		open		open					
Cocke (north of I-40)			open		open					
Greene			open		open					
Jefferson (east of 411)	open		open		open					
Johnson			open		open					
Monroe		open		open			open			
Polk (east of 411 & north of 64)		open		open			open			
Sevier	open		open		open					
Sullivan			open		open					
Unicoi			open		open					
Washington			open		open					

Appendix H

Applicable ENVIRON Standard Practice Instruction Manuals



Standard Practice Instruction 11

Trenching and Excavation

Prepared by:
ENVIRON International Corporation
333 W. Wacker Drive, Suite 2700
Chicago, Illinois

Implementation Date: **March 2010**
Revision Date: **March 2013**
2011 Version 4

STANDARD PRACTICE INSTRUCTION 11

IMPLEMENTATION DATE: March 2010
REVISION DATE: March 2013
SUBJECT: Trenching and Excavation Awareness

BASIS: The primary hazard to which employees may be exposed during trenching and excavation work is a cave-in, which occurs when the soil forming the side of the excavation can no longer resist the forces applied to it. This results from a reduction in the frictional and cohesive capacities of the soil to resist forces. Changing environmental conditions, such as freezing and thawing, or the addition or removal of water from the pores of the soil can reduce the ability of a soil to resist forces. The addition of superimposed loads from spoil piles, or the placement of equipment or materials near the edge of the excavation also create forces that can exceed the ability of the soil to resist.

GENERAL: ENVIRON International Corporation (ENVIRON) will ensure that when a trench (i.e., an excavation that has a width of less than 15 feet (ft) (5 meters) and is deeper than it is wide) or an excavation (i.e., any man-made hole) that is formed during the removal of earth, that the hazards and risks are evaluated, and that information concerning their identification and controls are transmitted to all affected employees. This Standard Practice Instruction (SPI) is intended to provide employees with an awareness of trenching and excavations; and is NOT intended to provide ENVIRON employees with the necessary knowledge and skills to be deemed a "Competent Person". These standards apply to all open excavations and trenches made in the earth's surface and/or trenching and excavating operations where tasks take place in or near an open trench or excavation.

RESPONSIBILITY: The Directors of Health and Safety (the "Directors") are solely responsible for all facets of this program and has full authority to make necessary decisions to ensure success of the program. The Directors are the sole persons authorized to amend these instructions and are authorized to halt any operation of the company where there is danger of serious personal injury.

However, in the event that an ENVIRON project involves trenching and/or an excavation, the Principal in Charge and the Project Manager (PM) shall establish a procedure for obtaining site or prime contract information regarding excavations and their specific written procedures so that their client or general contractor can be consulted with the information on soil analyses, slope estimations, atmospheric measurements, and protective systems. The nature of any prohibitions and/or site conditions should be discussed with all affected parties prior to the commencement of any trenching or excavation activity.

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List of Attachments

Attachment A: Sloping Requirements

Acronyms and Abbreviations

Directors	The Directors of Health and Safety
ENVIRON	ENVIRON International Corporation
ft	Feet
m	Meters
PM	Project Manager
PPE	Personal Protective Equipment
SPI	Standard Practice Instruction

1. Written Program

ENVIRON will review and evaluate this SPI on:

- A triennial basis
- When regulatory changes occur that prompt revision of this document
- When there is an accident or close-call that relates to this topic

Effective implementation of this program requires support from all levels of management within ENVIRON. This written program will be communicated to all personnel that are affected by it. It encompasses the total workplace, regardless of the number of workers employed or the number of work shifts. It is designed to establish clear goals, and objectives.

2. General Requirements

A "Competent Person" is one who:

1. Has a complete understanding of the applicable safety standards and any other data provided;
2. Assures that the proper locations of underground installations or utilities, and that the proper utility companies have been contacted;
3. Is knowledgeable in the identification of soil types and can conduct soil classification tests and reclassify soil after any condition changes;
4. Is capable of identifying existing and predictable hazards or hazardous conditions in the surroundings, or working conditions that are unsanitary, hazardous, or dangerous to employees and can determine adequate protective systems (sloping, shoring, or shielding systems) for employee protection;
5. Conducts and/or supervises all air monitoring activities for potential hazardous atmospheres;
6. Conducts daily and periodic inspections of excavations and trenches;
7. Has the responsibility and authority to take corrective actions to eliminate or control these hazards;
8. Is able to recognize environmental or operational conditions that could result in cave-ins, be able to recognize the potential for failure of protective systems, and the need for testing atmospheres; and
9. Approves design of structural ramps, if used.

The procedures outlined in this document are not intended to train ENVIRON employees as a "Competent Person" in trenching and/or excavations but instead to prevent future work-place injuries as they relate to trenching and excavation. This document will provide an awareness and basis for ensuring that ENVIRON employees understand what procedures need to be implemented in order for trenching and/or excavation activities to occur. This

document will help identify hazards in our work-place and enable us to determine the best course of action to take to reduce or eliminate known hazards.

Examples of the types of projects that have the potential to present hazardous trenching and/or excavation conditions include but are not limited to:

- Observation of excavating activities or inspection of a previously excavated opening;
- Sampling during or after removal of leaking or contaminated equipment (e.g., underground storage tanks);
- Drilling of large-diameter wells;
- Laying, repairing, or removing of underground utilities (i.e., water, electrical, sewer, or process lines); and
- Excavation of building foundations or other earthmoving activities.

The following hazards may be encountered during trenching and excavating operations:

- Surface encumbrances
- Exposure to vehicular traffic
- Exposure to falling loads, loose rock, or soil
- Hazardous atmospheres
- Water accumulation
- Adjacent structures and
- Falling into the trench/excavation.

The main hazard associated with any excavation operation is the danger of collapse of an exposed face. Collapse occurs most often when the angle of the excavation is too steep for the soil type or environmental conditions present. However, collapse can also occur as a result of heaving (when the weight of the surrounding soil pushes against the bottom of the trench) or because of boiling (when water in the bottom of the trench causes the soil to become "quick" and lose its weight bearing capability). Hazardous atmospheres can also be a danger during trenching and excavating. The most common atmospheric hazards are the accumulation of carbon monoxide from powered equipment, lack of oxygen, and sewer gas (hydrogen sulfide). A competent person who is aware of the possible hazards should supervise entry into, or work around, trenches or excavations.

The following general conditions are characteristic of a properly evaluated and controlled job site:

- Prior to the start of work, a competent person shall evaluate the soil type present at the job site;
- Sites for the spoil (i.e., removed soil) are located a safe distance away from excavations (in general, this distance is a minimum of 2 ft from the edge of the trench or excavation);

- Existence of underground utilities have been identified and procedures are in place in the event that unforeseen utilities are unearthed
- Warning systems for mobile equipment are in-place;
- Workers are not permitted to work under overhead loads
- Workers are properly protected from vehicular traffic;
- Adjacent structures are inspected for stability
- Workers are equipped with proper fall protection, if applicable;
- Vehicles are kept away from the open excavation; and,
- Methods or provisions for removing accumulated or standing water are present at the job site.

In general, no ENVIRON employee should enter an excavation or trench. However, if it becomes necessary for an employee to enter an excavation or trench, then the employee MUST notify and be granted permission to enter the trench or excavation by the Principal In Charge and Director of H&S PRIOR to entering, as well as fulfilling all other requirements as outlined in this SPI.

3. Surface Encumbrances and Underground Installations Safety Guidelines

All surface encumbrances that are located so as to create a hazard to employees will be removed or supported, as necessary, to safeguard employees. The estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, will be determined prior to opening an excavation. This would include the following:

3.1 Establish the locations of all underground and overhead utilities and services before beginning trenching or excavation operations.

3.1.1 Contact utility and service companies to include municipal owned and advise them prior to the start of all actual excavation. No exceptions.

☐ Within established or customary local response times;

☐ Advised of the proposed work, and;

☐ Asked to establish the location of the utility underground installations prior to the start of actual excavation and provide advice concerning surface encumbrances.

3.1.2 When excavation operations approach the estimated location of underground installations, the exact location of the installations will be determined by safe and acceptable means (modern techniques and customary types of equipment) as

determined by the Competent Person. Where this determination is unclear the owning utility will be contacted for assistance.

- 3.1.3 While any excavation is open, underground installations will be protected, supported or removed as necessary to safeguard employees.

4. Protection from Hazards Associated with Water Accumulation

- 4.1 Employees will not work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees adequately vary with each situation, but could include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline systems.
- 4.2 The designated Competent Person for the project shall inspect all excavations after any rainfall or other hazard producing occurrence to determine if any change to the soils capacity to resist the force has occurred. Water should not be allowed to accumulate within the excavation.
- 4.3 Water will be controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operations will be monitored by a competent person to ensure proper operation.
- 4.4 If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches or dikes, suitable means will be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation. Excavations subject to runoff from heavy rains will be inspected by a competent person

5. Protection from Superimposed Loads

- 5.1 Superimposed loads (crane, backhoe and other such equipment working close to the excavation edges) require extra sheet piling, shoring or other bracing be used to assure the ability of the soil to resist. The use of mobile equipment near the excavation requires proper vehicle barricades and/or stop blocks.

6. Access and Egress from Excavations

- 6.1. Structural ramps. Structural ramps that are used solely by employees as a means of access or egress from excavations will be designed by a Competent Person. Structural ramps used for access or egress of equipment will be designed by a competent person qualified in structural design, and will be constructed in accordance with the design.
- 6.2. Means of egress from trench excavations (less than 20 ft deep). A stairway, ladder, ramp or other safe means of egress will be located in trench excavations that are 4 ft

(1.22 m) or more in depth so as to require no more than 25 ft (7.62 meters (m)) of lateral travel for employees.

- 6.3. Means of egress from trench excavations (20 ft or greater in depth). Ladders will be equipped with ladder platforms at 20-foot intervals.

7. Trench Safety

- 7.1. Trenches more than 5 ft deep require shoring or will be laid back to its angle of repose (stabilized slope).
- 7.2. In hazardous soil conditions (loosely compacted or rocky) trenches under five foot need protection.
- 7.3. There shall be at any excavation site a competently trained person, who is capable of identifying existing and predictable hazards and who shall have the authority to take prompt corrective action to eliminate them on the site. This individual shall be able to identify soil classifications and protective systems (shoring, bracing and piling).
- 7.4. Trenches more than five (5) ft deep require shoring or will be laid back to a stable slope. In hazardous soil, trenches under five (5) ft will also be protected.
- 7.5. Portable trench boxes or sliding trench boxes used in place of shoring and sloping shall be designed, constructed and maintained to provide protection at least equal to the required sheeting and shoring. Shields shall be designed by a registered professional engineer and will meet applicable standards.
- 7.6. Shields shall be installed so as to restrict lateral or other hazardous movement. Trench boxes and shields shall extend to the bottom of the trench and no less than eighteen (18) inches above the vertical top of the trench or excavation face. Excavation to a level not greater than 2 ft (.61 m) below the bottom of a shield shall be permitted, but only if the shield is designed to resist the forces calculated for the full depth of the trench and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the shield. No employee shall be allowed within the shield, or trench box during the installation, removal or relocation. If at anytime trench boxes are stacked, means shall be provided to prevent separation.

8. Exposure to Vehicular Traffic

Employees exposed to public vehicular traffic will be provided with, and will wear, warning/Hi-Vis vests or other suitable garments marked with or made of reflectorized or high-visibility material. In addition, a warning system will be utilized such as barricades, cones, hand or mechanical signals, or stop logs to alert vehicular traffic that an excavation/trench exists. If possible, the grade should be away from the excavation.

9. Exposure to Falling Loads

- 9.1 No employee will be permitted underneath loads handled by lifting or digging equipment.
- 9.2 Employees will be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials.
- 9.3 Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped to provide adequate protection for the operator during loading and unloading operations.

10. Warning Systems for Mobile Equipment

When mobile equipment is operated adjacent to an excavation, or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system will be utilized such as barricades, hand or mechanical signals, or stop logs. If possible, the grade should be away from the excavation.

11. Hazardous Atmospheres

- 11.1 Testing and controls. Confined space entry procedures will be adhered to in accordance with ENVIRON Confined Space Entry Program. To prevent exposure to harmful levels of atmospheric contaminants and to assure acceptable atmospheric conditions, the following requirements apply:
 - 11.1.1 Oxygen deficiency. Where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are stored nearby, the atmospheres in the excavation will be tested before employees enter excavations greater than 4 ft (1.22 m) in depth.
 - 11.1.2 Flammable atmospheres. Adequate precaution will be taken such as providing ventilation, to prevent employee exposure to an atmosphere containing a concentration of a flammable gas in excess of 20 percent of the lower flammable limit of the gas.
 - 11.1.3 Testing. When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing will be conducted as often as necessary to ensure that the atmosphere remains safe.
- 11.2 Emergency rescue equipment.
 - 11.2.1 Availability. Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, will be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. The equipment will be attended when in use.

- 11.2.2 Lifelines. Employees entering bell-bottom pier holes, or other similar deep and confined footing excavations, will wear a harness with a lifeline securely attached to it. The lifeline will be separate from any line used to handle materials, and will be individually attended at all times while the employee wearing the lifeline is in the excavation.

12. Personal Protective Equipment (PPE)

The following procedures are designed to provide employees of ENVIRON with a checklist system or procedure to follow for the selection of proper PPE for operations under this program.

12.1 Checklist

- (1) Hard hat
- (2) Long sleeve garment
- (3) Trouser
- (4) Safety toes work boot
- (5) Proper eye and face protection
- (6) Work glove, rubber or neoprene when working with or in chemicals
- (7) NIOSH approved respirator where or when the job hazard may require
- (8) Hearing protection
- (9) Rubber or neoprene boots when exposed to waste-water products (a sanitary washing facility will be provided for cleanup)

Note: The PM and the on-site supervisor will be responsible for compliance for proper utilization of PPE.

13. Material Handling Equipment

All material handling equipment will be operated in accordance with established and recognized written policies, manufacturers procedures and applicable regulatory standards.

14. Stability of Adjacent Structures

- 14.1 Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning will be provided to ensure the stability of such structures for the protection of employees.
- 14.2 Excavation below the level of the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard to employees will not be permitted except when:
- 14.2.1 A support system, such as underpinning, is provided to ensure the safety of employees and the stability of the structure; or

14.2.2 The excavation is in stable rock; or

14.2.3 A registered professional engineer has approved the determination that the structure is sufficiently removed from the excavation so as to be unaffected by the excavation activity; or

14.2.4 A registered professional engineer has approved the determination that such excavation work will not pose a hazard to employees.

14.3 Sidewalks, pavements and appurtenant structures will not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures.

15. Protection of Employees from Loose Rock or Soil

15.1 Adequate protection will be provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection will consist of scaling to remove loose material; installation of protective barricades at intervals as necessary on the face to stop and contain falling material; or other means that provide equivalent protection.

15.2 Employees will be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. Protection will be provided by placing and keeping such materials or equipment at least 2 ft (.61 m) from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.

16. Site Inspections

16.1 A competent person inspects the excavation or trench daily for evidence of a situation that could result in possible cave-ins, indication of failure of protective systems, hazardous atmospheres, or other hazardous conditions. Daily inspections shall include the excavation or trench, adjacent areas, and protective systems. These inspections will be conducted prior to the start of work, as needed throughout the shift, after every rainstorm, and when employee exposure can be reasonably be anticipated.

The following precautions are in place for trenches and excavations greater than 4 ft in depth:

- Openings have safe routes of entry and egress,
- Atmospheres have been tested for oxygen deficiency or hazardous contaminants.
- The following additional precautions are in place for trenches and excavations greater than 5 ft in depth:
- Shoring, shielding, or other protective systems are in place when the slope of any exposed face is greater than allowed for by the soil type and conditions present.

For excavations greater than 20 ft in depth: A registered professional engineer has designed the protective system.

Once begun, an excavation must be inspected regularly to detect changes that may create a hazard.

17. Fall Protection

- 17.1 Where employees or equipment are required or permitted to cross over excavations, walkways or bridges with standard guardrails will be provided.
- 17.2 Adequate barrier physical protection will be provided at all remotely located excavations. All wells, pits, shafts, etc., will be barricaded or covered. Upon completion of exploration and other similar operations, temporary wells, pits, shafts, etc., will be backfilled.

18. Training Requirements

- 18.1 Initial Training.
 - 18.1.1 ENVIRON shall provide training to ensure the purpose and function of the trenching and excavation program is understood by employees and the knowledge and skills required for safe trenching and excavation operations is acquired by all affected employees. Specifically, Site and Ops personnel will receive training on Trenches and Excavations as part of HAZWOPER training and Facility personnel will receive "in-house" awareness training. All Site, OPs and Facility employees should also be made aware of ENVIRON's policy regarding entry (i.e., **in general, no ENVIRON employee should enter an excavation or trench deeper than 5 ft. However, if it becomes necessary for an employee to enter an excavation or trench deeper than 5 ft, then the employee must ensure that the excavation or trench is properly evaluated and that proper precautions are in place as noted above. All Facility and Site personnel must be able to identify the location of each excavation or trench, be aware of the hazards associated with each excavation or trench, and know when their activities (e.g., standing near the face, driving a vehicle, or operating equipment) could produce a hazardous condition).**

The training shall include as a minimum, the following:

- 18.1.2 Training in the recognition of applicable hazards associated with trenching and excavation operations.
- 18.1.3 Each affected employee shall be instructed in the purpose and use of this SPI.
- 18.1.4 All other employees whose work operations are or may be in an area where trenching and excavation operation are conducted shall be instructed to an awareness level about the procedures, and prohibitions relating to work in such areas.

18.2 Refresher Training.

18.2.1 Retraining shall be provided for all authorized and affected employees whenever there is a change in their job assignments, a change in equipment or processes that present a new hazard, or when there is a change in these procedures. **Note:** Retraining (to include a procedural review) will also be provided whenever there is a "close-call" or these procedures fail.

18.2.2 Additional retraining shall also be conducted whenever a periodic inspection reveals, or whenever ENVIRON has reason to believe, that there are deviations from or inadequacies in the employee's knowledge or use of these procedures.

18.2.3 The retraining shall reestablish employee proficiency and introduce new or revised operational methods and procedures, as necessary.

19. Protection of Employees in Excavations

19.1 Each employee in an excavation will be protected from cave-ins by an adequately designed protective system except when:

19.1.1 Excavations are made entirely in stable rock; or

19.1.2 Excavations are less than 5 ft (1.52 m) in depth and examination of the ground by a competent person provides no indication of a potential cave-in.

19.2 Protective systems will have the capacity to resist without failure all loads that are intended or could reasonably be expected to be applied or transmitted to the system.

20. Design of Sloping and Benching Systems

20.1 The slopes and configurations of sloping and benching systems will be properly selected and constructed as follows:

20.1.1 Option 1 - Allowable configurations and slopes. Excavations will be sloped at an angle not steeper than one and one-half horizontal to one vertical (34 degrees measured from the horizontal), unless the employer uses one of the other options listed below.

20.1.2 Option 2 - Determination of slopes and configurations is made using Maximum allowable slopes, and allowable configurations for sloping and benching systems.

20.1.3 Option 3 - Designs using other tabulated data. Designs of sloping or benching systems will be selected from and in accordance with tabulated data, such as approved tables and charts. The tabulated data will be in written form and will include:

- Identification of the parameters that affect the selection of a sloping or benching system drawn from such data;
- Identification of the limits of use of the data, to include the magnitude and configuration of slopes determined to be safe;
- Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.

Note: At least one copy of the tabulated data which identifies the registered professional engineer who approved the data, will be maintained at the jobsite during construction of the protective system. After that time the data may be stored off the jobsite, but a copy of the data will be made available upon request.

20.1.4 Option 4 - Design by a registered professional engineer that is deemed competent and knowledgeable in the design of sloping and benching.

20.2 Sloping and benching systems not utilizing Option (1) or Option (2) or Option (3) will be approved by a registered professional engineer. Designs will be in written form and will include at least the following:

20.2.1 The magnitude of the slopes that were determined safe for the particular project;

20.2.2 The configurations that were determined to be safe for the particular project;

20.2.3 The identity of the registered professional engineer approving the design.

Note: At least one copy of the design will be maintained at the jobsite while the slope is being constructed. After that time the design need not be at the jobsite, but a copy will be made available upon request.

21. Design of Support Systems, Shield Systems, and other Protective Systems

21.1 Designs of support systems, shield systems, and other protective systems will be selected and constructed in accordance with the following options:

21.1.1 Option 1 - Designs using applicable regulatory guidance. Designs for timber shoring in trenches will be determined in accordance with the conditions and regulatory requirements. Designs for aluminum hydraulic shoring will also be in accordance with regulatory requirements.

21.1.2 Option 2 - Designs using Manufacturer's Tabulated Data. Design of support systems, shield systems, or other protective systems that are drawn from

manufacturer's tabulated data will be in accordance with all specifications, recommendations, and limitations issued or made by the manufacturer.

21.1.2.1 Deviation from the specifications, recommendations, and limitations issued or made by the manufacturer will only be allowed after the manufacturer issues specific written approval.

21.1.2.2 Manufacturer's specifications, recommendations, and limitations, and manufacturer's approval to deviate from the specifications, recommendations, and limitations will be in written form at the jobsite during construction of the protective system.

21.1.3 Option 3 - Designs using other Tabulated Data. Designs of support systems, shield systems, or other protective systems will be selected from and be in accordance with tabulated data, such as tables and charts. The tabulated data will be in written form and include all of the following:

21.1.3.1 Identification of the parameters that affect the selection of a protective system drawn from such data;

21.1.3.2 Identification of the limits of use of the data;

21.1.3.3 Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.

Note: At least one copy of the tabulated data, which identifies the registered professional engineer who approved the data, will be maintained at the jobsite during construction of the protective system. After that time the data may be stored off the jobsite, but a copy of the data will be made available upon request.

21.1.4 Option 4 - Design by a Registered Professional Engineer. Support systems, shield systems, and other protective systems not utilizing Option 1, Option 2 or Option 3, above, will be approved by a registered professional engineer. Designs will be in written form and will include the following:

21.1.4.1 A plan indicating the sizes, types, and configurations of the materials to be used in the protective system; and

21.1.4.2 The identify of the registered professional engineer approving the design.

22. Materials and Equipment used for Protective Systems

22.1 Materials and equipment used for protective systems will be free from damage or defects that might impair their proper function.

- 22.2 Manufactured materials and equipment used for protective systems will be used and maintained in a manner that is consistent with the recommendations of the manufacturer, and in a manner that will prevent employee exposure to hazards.
- 22.3 When material or equipment that is used for protective systems is damaged, a competent person will examine the material or equipment and evaluate its suitability for continued use. If the competent person cannot assure the material or equipment is able to support the intended loads or is otherwise suitable for safe use, then the material or equipment will be removed from service, and will be evaluated and approved by a registered professional engineer before being returned to service.

23. Installation and Removal of Support Systems

23.1 General requirements.

- 23.1.1 Members of support systems will be securely connected together to prevent sliding, falling, kickouts, or other predictable failure.
- 23.1.2 Support systems will be installed and removed in a manner that protects employees from cave-ins, structural collapses, or from being struck by members of the support system.
- 23.1.3 Individual members of support systems will not be subjected to loads exceeding those which those members were designed to withstand.
- 23.1.4 Before temporary removal of individual members begins, additional precautions will be taken to ensure the safety of employees, such as installing other structural members to carry the loads imposed on the support system.
- 23.1.5 Removal will begin at, and progress from, the bottom of the excavation. Members will be released slowly so as to note any indication of possible failure of the remaining members of the structure or possible cave-in of the sides of the excavation.
- 23.1.6 Backfilling will progress together with the removal of support systems from excavations.

23.2 Additional requirements for support systems for trench excavations.

- 23.2.1 Excavation of material to a level no greater than 2 ft (.61 m) below the bottom of the members of a support system will be permitted, but only if the system is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the support system.
- 23.2.2 Installation of a support system will be closely coordinated with the excavation of trenches.

24. Sloping and Benching Systems

- 24.1 Employees will not be permitted to work on the faces of sloped or benched excavations at levels above other employees except when employees at the lower levels are adequately protected from the hazard of falling, rolling, or sliding material or equipment.

25. Shield Systems

- 25.1 Shield systems will not be subjected to loads exceeding those which the system was designed to withstand.
- 25.2 Shields will be installed in a manner to restrict lateral or other hazardous movement of the shield in the event of the application of sudden lateral loads.
- 25.3 Employees will be protected from the hazard of cave-ins when entering or exiting the areas protected by shields.
- 25.4 Employees will not be allowed in shields when shields are being installed, removed, or moved vertically.
- 25.5 Excavations of earth material to a level not greater than 2 ft (.61 m) below the bottom of a shield will be permitted, but only if the shield is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the shield.

26. Applicable Definitions

Accepted Engineering Practices - means those requirements which are compatible with standards of practice required by a registered professional engineer.

Aluminum Hydraulic Shoring - means a pre-engineered shoring system comprised of aluminum hydraulic cylinders (crossbraces) used in conjunction with vertical rails (uprights) or horizontal rails (wales). Such system is designed specifically to support the sidewalls of an excavation and prevent cave-ins.

Bell-Bottom Pier Hole - means a type of shaft or footing excavation, the bottom of which is made larger than the cross section above to form a bell shape.

Benching (Benching System) - means a method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

Cave-In - means the separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person.

Competent Person - means one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

Cross Braces - mean the horizontal members of a shoring system installed perpendicular to the sides of the excavation, the ends of which bear against either uprights or wales.

Excavation - means any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.

Faces or Sides - means the vertical or inclined earth surfaces formed as a result of excavation work.

Failure - means the breakage, displacement, or permanent deformation of a structural member or connection so as to reduce its structural integrity and its supportive capabilities.

Hazardous Atmosphere - means an atmosphere which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause death, illness, or injury.

Kickout - means the accidental release or failure of a cross brace.

Protective System - means a method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.

Ramp - means an inclined walking or working surface that is used to gain access to one point from another, and is constructed from earth or from structural materials such as steel or wood.

Registered Professional Engineer - means a person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any state is deemed to be a "registered professional engineer" within the meaning of this standard when approving designs for "manufactured protective systems" or "tabulated data" to be used in interstate commerce.

Sheeting - means the members of a shoring system that retain the earth in position and in turn are supported by other members of the shoring system.

Shield (Shield System) - means a structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either premanufactured or job-built in accordance with 1926.652. Shields used in trenches are usually referred to as "trench boxes" or "trench shields."

Shoring (Shoring System) - means a structure such as a metal hydraulic, mechanical or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.

Sides. See "Faces."

Sloping (Sloping System) - means a method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

Stable Rock - means natural solid mineral material that can be excavated with vertical sides and will remain intact while exposed. Unstable rock is considered to be stable when the rock material on the side or sides of the excavation is secured against caving-in or movement by rock bolts or by another protective system that has been designed by a registered professional engineer.

Structural Ramp - means a ramp built of steel or wood, usually used for vehicle access. Ramps made of soil or rock are not considered structural ramps.

Support System - means a structure such as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.

Tabulated Data - means tables and charts approved by a registered professional engineer and used to design and construct a protective system.

Trench (Trench Excavation) - means a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 ft (4.6 m) or less (measured at the bottom of the excavation), the excavation is also considered to be a trench.

Trench Box. See "Shield."

Trench Shield. See "Shield."

Uprights - means the vertical members of a trench shoring system placed in contact with the earth and usually positioned so that individual members do not contact each other. Uprights placed so that individual members are closely spaced, in contact with or interconnected to each other, are often called "sheeting."

Wales - means horizontal members of a shoring system placed parallel to the excavation face whose sides bear against the vertical members of the shoring system or earth.

Attachment A
Sloping Requirements

UNCONTROLLED WHEN PRINTED

SLOPING REQUIREMENTS

NOTE: All Slope Configurations stated in the horizontal to vertical ratio.

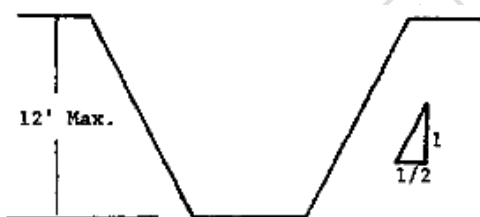
Excavations made in Type A soil.

1. All simple slope excavation 20 feet or less in depth shall have a maximum allowable slope of $\frac{3}{4}:1$.



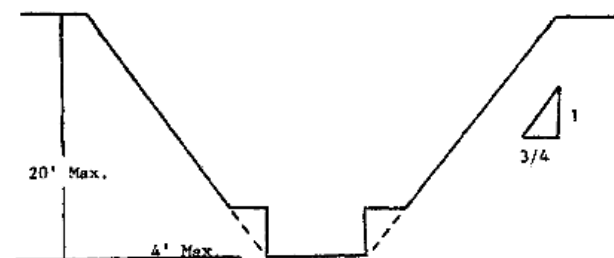
SIMPLE SLOPE -- GENERAL

Exception: Simple slope excavations which are open 24 hours or less (short term) and which are 12 feet or less in depth shall have a maximum allowable slope of $\frac{1}{2}:1$.

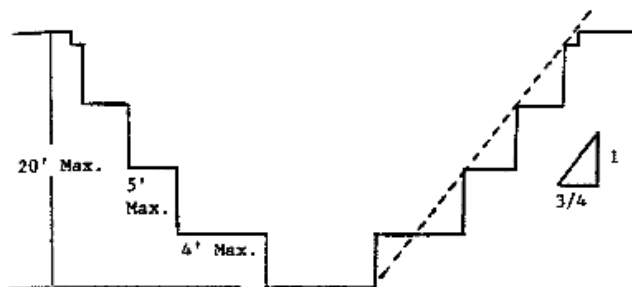


SIMPLE SLOPE -- SHORT TERM

2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of $\frac{3}{4}$ to 1 and maximum bench dimensions as follows:

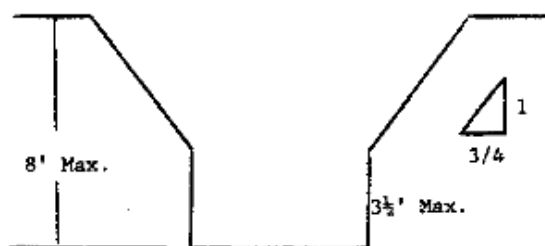


SIMPLE BENCH



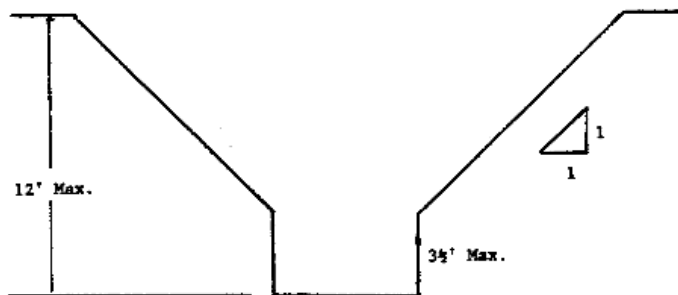
MULTIPLE BENCH

3. All excavations 8 feet or less in depth which have unsupported vertically sided lower portions shall have a maximum vertical side of $3\frac{1}{2}$ feet.



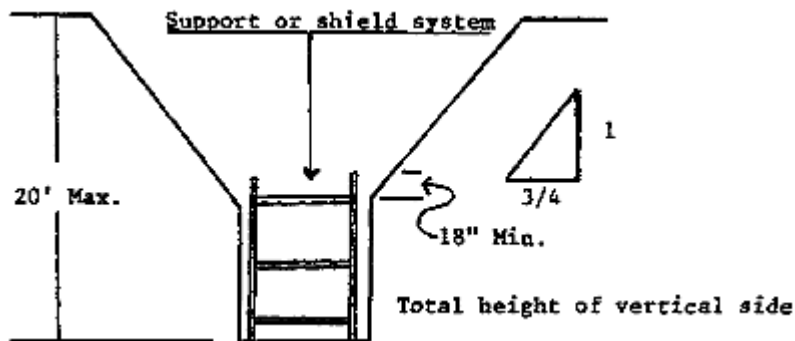
UNSUPPORTED VERTICALLY SIDED LOWER PORTION -- MAXIMUM 8 FEET IN DEPTH)

All excavations more than 8 feet but not more than 12 feet in depth with unsupported vertically sided lower portions shall have a maximum allowable slope of 1:1 and a maximum vertical side of $3\frac{1}{2}$ feet.



UNSUPPORTED VERTICALLY SIDED LOWER PORTION -- MAXIMUM 12 FEET IN DEPTH)

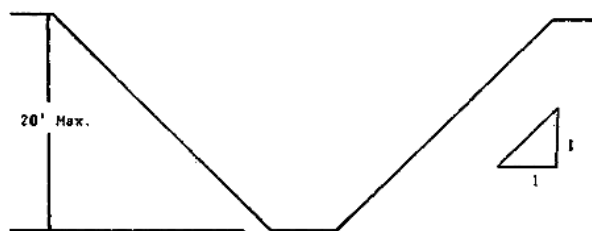
All excavations 20 feet or less in depth which have vertically sided lower portions that are supported or shielded shall have a maximum allowable slope of $\frac{3}{4}$:1. The support or shield system must extend at least 18 inches above the top of the vertical side.



SUPPORTED OR SHIELDED VERTICALLY SIDED LOWER PORTION

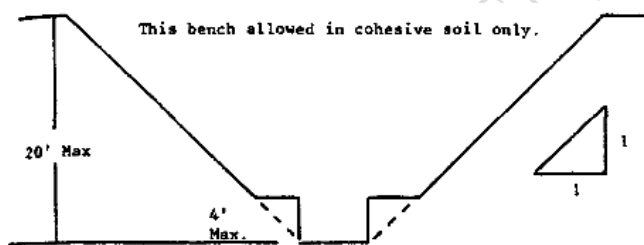
Excavations Made in Type B Soil

1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1.

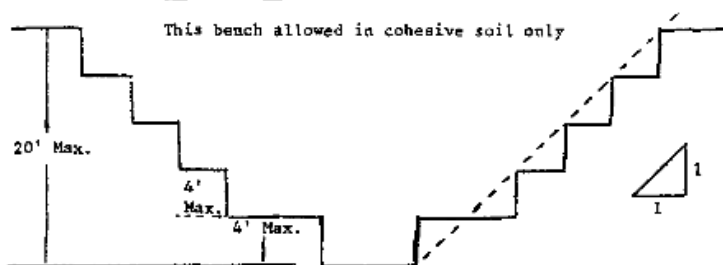


SIMPLE SLOPE

2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1 and maximum bench dimensions as follows:

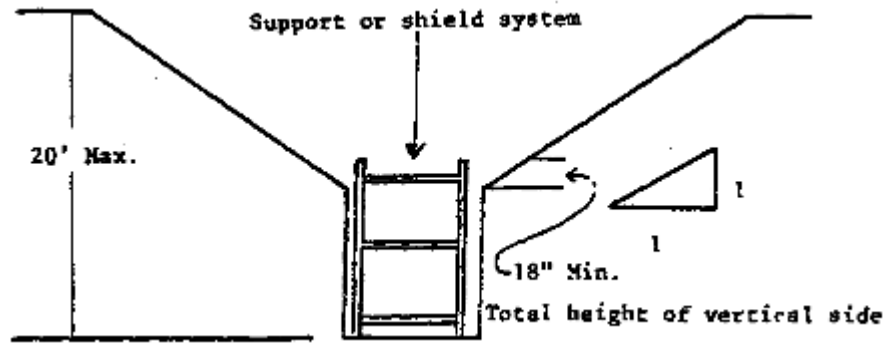


SINGLE BENCH



MULTIPLE BENCH

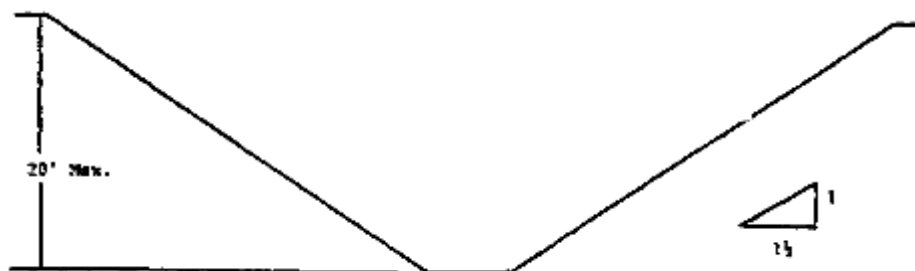
3. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1:1.



VERTICALLY SIDED LOWER PORTION

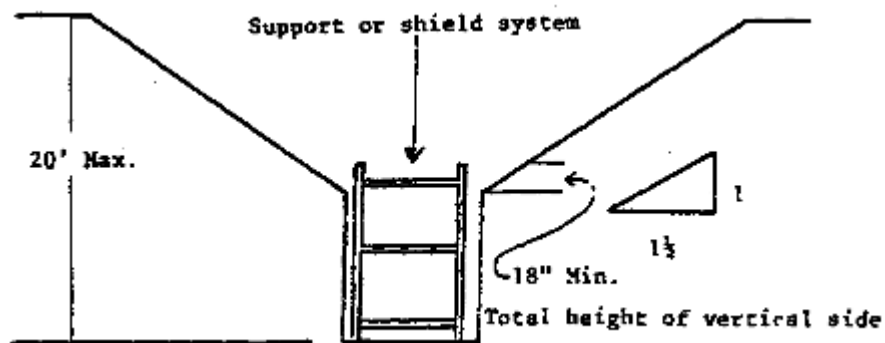
Excavations Made in Type C Soil

1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of $1\frac{1}{2}:1$.



SIMPLE SLOPE

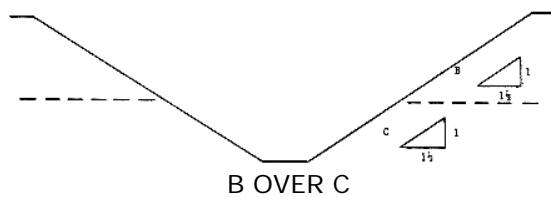
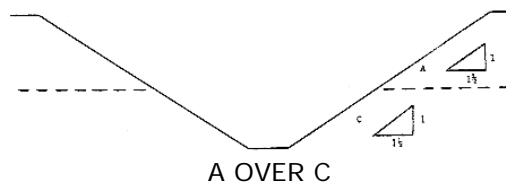
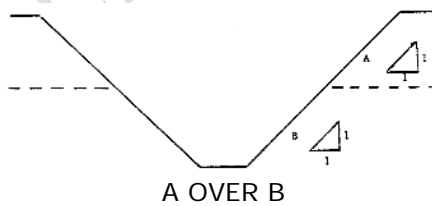
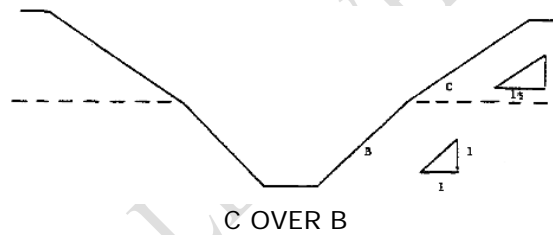
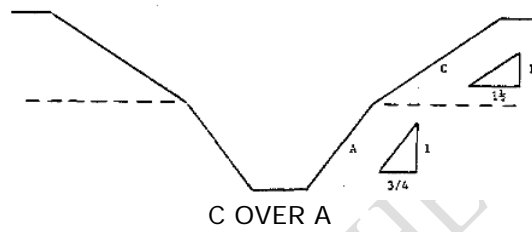
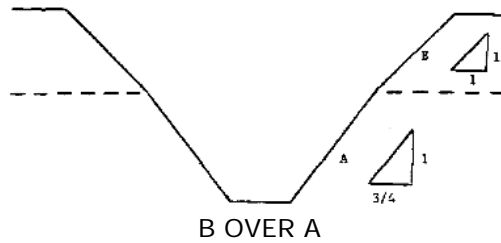
2. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of $1\frac{1}{2}:1$.



VERTICAL SIDED LOWER PORTION

Excavations Made in Layered Soils

1. All excavations 20 feet or less in depth made in layered soils shall have a maximum allowable slope for each layer as set forth below.





Standard Practice Instruction 30

Heat Stress

Prepared by:
ENVIRON International Corporation
333 W. Wacker Drive, Suite 2700
Chicago, Illinois

Implementation Date: **September 2011**
Revision Date: **September 2014**
2011 Version 3

STANDARD PRACTICE INSTRUCTION 30

IMPLEMENTATION DATE: September 2011
REVISION DATE: September 2014
SUBJECT: Heat Stress

BASIS: Heat induced occupational illnesses, injuries, and reduced productivity occurs in situations in which the total heat load (environmental plus metabolic) exceeds the capacities of the body to maintain normal body functions without excessive strain. The reduction of adverse heat related health effects can be accomplished by the proper application of engineering and work practice controls, worker training, measurements and assessment of heat stress, medical supervision, and proper use of heat-protective clothing and equipment.

GENERAL: ENVIRON will ensure that work practices and environmental conditions that impact the work environment are evaluated to determine if excessive heat conditions exist and ensure that proper safety precautions and work practice controls are instituted. This standard practice instruction is intended to address comprehensively the issues of; evaluating and identifying the specific heat stress hazards where work is performed, communicating information concerning these hazards, and establishing appropriate procedures and protective measures for our employees.

RESPONSIBILITY: The Directors of Health and Safety (the "Directors") are solely responsible for all facets of this program and has full authority to make necessary decisions to ensure success of the program. The Directors are the sole persons authorized to amend these instructions and are authorized to halt any operation of the company where there is danger of serious personal injury. In addition, ENVIRON has expressly authorized the Program Manager (PM) and/or Health and Safety Coordinator (HSC) to halt any operation where there is danger of serious personal injury.

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List of Attachments

Attachment A: Heat Management Card

Acronyms and Abbreviations

ENVIRON	ENVIRON International Corporation
HASP	Health and Safety Plan
HS	Health and Safety
HSC	Health and Safety Coordinator
JSA	Job Safety Analysis
PIC	Principal-in-Charge
PM	Project Manager
PPE	Personal protective equipment
SPI	Standard Practice Instruction

1 Written Program

ENVIRON will review and evaluate this Standard Practice Instruction (SPI) on a triennial basis, or when changes occur to that prompt revision of this document, or when facility operational changes occur that require a revision of this document. Effective implementation of this program requires support from all levels of management within this company. This written program will be communicated to all personnel that are affected by it. It encompasses the total workplace, regardless of number of workers employed or the number of work shifts. It is designed to establish clear goals and objectives.

2 Training and Work Acclimatization

2.1 Types of training. The degree of training provided shall be determined by the complexity of the job and the associated heat stress hazards.

2.1.1 Initial Training/Acclimatization. Prior to job assignment, ENVIRON shall provide training to ensure that the heat stress hazards associated with pre-designated job skills are understood by employees and that the knowledge and skills required for the safe application and usage of work place procedures and equipment, are acquired by employees. The training shall include the following:

2.1.1.1 Each authorized employee shall receive training in the recognition of applicable heat stress hazards involved with a particular job, and the methods and means necessary for safe work.

2.1.1.2 All other employees whose work operations are or may be in an area where an incidence of heat stress could occur, will be instructed about the procedure, and about the prohibitions related to working in that area.

2.1.1.3 Training course content. All new and current workers, who are un-acclimatized to heat and work in areas where there is reasonable likelihood of heat injury or illness, will be kept informed through continuing education programs. Initial and refresher training will, as a minimum cover the following:

- Heat stress hazards.
- Predisposing factors and relevant signs and symptoms of heat injury and illness.
- Potential health effects of excessive heat stress and first aid procedures.
- Proper precautions for work in heat stress areas.

- Employee responsibilities for following proper work practices and control procedures to help protect the health and provide for the safety of themselves and fellow employees, including instructions to immediately report to the Principal in Charge, Project Manager, and/or their local Health and Safety Coordinator, the development of signs or symptoms of heat stress overexposure.
- The effects of therapeutic drugs, over-the-counter medications, or social drugs (including alcohol), that may increase the risk of heat injury or illness by reducing heat tolerance.
- The purposes for and descriptions of the environmental and medical surveillance programs and of the advantages to the worker of participating in these surveillance programs.
- Proper use of protective clothing and equipment.

2.1.2 Refresher Training. Scheduled refresher training will be conducted on an annual basis.

2.1.2.1 Retraining shall be provided for all authorized and affected employees whenever there is a change in their job assignments, a change in equipment or processes that present a new heat stress hazard, or when their work takes them into other heat stress incidence areas.

2.1.2.2 Additional retraining shall also be conducted whenever a periodic inspection reveals, or whenever ENVIRON has reason to believe, that there are deviations from or inadequacies in the employee's knowledge of known hazards, or use of equipment or procedures.

2.1.2.3 The retraining shall reestablish employee proficiency and introduce new equipment, or revised control methods and procedures, as necessary.

2.1.3 Certification. ENVIRON shall certify that employee training has been accomplished and is being kept up to date. The certification shall contain a synopsis of the training conducted, each employee's name, and dates of training.

3 New Employee Conditioning Period

Project Managers will ensure that new or transferred employee's are allowed an appropriate conditioning period. New and returning employees will be gradually integrated into a full workload as appropriate for specific jobs and individuals. Employees will be assigned to an experienced trainer for job training and evaluation during the break-in period. Employees reassigned to new jobs should also have a break-in period. Important - Supervisors will closely monitor employees that fall into this category throughout their break in period.

4 Major Risk Factors

- 4.1 Several Factors contribute to heat stress in the work environment, including high temperature and humidity; direct sun or heat; limited air movement; physical exertion; poor physical condition; some medications; inadequate tolerance for hot workplaces; and insufficient water intake.
- 4.2 Harmful effects:
- 4.1.1 Heat stroke. The most serious heat related disorder, occurs when the body's temperature regulation fails and body temperature rises to critical levels. The primary signs and symptoms of heat stroke are confusion; irrational behavior; loss of consciousness; convulsions; a lack of sweating; hot, dry skin; and an abnormally high body temperature.
 - 4.1.2 Heat stroke treatment. If a worker shows signs of possible heat stroke, professional medical treatment should be obtained immediately. The worker should be placed in a shady, cool area and their outer clothing should be removed. Douse the worker with cool water and circulate air to improve evaporative cooling. Provide the worker fluids, preferably water, but avoid caffeine.
 - 4.1.3 Heat exhaustion. Due to a combination of excessive heat and dehydration. Signs and symptoms include headache, nausea, dizziness, weakness, thirst, and giddiness. Fainting and heat collapse is often associated with heat exhaustion.
 - 4.1.4 Heat exhaustion treatment. Workers suffering from heat exhaustion should be removed from the hot environment and given fluid replacement. They should be encouraged to get adequate rest and when possible, ice packs should be wrapped in towels and applied to the core of the body.
 - 4.1.5 Heat cramps. Usually caused by performing hard physical labor in a hot environment. They have been attributed to an electrolyte imbalance caused by sweating and lack of water replenishment. It is imperative that workers in hot environments drink water every 15 to 20 minutes and drink carbohydrate-electrolyte replacement liquids (sports drinks).
 - 4.1.6 Heat rashes. The most common problem in hot work environments is a result of the skin being persistently wetted by unevaporated sweat. Heat rash looks like a red cluster of pimples or small blisters and is more likely to occur on the neck, upper chest, groin, under the breasts, and in elbow creases. The best treatment for heat rash is to provide a cooler, less humid environment and keep the affected area dry.

5 Medical Management

Employees will have access to health care providers or designated alternates in order to facilitate treatment, surveillance activities, and recording of information as outlined in SPI 5 entitled “Medical Surveillance”.

6 Job Reassignment

Job reassignments will be coordinated with the Project Manager and must be chosen with knowledge of whether the new task will aid in acclimatizing the worker to the new job. Inappropriate job reassignment can prolong the acclimatization period. The worker may be placed in a low heat stress job. Assigning the worker to a restricted or low heat stress risk job is a helpful method for acclimatizing workers.

7 Selection and Use of Work Practices

Principals and Project Managers shall ensure the use of standardized safety-related work practices to prevent injuries resulting from incidence of heat stress. The specific safety-related work practices shall be consistent with the nature and extent of the associated work hazards and shall be incorporated, where applicable, in the project specific Health and Safety Plan (HASP).

8 Workplace Limits and Surveillance

8.1 Recommended exposure limits (REL).

- 8.1.1 Recommended exposure limits (REL) (unacclimatized workers). Total heat exposure to workers shall be controlled so that unprotected health workers who are not acclimatized to working in hot environments are not exposed to combinations of metabolic and environmental heat greater than the applicable permissible heat exposure Threshold Limit Values found in the Threshold Limit Values guidance provided by the American Conference of Governmental Industrial Hygienists (ACGIH).
- 8.1.2 Recommended exposure limits (REL) (acclimatized workers). Total heat exposure to workers shall be controlled so that unprotected health workers who are acclimatized to working in hot environments are not exposed to combinations of metabolic and environmental heat greater than the applicable permissible heat exposure Threshold Limit Values found in the Threshold Limit Values guidance provided by the ACGIH.
- 8.1.3 Effect of clothing. The REL given by the ACGIH is based on the assumption that the worker is healthy and medically fit for the level of activity required by their job. They are assumed to be wearing the type clothing used in the correction factors table in the TLV guidance produced by the ACGIH.

- 8.1.4 Ceiling limits. No worker will be exposed to combinations of metabolic and environmental heat exceeding the applicable RELs produced by the ACGIH.

8.2 Determination of Environmental Heat Levels.

- 8.2.1 Measurement methods: Environmental heat exposures will be assessed by the Wet Bulb Globe Thermometer (WBST) method.

- 8.2.2 Measurement requirements: Environmental heat measurements will be made at or as close as feasible to the work area where the worker is exposed. When a worker is not continuously exposed in a single hot area, but moves between two or more areas with differing levels of environmental heat or when the environmental heat substantially varies at the single hot area, the environmental heat exposure shall be measured at each area and during each period of constant heat levels where employees are exposed. Hourly TWA WBGTs will be calculated for the combination of jobs (tasks), including all scheduled and unscheduled rest periods.

- 8.2.3 Modifications of work conditions: Ideally, environmental heat measurements will be made at least hourly during the hottest portion of each work shift, during the hottest months of the year, and when a heat wave occurs or is predicted. If two such sequential measurements exceed the applicable REL, then work conditions will be modified by use of appropriate engineering controls, work practices, or other measures until two sequential measures are in compliance with the exposure limits.

8.2.4 Initiation of Measurements:

- 8.2.4.1 Establishing a baseline. A WBGT or an individual environmental factors profile (baseline) will be established for each hot working environment for both winter and summer seasons as a guide for determining when engineering controls and/or work practices or other control methods will be instituted.

- 8.2.4.2 Measurements. After the environmental profiles have been established, measurements will be made during the time of year and days when the profile indicates that total heat exposures above the REL's may be reasonably anticipated.

- 8.3 ACGIH screening criteria for heat stress exposure in degrees Celsius for an 8 hour work day 5 days per week with conventional breaks will be used in determining safe exposure for acclimatized and unacclimatized employees.

Allocation of Work in a Work/Rest Cycle	Acclimatized				Action Limit (Unacclimatized)			
	Light	Moderate	Heavy	Very Heavy	Light	Moderate	Heavy	Very Heavy
75-100%	31.0 (87.8F)	28.0 (82.4F)	--	--	28.0 (82.4F)	25.0 (77F)	--	--
50-75%	31.0 (87.8F)	29.0 (84.2F)	27.5 (81.5)	--	28.5 (83.3F)	26.0 (78.8F)	24.0 (75.2F)	--
25-50%	32.0 (89.6F)	30.0 (86F)	29.0 (84.2F)	28.0 (82.4F)	29.5 (85.1F)	27.0 (80.6F)	25.5 (77.9)	24.5 (76.1F)
0-25%	32.5 (90.5F)	31.5 (88.7F)	30.5 (86.9F)	30.0 (86F)	30.0 (86F)	29.0 (84.2F)	28.0 (82.4F)	27.0 (80.6F)

8.3.1 These TLVs assume that workers exposed to these conditions are adequately hydrated, are not taking medication, are wearing lightweight clothing, and are in generally good health.

8.3.2 Examples of workloads:

- Rest: Sitting (quietly or with moderate arm movement)
- Light work: Sitting or standing to control machines; perform light hand or arm work; occasional walking; driving
- Moderate work: walking about with moderate lifting and pushing or pulling; walking at moderate pace
- Heavy work: pick and shovel work, digging, carrying, pushing/pulling heavy loads; walking at a fast pace
- Very heavy: very intense activity at fast to maximum pace

9 Control Measures for Reducing Heat Stress

9.1 General requirements.

9.1.1 Administrative and work practice controls to offset heat effects:

- Acclimatize workers by exposing them to work in a hot environment for progressively longer periods of time.
- Replace fluids by providing potable drinking water and any other liquids (except alcoholic and caffeinated) to workers and encourage them to drink small amounts frequently. Where plumbed or otherwise continuously supplied water does not exist, it shall be provided in sufficient quantity throughout the work shift.
- Reduce physical demands by reducing extreme physical exertion and use relief workers or assign extra workers.

- Provide recovery areas such as air-conditioned enclosures/rooms or shaded areas to provide intermittent rest periods with water breaks. Access to enclosures/rooms and or shaded areas shall be permitted at all times.
- Reschedule hot jobs for the cooler part of the day, and routine maintenance and repair work in hot areas should be scheduled for cooler seasons during the year.
- Personal protective equipment such as reflective clothing and wetted or water cooled garments can be effective in reducing heat stress.

9.1.2 Where engineering and work practice controls are not sufficient to reduce exposures to or below the applicable REL, they will be used to reduce exposures to the lowest level achievable by these controls, and will be supplemented by the use of heat-protective clothing or equipment. A heat-alert program will be implemented as specified in this SPI.

9.1.3 ENVIRON will establish and implement a written program to reduce exposures to or below the applicable REL by means of engineering and work practice controls.

9.2 Engineering Controls. The type and extent of engineering controls required to bring the environmental heat below the applicable REL can be calculated using the basic heat exchange formulae (see NIOSH Publication 86-113, Occupational Exposure to Hot Environments). When the environmental heat exceeds the applicable REL, the following control requirements will be used.

9.2.1 Air temp. exceeds skin temp. When the air temperature exceeds the skin temperature, convective heat gain will be reduced by decreasing air temperature and or decreasing the air velocity if it exceeds 1.5 meters per second (300 ft/min). When air temperature is lower than skin temperature, convective heat loss will be increased by increasing air velocity. The type, amount, and characteristics of clothing will influence heat exchange between the body and the environment.

9.2.2 Surrounding object temp. exceeds skin temp. When the temperature of surrounding solid objects exceeds skin temperature, radiative heat gain will be reduced by:

- Placing shielding or barriers that are radiant-reflecting or heat-absorbing, between the heat source and the employee.
- Isolating the source of the radiant heat.
- Modifying the hot process or operation.

9.2.3 Evaporative heat loss. When necessary, evaporative heat loss will be increased by increasing air movement over the employee by reducing the influx of moisture from steam leaks or from water on the workplace floors, or by reducing the vapor content of the clothing worn by the employee will influence the rate of heat exchange by evaporation.

9.3 Work and hygienic practices. Work modifications and hygienic practices will be introduced to reduce both environmental and metabolic heat when engineering controls are not adequate or are not feasible. The most effective preventive work and hygienic practices for reducing heat stress include, but are not limited to the following:

- 9.3.1 Limiting the time the worker spends each day in the hot environment by decreasing exposure time in the hot environment and/or increasing recovery time spent in a cool environment.
- 9.3.2 Reducing the metabolic demands of the job by such procedures as mechanization, use of special tools, or increasing the number of employees per task.
- 9.3.3 Increasing heat tolerance by a heat acclimatization program and by increasing physical fitness.
- 9.3.4 Training supervisors and their workers to recognize early signs and symptoms of heat intolerance such as weakness, unsteady gait, irritability, disorientation, changes in skin color, or general malaise.
- 9.3.5 Providing adequate amounts of cool (i.e. 50 to 59 degrees F.) potable water near the work area and encouraging all workers to drink a cup of water (5 to 7 ounces) every 15 to 20 minutes. Individual, not communal drinking cups will be provided.

9.4 Heat-Alert program. Whenever the National Weather Service or local weather forecast service forecasts that a heat wave (i.e., a heat wave is indicated when daily maximum temperature exceeds 95°F or when the daily maximum temperature exceeds 90°F and is 9°F or more above the maximum reached on the preceding days), the following procedures are to be implemented:

- Postpone tasks which are not urgent.
- Increase the number of workers in each team in order to reduce each workers heat exposure.
- Increase rest allowances.
- Turn off heat sources which are not absolutely necessary.
- Remind employees to drink water in small amounts frequently to prevent excessive dehydration.
- Monitor the environmental heat at the job sites and resting places.
- Check oral temperature during most severe heat-exposure period.
- Exercise additional caution on the first day of a shift change to make sure that the employee(s) is not overexposed to heat, because they may have lost some of their acclimatization over the weekend and or during days off.

- Send workers who show signs of a heat disorder, even a minor one, to the medical department. The physician's permission to return to work must be given in writing.
- Restrict overtime work.

10 Recordkeeping

- 10.1 Temperature readings shall be documented in the project field book in order to establish and maintain an accurate record of all measurements made to determine environmental and/or metabolic exposures to employees.

11 Revision Summary

UNCONTROLLED WHEN PRINTED

Attachment A
Heat Management Card

UNCONTROLLED WHEN PRINTED

Heat Management Card – Water, Rest, Shade

Work Practices to Prevent Heat-Related Health Effects

- Ensure personnel are staying hydrated throughout the workday and not showing any signs or symptoms of any heat related illness.
- Taking personal factors (e.g., age, acclimatization, fitness) into consideration before assigning tasks with higher probability of a heat related illness.
- Provide workers with plenty of cool water in convenient, visible locations close to the work area. Water should have a palatable (pleasant and odor free) taste and water temperature should be 50-60°F (10-16°C) if possible.
- Remind workers to frequently drink small amounts of water before they become thirsty to maintain good hydration. During moderate activity, in moderately hot conditions, at least one pint of water per hour is needed. Workers should drink about 6 ounces or a medium-sized glass-full every 15 minutes.
- Schedule crews to work areas / assignments with excessive walking or digging during the coolest part of the day.
- Eat lightly, Avoid heavy meals or caffeine before working in hot environments
- Locate shaded recovery area within 300 feet (91 meters) of work and schedule frequent rest periods with water breaks.
- Follow SPI and PPE Guidance: Wear Light-colored and loose fitting clothing, sun block (SPF 50) and wide-brimmed hats (preferred)

Work Rest Cycles- *Any time* a worker feels signs or symptoms of heat disorder, they should **STOP WORK** and move to shade and drink water or electrolyte drinks.

Clothing:	Continuous	40 work / 20 rest	20 work / 40 rest
Work clothes with or without boots and gloves	< 87°F (31°C)	< 93°F (34°C)	< 98°F (37°C)
Work clothes with a particle or water barrier coverall	---	< 78°F (26°C)	< 92°F (33°C)
Work clothes with a vapor barrier coverall	---	< 75°F (24°C)	< 88°F (31°C)

SIGNS & SYMPTOMS FOR HEAT RELATED DISORDERS

	Dehydration	Heat Exhaustion	Heat / Sun Stroke
Symptoms	<p>Mild dehydration appear when the body has lost about 2% of its total fluid: Signs include:</p> <ul style="list-style-type: none"> • Increased thirst • Loss of Appetite • Dry Skin • Skin Flushing • Dark Color Urine • Dry Mouth • Fatigue or Weakness • Chills\ • Head Rush 	<ul style="list-style-type: none"> • Fatigue • Headache • Dizziness • Profuse sweating • Rapid pulse rate • Weakness and wet skin • Irritability or confusion • Thirst • Nausea, or vomiting 	<ul style="list-style-type: none"> • Skin of a heat stroke victim is usually very hot and dry. The victim normally appears flushed and has a rapid pulse, and may be confused and nauseated. • Very high body temperature (104 degrees F or higher). • Lack of sweat, mental confusion • Deep breathing and rapid pulse • Hot, dry, red or mottled skin, and dilated pupils. Seek medical help at once for this condition • Symptoms of heat stroke may also include convulsions or unconsciousness.
Action	<ul style="list-style-type: none"> • Notify Supervisor & Safety • Move the person to a cool shaded area to rest. • Give person plenty of water and let them drink it very slowly, in small sips. • Replace salts by drinking Gatoraid during and after periods of heavy sweating. 	<ul style="list-style-type: none"> • Notify Supervisor & Safety • Move the person to a cool shaded area to rest. • Loosen clothing, remove hat and heavy clothing. • Have the person drink some cool water (a small cup every 15 minutes) if not feeling nauseated. • Cool the person by fanning. • Cool the skin with a cool spray mist of water or wet cloth. • <u>Call for emergency help:</u> If the person does not feel better in a few minutes 	<ul style="list-style-type: none"> • Call 911 • Notify Supervisor & Safety • <u>Treat as life-threatening emergency</u> • Move the victim to a cooler location. • Remove hat and any outer clothing that would interfere with the free circulation of air around the victim's body. • Apply cool water to the entire body surface of the victim. Apply ice bags or ice towels as necessary. • Vigorously fan the victim to increase the cooling effect of the water.



Standard Practice Instruction 31

Water Safety

Prepared by:
ENVIRON International Corporation
333 W. Wacker Drive, Suite 2700
Chicago, Illinois

Implementation Date: **January 2012**
Revision Date: **January 2015**
2012 Version 7

STANDARD PRACTICE INSTRUCTION 31

IMPLEMENTATION DATE: January 2012
REVISION DATE: January 2015
SUBJECT: Water Safety

BASIS: Unsafe water practices result in death, injuries and property damage each year. Recognizing, evaluating and controlling water safety hazards and risks can reduce the likelihood of these negative results. Many environmental and mechanical factors in the work place influence the safety of the worker in and around water, including chemicals in the form of liquids, dusts, fumes, mists, vapors, and gases; physical agents such as motors, noise, vibration; biological agents such as insects and aquatic wildlife; environmental factors such as extremes in temperature, adverse weather conditions, decreased visibility, or tidal or wave conditions; and ergonomic factors including repetitive motion, and fatigue. The objective is to reduce the risk of hazards associated with water quality monitoring, sampling, vessel operation and maintenance, and dredge material placement monitoring and investigation.

GENERAL: Throughout all aspects of work conducted by ENVIRON International Corporation (ENVIRON), the prevention of accidents and the compliance with legislative requirements are taken as a minimum standard upon which to base a sound, proactive health and safety management approach. The approach outlined in this Standard Practice Instruction (SPI) is designed to ensure the health, safety and welfare of ENVIRON staff, contractors and others potentially affected by ENVIRON's work. The aim is to manage risk to the lowest practicable level, ensuring compliance with the relevant applicable legislation and ENVIRON Policy.

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Acronyms and Abbreviations

ENVIRON	ENVIRON International Corporation
HASP	Health and Safety Plan
PFD	Personal floatation device
SCGL	Stairways, catwalks, guardrails, & ladders
SPI	Standard Practice Instruction
USCG	United States Coast Guard

1. Introduction

ENVIRON will review and evaluate this SPI on a triennial basis, or when changes occur that prompt revision of this document, or when facility operational changes occur that require a revision of this document. Effective implementation of this program requires support from all levels of management within ENVIRON. This written program will be communicated to all personnel that are affected by it. It encompasses wherever ENVIRON is actively working, regardless of the number of workers employed or the number of worker shifts. It is designed to establish clear goals and objectives.

For the purposes of this SPI, the term “working near water” will collectively mean any environment where an employee is NEAR (i.e., equal to or less than four feet (1.22 meters)) to a water body, whether tidal or non-tidal, and where there is any potential for an employee to enter the water, either voluntarily or not. This would also include situations where the applicable task involves working IN, ON, or OVER water.

2. General Safety Practices

Overall, a Health and Safety Plan (HASP)/Risk Assessment helps to identify potential and actual hazards and risks workers may be exposed to as they perform their work. In addition, it also identifies what control measures should be taken to protect against those hazards and risks, as well as how to respond to emergencies that may unexpectedly happen. As such, projects involving tasks that are near, in, on, or over bodies of water must assess the risk and implement control measures and practices as outlined in this SPI as a minimum requirement. All identified hazards, risks and control mechanisms will be communicated to affected employees as part of the HASP review process and are required to sign the project specific HASP BEFORE work can begin.

3. General Practices and Housekeeping

- Water work must be performed during daylight hours.
- Good housekeeping (e.g., minimal clutter) must be maintained at all times in all project work areas. All cords and lines should be properly stowed when not in use.
- Common paths of travel should be established and kept free from the accumulation of materials and obstructions.
- Provide slip resistant surfaces, rails, ropes and other devices to be used to execute project tasks. Refer to SPI 26 entitled “Slips, Trips, and Falls” for additional requirements concerning this topic.
- Specific areas should be designated for the proper storage of materials. Tools, equipment, materials and supplies shall be stored in an orderly manner.
- As work progresses, scrap and unessential materials must be neatly stored or removed from the work area. Containers should be provided for collecting trash and other debris and shall be removed at regular intervals.

- All spills should be quickly cleaned up. Oil and grease shall be cleaned from walking and working surfaces.
- Wear appropriate personal protective equipment (gloves, boots, and clothing) to eliminate direct contact with sediment. This would be in addition to any personal floatation devices.
- All permits must be posted or otherwise made available at the project site and/or on board the vessel as applicable.
- All documents pertaining to health & safety and/or procedural requirements must be made available in the language that is understood by all workers. For projects with multi-national workers, this means that the same document must be available in the first language of the worker.

4. General Hazards and Control Measures

- 4.1 Biohazards. All personnel should be aware of biohazards associated with each site and may include but not limited to poisonous plants, insects, animals, or exposure to blood-borne pathogens or mold. Long sleeves will help protect against insect bites and exposure to poisonous plants. If desired and if pesticides are not a potential contaminant of concern at the site, insect repellent may be applied to clothing in accordance with the manufacturer's directions. Site personnel should avoid contact with animals whenever possible.
- 4.2 Hearing Damage. While aboard any vessel, personnel may be subjected to noise in excess of 85dBA. In these situations personnel shall wear appropriate hearing protection. Refer to SPI 8 entitled "Occupational Noise Exposure Program" for additional requirements concerning this topic.
- 4.3 Thermal Hazards. All personnel should be aware of thermal hazards associated with each site and take the appropriate measures to protect themselves.

During period of hot weather, personnel shall be aware of the symptoms and appropriate response actions for heat exhaustion and heat stroke. Several Factors contribute to heat stress in the work environment, including high temperature and humidity; direct sun or heat; limited air movement; physical exertion; poor physical condition; some medications; inadequate tolerance for hot workplaces; and insufficient water intake.

The screening criteria for heat stress exposure in degrees Celsius (and shown in degrees Fahrenheit (F)) for an 8 hour work day, 5 days per week with conventional breaks will be used in determining safe exposure for acclimatized and unacclimatized employees as follows:

Actual Temperature (C)								
Allocation of Work in a Work/Rest Cycle	Acclimatized				Action Limit (Unacclimatized)			
	Light	Moderate	Heavy	Very Heavy	Light	Moderate	Heavy	Very Heavy
75-100%	31.0 (87.8F)	28.0 (82.4F)	--	--	28.0 (82.4F)	25.0 (77F)	--	--
50-75%	31.0 (87.8F)	29.0 (84.2F)	27.5 (81.5F)	--	28.5 (83.3F)	26.0 (78.8F)	24.0 (75.2F)	--
25-50%	32.0 (89.6F)	30.0 (86F)	29.0 (84.2F)	28.0 (82.4F)	29.5 (85.1F)	27.0 (80.6F)	25.5 (77.9)	24.5 (76.1F)
0-25%	32.5 (90.5F)	31.5 (88.7F)	30.5 (86.9F)	30.0 (86F)	30.0 (86F)	29.0 (84.2F)	28.0 (82.4F)	27.0 (80.6F)

Refer to SPI 30 entitled “Heat Stress” for additional requirements concerning this topic.

For cold stress, the four environmental conditions that cause cold-related stress are low temperatures, high/cool winds, dampness and cold water and cold surfaces. Wind chill is a combination of temperature and wind velocity, and is a crucial factor to evaluate when working outside so that proper precautions can be taken (e.g., breaks, suitable clothing, and/or the stopping of non-essential work).

Cooling Power on Exposed Flesh Expressed as an Equivalent Temperature Under Calm Conditions												
Estimated Wind Speed (mph)	Actual Temperature Reading (F.)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (F.)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-145
35	27	11	4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little additional effect.)	LITTLE DANGER In <hr with dry skin. Maximum danger of false sense of security				INCREASING DANGER Danger from freezing of exposed flesh within 1 minute				GREAT DANGER Flesh may freeze within 30 seconds			
Trench foot and immersion foot may occur at any point on this chart.												
*Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA. Source: ACGIH, Threshold Limit Values for Chemical Substances in the Work Environment for 1984-1985.												

The cooling power of wind (°C)

Estimated wind speed (in km/h)	Actual temperature reading (°C)													
	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	-50	
	Equivalent chill temperature (°C)													
Calm	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	-50	
8	9	3	-2	-7	-12	-18	-23	-28	-33	-38	-44	-49	-54	
16	4	-2	-7	-14	-20	-27	-33	-38	-45	-50	-57	-63	-69	
24	2	-5	-11	-18	-25	-32	-38	-45	-52	-58	-65	-72	-78	
32	0	-7	-14	-21	-28	-35	-42	-50	-56	-64	-71	-78	-84	
40	-1	-8	-16	-24	-31	-38	-46	-53	-60	-67	-76	-82	-90	
48	-2	-10	-17	-25	-33	-40	-48	-55	-63	-70	-78	-86	-94	
56	-3	-11	-18	-26	-34	-42	-50	-58	-65	-73	-81	-89	-96	
64	-3	-11	-19	-27	-35	-43	-51	-59	-66	-74	-82	-90	-98	
(Wind speeds greater than 64 km/h have little additional effect.)	LITTLE DANGER In < 1 hr with dry skin. Maximum danger of false sense of security.				INCREASING DANGER Danger from freezing of exposed flesh within one minute.				GREAT DANGER Flesh may freeze within 30 seconds.					
Trenchfoot and immersion foot may occur at any point on this chart.														

Equivalent chill temperature requiring dry clothing to maintain core body temperature above 36°C (96.8° F) per cold stress TLV.

At air temperatures of 35.6F (2C) or less, it is imperative that workers who become immersed in water or whose clothing becomes wet be immediately provided with a change of clothing and

treated for hypothermia. During periods of cold weather, field personnel shall acquaint themselves with the symptoms of cold stress, frostbite and hypothermia as well as SPI 29 entitled "Cold Stress" for additional requirements concerning this topic.

- 4.4 Eye and Head Injury. Appropriate eye protection should be worn at all times to help guard against eye injury resulting from foreign objects striking the eye and harmful solar radiation. A hard-hat shall be worn while working around heavy equipment and overhead hazards.
- 4.5 Submerged and Unmarked Objects. Personnel shall be aware of the possible existence of submerged and/or unmarked objects while accessing the site, during vessel operation, and while sampling.
- 4.6 Slip, Trip, Fall Hazards. Proper house-keeping procedures shall be maintained to prevent slip, trips, and falls. Electrical cords and lines should be properly stowed when not in use. Personnel should be made aware of any hazards that may lead to slips, trips, and falls. Handrails should be used whenever available to prevent slips, trips and falls. Stairways, catwalks, guardrails and ladders (SCGL) may be encountered on dredges, scows, support vessels, berths, wharfs, docks, and at up-land and beach nourishment sites. Personnel shall wear a United States Coast Guard (USCG), or country specific equivalent, -approved personal floatation device (PFD) whenever using a stairway, catwalk or ladder that extends or spans, over or near water. Personnel should avoid using both hands to carry objects while on stairways; if unavoidable, use extra caution. Refer to SPI 35 entitled "Ladder and Stairway Safety" for additional requirements concerning this topic.

The following requirements apply to SCGL:

- 4.6.1 SCGL shall be maintained free of slippery conditions and dangerous projections such as protruding nails.
- 4.6.2 When doors or gates open directly onto a stairway, catwalk, or ladder a landing shall be provided that extends at least 20 inches (58 cm) beyond the swing of the door.
- 4.6.3 At least one handrail or guardrail shall be installed on all stairways, catwalks, ladders, elevated platforms and decks to provide personnel with handhold for support.
- 4.6.4 Handrails shall be between 30 and 37 inches (76.2-94 cm) from the surface of the tread and have a minimum clearance of 3 inches (7.6 cm) between the handrail and any wall or other object. When the top rail of a stair rail also serves as a handrail, the top rail shall be between 36 and 37 inches (76.2-94 cm) from the surface of the tread. Midrails, screens, mesh, intermediate vertical members, or equivalent intermediate structural members shall be installed between the top rail and treads.

- 4.6.5 When on a vessel, guardrails shall be installed along each unprotected side or edge of a landing or deck to prevent personnel from falling. Guardrails shall consist of toprails, midrails, and posts, and shall have a vertical height of 42 inches (106.7 cm) +/- 3 inches (7.6 cm) from the upper surface of the toprail to the floor, platform, runway, or ramp level. Standard guardrail systems shall be provided with toe boards on all open sides/ends at locations where persons are required or permitted to pass or work under the elevated platform or where needed to prevent persons and material from falling from the elevated platform.
- 4.6.6 Handrails and guardrails shall be capable of withstanding a 200 pound force applied in any downward or outward direction, be surfaced to prevent laceration injuries or cloth snagging, and be constructed so the rail ends do not create a projection hazard.
- 4.7 Back Injury. Proper lifting techniques such as keeping the back straight and the legs bent shall be utilized when lifting equipment. If the equipment cannot be lifted in this manner, it is too heavy to lift alone. Call other personnel, or use a mechanical device for lifting. When in transit on any vessel, personnel shall stand in a stable position and keep legs bent to absorb the motion of the vessel caused by heavy seas or chop.
- 4.8 Vessel/Vehicle Traffic. Personnel shall be aware of other vessels and other vehicles operating in the area and take appropriate actions to avoid collision and damage.
- 4.9 Weather Hazards can present a considerable challenge to conducting field activities in a safe manner. Site personnel shall be aware of any severe weather event and take appropriate safe actions. Sampling vessel operations should monitor weather conditions closely and may choose to discontinue sampling activities if severe weather conditions compromise site safety. Severe weather events may include: fog, high winds, high seas, heavy current, lightning, extreme heat or cold, flooding, snow, and ice. Sampling during adverse weather conditions (e.g., excessive heat or cold, storm events with precipitation, lightning, high winds) and where environmental hazards (e.g., poison ivy, biting insects, unstable slopes, falling tree limbs) are present requires additional level of preparation, precaution and awareness.
- 4.10 Severe weather conditions include high winds, electrical storms, and heavy rain.

When lightning is spotted site personnel should use the following steps to avoid injury from lightning:

- Note the flash-boom ratio by counting the seconds after the lightning was seen until the thunder was heard. By counting the seconds between seeing lightning and hearing thunder and dividing by 5, you can estimate your distance from the storm (in miles or kilometers). If the storm is 6 miles (9.66 km) away or less (30 seconds between when lightning was seen and thunder was heard), stop work and take shelter.
- If the storm is more than 6 miles (9.66 km) away (greater than 30 seconds between lightning and thunder), monitor the storm and be prepared to cease work if the storm

approaches an unsafe distance. Since storms can travel at varying speeds and the amount of time it takes to cease and secure operations will also vary, prudent judgment should be exercised when storms are in the vicinity of the working area and/or developing (e.g., darkening skies, increasing wind speeds, etc).

- Workers should not stay in exposed areas (e.g., on, in, or near water) after lightning has been witnessed. All personnel must move to a safe location.
- Workers should wait 30 minutes from the last sight of lightning or sound of thunder before returning to work. The last noted time of lightning or thunder shall be recorded in the field notebook.
- Once the 30 minute wait time period has elapsed and no additional lightning or thunder has been seen or heard, individuals may resume normal work.

4.10.1 Additional Environmental Hazards. Considerations should include but not be limited to the following:

- Wear clothing that is appropriate for protection from the elements and also appropriate for protection from biological, chemical or physical hazards associated with the field activities to be conducted.
- Consider the appropriateness of using sunscreen or bug repellents in light of the potential for introducing contaminants from these substances into the samples. Often suitable clothing can provide adequate protection.

5. Water and Vessel Safety

5.1 General Water Safety

- 5.1.1 All personnel and visitors when immediately near water (i.e., within 4 feet/1.22 meters), over water, wading in water or on any vessel, **where the danger of drowning exists**, must wear a Type III, Type V work vest, or better USCG-approved, or country specific equivalent, International Orange PFD equipped with a USCG-approved, or country specific equivalent, automatically activated light (not required during daylight hours). However, several factors are relevant to determining whether a danger of drowning exists. These include the type of water body (i.e., a pool, a river, a canal), depth, presence or absence of a current, height above the water surface, and the use of fall protection when working above a water body.

Depending on the factors present, there are some circumstances where a drowning hazard could exist where workers are near or over water that is relatively shallow (i.e., less than 2 feet (0.6 meters) in depth). For example, where workers are not using fall protection and are 10 feet (1.05 meters) above a river, a worker may fall and be knocked unconscious. Without the use of a life jacket or buoyant work vest, a worker in such a scenario could drown.

This PFD must be properly secured to the wearer. The PFD must be inspected for defects and free of all defects (e.g., rips, tears, stress) which could alter the strength or buoyancy prior to, and after, each use. In addition, the PFD will be kept clean and free of excessive dirt and oil.

- 5.1.2 A life ring equipped with 90 feet (27.4 meters) of solid braid polycarbonate line, or equivalent must be close to the working area and accessible for use. This includes activities on board all vessels.

For land projects adjacent to water bodies, ring buoys shall be spaced no further than 200 feet (67 meters) apart in close proximity and parallel to the water body. The number of ring buoys will depend on the overall length of the work occurring adjacent to the water body but at a minimum, three ring buoys will be used. The middle ring buoy will be placed center lined of the proposed work site, with the 2 end ring buoys 200 feet (67 meters) from the center ring buoy, one up stream and one downstream. Additional ring buoys will be installed at a distance no greater than 200 feet (67 meters) from the next adjacent downstream ring buoy.

- 5.1.3. USCG boating safety guidelines, or country specific equivalent, should be adhered to when operating a boat during sampling activities.

- Boats must be equipped with the required running lights for night time or poor visibility conditions.
- Boats must be equipped with an anchor and alternate means of locomotion (e.g., extra motor, floatable oars).
- The boat must be equipped with suitable signaling devices, such as an air horn and signal light.

- 5.1.4 Prudent judgment must be exercised when determining if it is safe to conduct work in open water. One factor that needs to be considered is wind speed. The Beaufort wind force scale is an empirical measure for describing wind speed mainly based on observed sea conditions in the open ocean and not along shore. In general, winds of force 6 or 7 result in the issuance of a small craft advisory, with force 8 or 9 winds bringing about a gale warning, force 10 or 11 a storm warning ("a tropical storm warning" being issued instead of the latter two if the winds relate to a tropical cyclone), and force 12 a hurricane force wind warning (or hurricane warning if related to a tropical cyclone). A set of red warning flags (daylight) and red warning lights (night time) is displayed at shore establishments which coincide with the various levels of warning. Open water work should not be conducted when wind forces are above 5 on the Beaufort scale as noted below:

Beaufort wind force scale

Specifications and equivalent speeds									
Beaufort wind scale	Mean Wind Speed		Limits of wind speed		Wind descriptive terms	Probable wave height in metres*	Probable maximum wave height in metres*	Seastate	Sea descriptive terms
	Knots	m/s	Knots	m/s					
0	0	0	<1	0-0.2	Calm	-	-	0	Calm (glassy)
1	2	0.8	1-3	0.3-1.5	Light air	0.1	0.1	1	Calm (rippled)
2	5	2.4	4-6	1.6-3.3	Light breeze	0.2	0.3	2	Smooth (wavelets)
3	9	4.3	7-10	3.4-5.4	Gentle breeze	0.6	1.0	3	Slight
4	13	6.7	11-16	5.5-7.9	Moderate breeze	1.0	1.5	3-4	Slight-Moderate
5	19	9.3	17-21	8.0-10.7	Fresh breeze	2.0	2.5	4	Moderate
6	24	12.3	22-27	10.8-13.8	Strong breeze	3.0	4.0	5	Rough
7	30	15.5	28-33	13.9-17.1	Near gale	4.0	5.5	5-6	Rough-Very rough
8	37	18.9	34-40	17.2-20.7	Gale	5.5	7.5	6-7	Very rough-High
9	44	22.6	41-47	20.8-24.4	Severe gale	7.0	10.0	7	High
10	52	26.4	48-55	24.5-28.4	Storm	9.0	12.5	8	Very High
11	60	30.5	56-63	28.5-32.6	Violent storm	11.5	16.0	8	Very High
12	-	-	64+	32.7+	Hurricane	14+	-	9	Phenomenal

- * 1. These values refer to well-developed wind waves of the open sea.
2. The lag effect between the wind getting up and the sea increasing should be borne in mind.

5.1.5 Water safety training will be provided to employees working immediately near water (i.e., within 4 feet/1.22 meter), over water, wading in water or on any vessel, **where the danger of drowning exists**. At a minimum, training will include how to properly wear, inspect, and store a PFD; cold water immersion, general boating safety, as well as the effects of hypothermia as outlined in the chart below.

Hypothermia Chart		
IF THE WATER TEMPERATURE F (C) IS:	EXHAUSTION OR UNCONSCIOUSNESS	EXPECTED TIME OF SURVIVAL IS:
32.5 (0.28)	Under 15 Minutes	Under 15 - 45 Minutes
32.5 - 40.0 (0.28-4.4)	15 - 30 Minutes	30 - 90 Minutes
40.0 - 50.0 (4.4-20)	30 - 60 Minutes	1 - 3 Hours
50.0 - 60.0 (10-15.5)	1 - 2 Hours	1 - 6 Hours
60.0 - 70.0 (15.5-21)	2 - 7 Hours	2 - 40 Hours
70.0 - 80.0 (21-26.6)	3 - 12 Hours	3 Hours - Indefinitely
OVER 80.0 (>26.6)	Indefinitely	Indefinitely

The use of an Immersion Suit or other buoyant thermal protective device will greatly enhance survival time. Chart is for general reference only.

5.2 Working Near Water

- 5.2.1 A Type III, Type V work vest, or better USCG-approved, or country specific equivalent, International Orange PFD equipped with a USCG-approved, or country specific equivalent, automatically activated light (not required during daylight hours), and reflective tape shall be properly worn (zipped, tied, latched, etc., in closed fashion) at all times when working within 4 feet or 1.22 meters from a water source, **where the danger of drowning exists.**

- 5.2.1.1 All near water work shall be performed by at least a two-person team. Deviations to this provision will require acknowledgment and sign-off from the Principal in Charge in accordance with SPI 42 entitled "Working Alone".

5.3 Working In Water

There are many situations when an employee may be required to work in water, whether performing work outside of a designated vessel, or performing ground work in wet or marshy areas. These situations present the same hazards and risks deep water, and the same safety precautions shall apply.

- 5.3.1 **Where the danger of drowning exists**, a Type III, Type V work vest, or better USCG-approved, or country specific equivalent, International Orange PFD equipped with a USCG-approved, or country specific equivalent, automatically activated light (not required during daylight hours), and reflective tape shall be properly worn (zipped, tied, latched, etc., in closed fashion) at all times when working in water.

- 5.3.2 All water work shall be performed by at least a two-person team. Both people shall be equipped with the proper safety gear and capable of readily summoning emergency rescue if needed. ENVIRON personnel are prohibited from working in or near water by themselves.

5.4 Rescue Vessels

- 5.4.1 At least one lifesaving rescue vessel (e.g., a skiff) shall be immediately available at locations where employees are working over, in, on or adjacent to water where the danger of drowning exists. The need to have a rescue vessel "immediately available" for use is dependant upon a number of factors, including but not limited to:

- The number of work locations operating;
- The distance to each of those locations;
- Water temperature;
- Currents, and;
- Other hazards such as, but not limited to, rapids, dams, and water intakes.

In general, if the water is so shallow that rescuers could simply run into the water body without endangering themselves and/or others or the work was being conducted very close to shore (e.g., the length of the skiff from shore would be greater than the working distance from shore and/or the skiff would foul on the bottom anyway), a skiff would not be required.

5.4.2 In the event that a skiff is required or used, the following criteria must be implemented:

- 1) The skiff must be in the water or capable of being quickly launched by one person.
- 2) There must be at least one person present and specifically designated to respond to water emergencies and operate the skiff at all times.
- 3) When the operator is on break, another operator must be designated to provide the requisite coverage while employees are working or operations cease (i.e., employees return to dry land).
- 4) The designated operator must either man the skiff at all times or remain in the immediate area such that the operator can quickly reach the skiff and get underway.
- 5) The skiff operator may be assigned other tasks provided the tasks do not interfere with the operator's ability to monitor water activities, quickly reach the skiff, and get underway.
- 6) The communication system, such as a walkie-talkie, must be used to inform the skiff operator of an emergency and to inform the operator where the skiff is needed.
- 7) The skiff must be equipped with both an operational motor and oars.
- 8) The skiff operator must be certified in first aid.

Having a skiff, or life saving vessel, immediately available for rescue activities should be determined by the Project Manager based on a hazard analysis of the job requirements, site characteristics and any other pertinent information.

5.5 Working Aboard a Vessel

- 5.5.1 All work aboard a vessel shall be performed by at least a two-person team. If work is performed at times when water temperatures are less than 38°F (3-4C), it is recommended, but not mandatory, that sampling personnel wear float coats. The vessel should be operated only by designated, experienced staff.
- 5.5.2 USCG boating safety guidelines, or country specific equivalent, should be adhered to when operating a vessel during sampling activities.
- 5.5.3 USCG approved PFDs, or country specific equivalent, must be worn by all staff when aboard a vessel.

- 5.5.4 Vessels must be equipped with the required running lights for night-time and poor visibility conditions.
- 5.5.5 The vessel must be equipped with an anchor and alternate means of locomotion (e.g., oars).
- 5.5.6 The vessel must be equipped with suitable signaling devices, such as an air horn and signal light. All vessels are required to have functioning navigational lights for any required dusk or night work, and any work required when conditions such as fog impair visibility.
- 5.5.7 Weather and water conditions must be monitored to determine if it is safe to be out on a water body.
- 5.5.8 If the work involves reaching, stretching, etc., from the vessel, the worker shall be equipped with a harness and lifeline or the use of a PFD. The lifeline shall be attached to the vessel.
- 5.5.9 Footwear shall have sufficient traction to reduce the risk of slipping.

The remaining paragraphs of this section are intended to apply to the operation of Class A and Class 1-2 boats.

- Class A – a vessel less than 16 feet long (4.9 meters). Class A has the greatest number of vessels. They can all be car topped or trailered. Due to their lightness and small size, many can become unstable if weight in them is excessive or carelessly loaded. Too much weight makes these boats sluggish, reduces their freeboard (the height of their sides above water) and can swamp (flood) them.
 - Class 1 – a motorized vessel from 16 feet (4.9 meters) to less than 26 feet (7.9 meters) in length. Though heavier and more powerful than Class A vessels, most are still trailerable.
 - Class 2 – a motorized vessel from 26 feet (7.9 meters) to less than 40 feet (12.2 meters) in length. Heavier, and more stable than Class 1 vessels, some are trailerable.
- 5.6 Boarding Small Vessels. Be sure that the boat is properly secured with at least two mooring lines, fore and aft. With one hand on the vessel, quickly lower yourself straight down into the center of the vessel. An appropriate PFD should be worn. If others are boarding, have them step as close as possible to the center line of the boat while you hold the boat in place along the pier, dredge or adjacent support vessel. Avoid carrying anything as you board. Step down into the boat and have someone assist you with loading items by hand, one by one.
- 5.7 Loading of Vessels. Amount and location of weight (persons and gear: the movable ballast) is critical for capsize protection. In a small utility vessel, keep weight toward the center of mass. If you see waves approaching, take them on the bow preferably at a 45 degree angle. Overloading a small boat inhibits its ability to rise to oncoming waves.

Less freeboard means less clearance above the water's surface to prevent swamping. All crafts must be operated within the boat manufacturers' weight limit.

5.8 Vessel Safety Equipment. Vessel safety equipment for Class A and Class 1-2 vessels.

- 5.8.1 Persons on the vessel should wear a USCG approved, or country specific equivalent, type III personal floatation vest at all times. In addition, a throwable Type IV devices will be readily available for use.
- 5.8.2 At least one B-1 Type (class A and class I), and two B-1 Type (class 2) USCG approved, or country specific equivalent, hand held portable fire extinguishers will be on the vessel, readily available for use.
- 5.8.3 Visual Distress Signal Flares and battery operated lights will be in good working order and readily available on the boat.
- 5.8.4 A sound-producing distress signal, bell, whistle, or horn, will be in good working order and readily available on the boat.
- 5.8.5 A first aid kit will be available on the boat.
- 5.8.6 All boat fuel will be contained in engine manufacturer's approved containers that supply fuel to the engine via neoprene fuel lines. No fuel transfers between containers are to be conducted aboard the boat.
- 5.8.7 A secondary means of propulsion will be available on the vessel (second engines, oars or paddle).
- 5.8.8 A boat hook, anchors, and proper mooring lines will be available on the vessel.

5.9 Safe Vessel Operations

- 5.9.1 The vessel will only be operated by experienced personnel. At a minimum, all operators must have a licensed USCG captain, or country specific equivalent, depending on vessel size.
- 5.9.2 The vessel will be operated in a safe manner and all state and federal waterway regulations will be obeyed. A safety meeting will be conducted that reviews the project tasks, hazards/controls mechanisms, communication devices, signals, and other safety issues prior to the commencement of the project. This meeting will be documented in the HASP by all participants.
- 5.9.3 No smoking or alcoholic beverages are permitted on the vessel.
- 5.9.4 No recreational equipment for fishing, hunting, water skinning, or SCUBA diving will be allowed on the vessel unless specifically authorized as part of the work-related equipment.

5.10 Vessel Accidents. Coast Guard regulations, as well as state regulations, require accident reports if significant injuries or property damage occurs. It is normally best to stay with the boat in case of an accident and use signal flares or a distress horn to summon help. Hypothermia is a significant risk for those involved in boating accidents due to the rapid conduction of body heat by cold water.

5.11 Man Overboard Procedures

- Mark the vessels position using the Man Overboard option on the GPS if available.
- If within eye contact, never take your eye off the person overboard.
- Shout “**man overboard port/starboard side**”.
- Point at the person continually.
- Achieve physical contact with the person for extraction from the water: reach (extend an arm, pole, etc.), throw (life ring, PFD, cooler, etc.), go (considering wind, current, seas, depth, and space, maneuver and position the boat favorably and as quickly and as safely as possible).
- Monitor the person for hypothermia.

5.12 Communication. At a minimum, there must be a means of communication or other appropriate provisions must be made for access to emergency/medical assistance. This may be in the form of cell phones, CB radios, and/or two-way radios¹. Sampling vessels operating on larger, open bodies of water shall be equipped with at least one VHF and UHF radio.

5.12.1 VHF-marine radio:

- Ch. 16 – used for hailing and emergencies: May Day, May Day, May Day (immediate danger, loss of life eminent), Pan-Pan (urgent situation involving people). Sampling vessel must monitor Ch. 16 at all times.
- Ch. 22 – United States Coast Guard Broadcasting: Security - information on navigational updates, weather, general safety.
- Ch. 13 – Bridge to Bridge (commercial navigation), navigational purposes.
- Ch. 09 – Hailing.
- Ch. 26 – Marine Operator.

5.12.2 UHF radio:

- Ch. 1 (453.425 Mhz) – Inter-vessel communication. Sampling vessel must monitor UHF Ch. 1 at all times when acting in support of water operations.

5.13 Environmental Permits. A copy of all applicable permits will be stored and maintained on the sampling vessel at all times.

¹ Two-way radios are only appropriate if other staff members are present on land and within range)

5.14 Chartering a Boat.

Registration requirements for vessels vary by area, check with your local authority for guidelines specific to the area of intended boating. However, in general, registration often includes a Vessel Registration issued by the local regulatory agency with Vessel Documentation, as applicable. Registration numbers typically must be painted or permanently attached to each side of the forward half of the vessel and documentation of the vessel marked on the hull.

Inspection requirements for vessels vary by area, check with the local authority for specific inspection guidelines. For example, small passenger vessels under 100 gross tons operating on navigable waterways of the US are inspected for safety by the USCG and a copy of this inspection should be available for review and proof of inspection posted onboard.

Insurance requirements for chartered boats vary based on the classification of the vessel and intended use, and are typically maintained by the owner of the chartered boat. “Bareboat” charters, when the charterer supplies their own captain, require a different type of insurance coverage. In most cases the company that provides the bareboat requires the charterer to sign a hold harmless agreement that states the charterer and guests will not sue owner for injuries aboard during the charter. Inquiries should be made to the owner(s) of all chartered boats as to insurance requirements.

The Captain ensures that the ship complies with local and various international laws. The Captain is ultimately responsible for aspects of operation such as safe navigation of the ship, its orderliness and seaworthiness, safe handling of all cargo, management of all personnel, and maintaining the ship's certificates and documentation.

One of the Captain's duties is to ensure compliance with the vessel's security plan (as required by the International Maritime Organization), as applicable. The plan, customized to meet the needs of each individual ship, spells out duties including conducting searches and inspections, maintaining restricted spaces, and responding to threats from terrorists, hijackers, pirates, and stowaways.

Requirements for boating licenses and certifications vary by location, and due diligence shall be performed to ensure that the captain has the appropriate credentials and experience to operate the vessel. These may include:

- United States Coast Guard Charter Boat Captain License (OUPV or Master depending on vessel and crew number)
- American Sailing Association License
- Other Location-Specific Boating Safety courses or classes
- A hands-on Sail Test Challenge
- Demonstrated experience on a vessel of similar or greater size and power

The crew aboard any vessel must agree and understand the responsibilities of the Captain.

6. Definitions

Bank. Means all land abutting the edge of any river, canal or enclosed water such as a pond or lake.

Bow. The forward part of the boat.

Float Coat. A type of PFD that combines the warmth of a coat with the buoyancy of a life-vest. They offer added insulation and protection from cold winds and water.

Floodwater. Means any area of water that in normal circumstances does not exist and incorporates any water that is formed as a result of heavy rainfall and/or overflow water from any normal source of water, e.g. rivers, canals, etc.

Ice. Refers to any water whilst in a frozen state, note that salt water freezes at a lower temperature than fresh water.

Marina. A docking facility, or landing in a harbor next to a pier, where ships are loaded, unloaded and/or repaired. Typically has docks, moorings, or supplies for small watercrafts.

Mud. Means any area of mud/sand/slurry that cannot be easily assessed as being safe. i.e. it is of an unknown depth or consistency. It will often be linked to mud flats at the coast but could equally be a deep area of mud in a woodland environment or a farmer's slurry pit.

Non-tidal water. Means any water that is not affected by the sun and moon, i.e. the depth and/or flow of current is unaffected by tidal affects. This includes all upper river areas, streams, ponds, canals, lakes, swimming pools, etc.

Personal Floatation Device (PFD).

- Type III Floatation Aid – generally the most comfortable, have at least 15.5 pounds of buoyancy in the adult size. They do not turn face-up, and therefore do not provide protection from drowning if a victim falls face down into the water in an unconscious state. They can be jackets or vests.
- Type IV Throwable Devices – include the horseshoe, ring, and cushion. They have at least 16.5 pounds of buoyancy, 70 feet (21.3 meters) of 3/8 inch solid braid polypropylene, or equivalent, line attached and must offer immediate access.

Pontoon. Means any structure, whether floating or fixed to the ground, which allows access by foot or vehicle to watercraft on moorings, whether or not watercraft are present.

Port Side. The left side of the boat looking forward.

Starboard. The right side of the boat looking forward.

Stern. The after part of the boat.

Tidal water. Means any water that is affected by the position of the moon and sun, i.e. the depth and/or flow of current increases/decreases as a result of the tidal effects at the coast.

Watercraft. Means any vessel that floats and is designed to carry people or equipment. This could be a simple raft used as a working platform, or a ship. It could also include inflatable vessels from small children's beach dinghies to commercial rigid inflatable boats (RIBs).

Weather. Means the combined effects of temperature, wind speed and direction and rain.

Working near water. Means any environment where the staff member is working within 4 feet or 1.22 meters from water, whether tidal or non tidal, where there is any potential for the member entering that water, either voluntarily or not. This includes working in, on, near and over water.

7. Revision Summary

Appendix I

Emergency Information

Table 1A: Emergency Response Telephone Roster

	Office	Cell
CLIENT CONTACT		
Lisa Krogman (as Contractor to Battery Properties, Inc.)	847-646-9613	224-659-9103
ENVIRON PERSONNEL		
Principal In Charge: Alan Fowler	978-449-0308	617-834-5847
Project Manager/ Site Manager: Angela DeDolph	312-288-3816	224-659-9102
Designated Site Supervisor: TBD	TBD	TBD
Alternate Site Supervisor: TBD	TBD	TBD
Health & Safety Coordinators: Renee Petersen	312-288-3838	630-743-3915
Marlyn Lozada	312-288-3859	773-895-7239
Corporate H&S Director: Mark Watka	312-288-3875	312-927-1140
Contractors		
TBD	TBD	TBD
Facility/Security		
Site Contact: Lisa Krogman	847-646-9613	224-659-9103
EMERGENCY RESPONSE AGENCIES		
Hospital: Wayne Medical Center	911	
Emergency Fire	911	
Emergency Police	911	
Wayne County Health Department	931-722-3292	
Ambulance Service: Wayne Medical Center Ambulance Service	931-722-2055	
OTHER EMERGENCY ASSISTANCE		
CHEMTREC	800-424-9300	
National Response Center (oil and chemical spills)	800-424-8802	
Poison Control Center	800-222-1222	
Federal Emergency Management Agency	202-646-2500	

OFF-SITE AGENCIES – NON EMERGENCY PHONE NUMBERS		
Police: Waynesboro Police Department	931-722-5486	
Medical Center: Fast Pace Urgent Care	931-722-9099	
Hospital: Wayne Medical Center	931-722-5411	
Fire: Waynesboro Fire Department	931-722-3602	
Ambulance Service: Wayne Medical Center Ambulance Service	931-722-2055	
Tennessee One-Call (public utility locating service)	800-351-1111	
Federal Agency: US Environmental Protection Agency: Region IV	404-562-8700	
United States Environmental Protection Agency On-Scene Coordinator: Steve Spurlin	731-394-8996	
State Agency: Tennessee Department of Environment and Conservation	888-891-8332	

Potential Chemicals of Concern: PCBs – Aroclor 1248, Aroclor 1254

Table 1B: Emergency Services Instructions

For Emergency Medical Incidents, Emergency Fire Response, or Hazardous Materials Incidents

Emergency Telephone Numbers:

- Hospital: 911
- Police: 911
- Fire Department: 911
- Site Security/Client: Lisa Krogman 847-646-9613 / 224-659-9103

1. **Remember to speak SLOWLY and CLEARLY. Do NOT hang up first: let the dispatcher conclude the call.**
2. Provide the following information:
 - A Location: Intersection of Clifton Turnpike and U.S. Highway 64
 - B. Your name and phone number
3. Describe nature of Incident:
 - A. Emergency Medical Incident
 - How many victims
 - Type of incident - physical injury, etc.
 - Assessment of victims' condition if known (whether victim is conscious/unconscious, breathing/not breathing, pulse/no pulse, nature of injuries, first aid measures used, etc.)
 - Where incident occurred
 - B. Fire:
 - Location of Fire
 - C. Hazardous Materials Incident:
 - This is a hazardous materials incident requiring dispatch of HAZMAT unit
 - Type of incident (fire, explosion, spill, etc.)
 - Type of material (specific chemicals or general description)
 - Whether there is also a Medical Emergency
4. Give your location at the Site

Note: Security, Site supervisor or designee must meet the emergency personnel at the staging area to brief them on the situation.

Route Description and Map to Hospital

Hospital Information:

Hospital Name: Wayne Medical Center

Hospital Address: 103 J.V. Mangubat Drive, Waynesboro, TN 38485

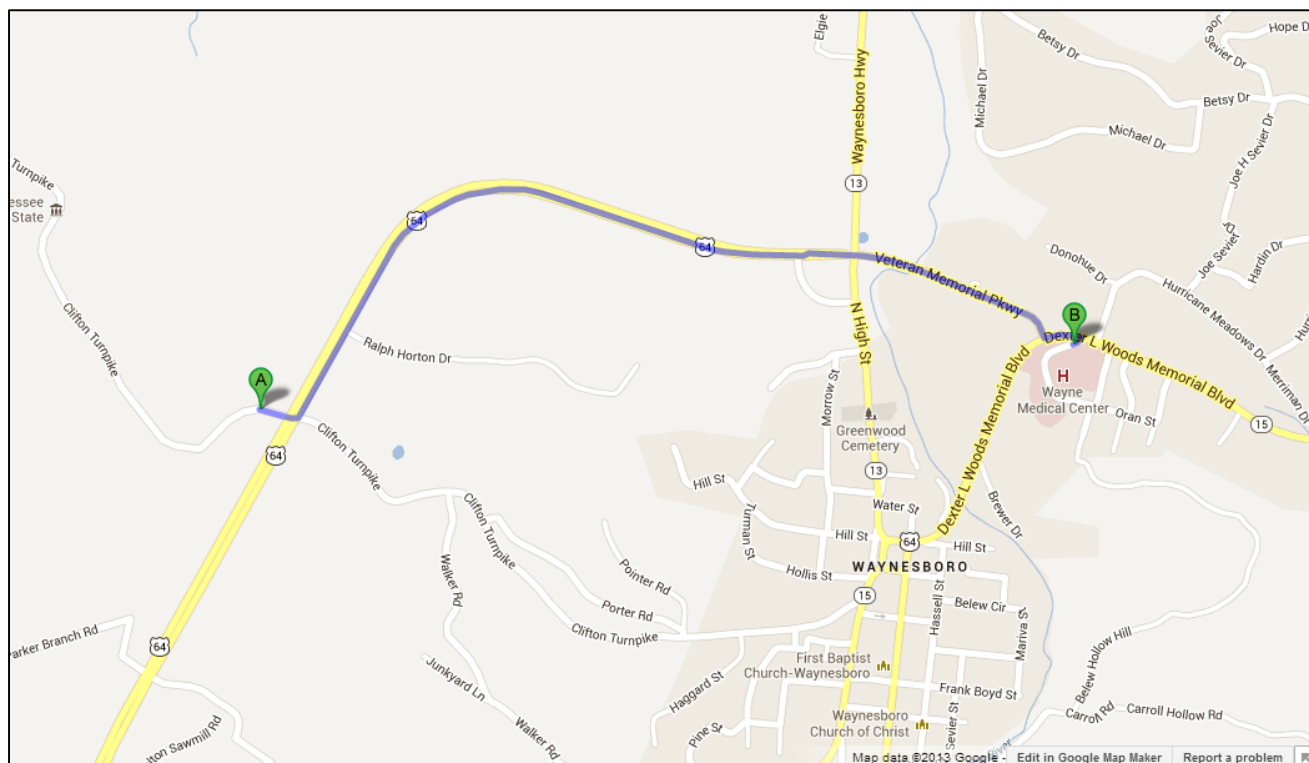
Hospital Phone Number: 931-722-5411

Directions to Area Hospital:

START: Intersection of Clifton Turnpike and U.S. Highway 64, Waynesboro, TN

- Head **east** on **Clifton Turnpike** toward **US-64 Bypass** (75 feet)
- Turn left onto **US-64 Bypass/Veteran Memorial Parkway** (1.7 mi)
- Turn left onto **Dexter L Woods Memorial Blvd** (364 feet)
- Turn right onto **J V Mangubat/Oran St** (112 feet)

END: 103 J.V. Mangubat Drive, Waynesboro, TN 38485 (destination will be the left)



Route to Primary and Secondary Rally Points

In the event of an evacuation (e.g., unsafe conditions are observed such as a trespasser present on-site) from the immediate work area, two safe locations (i.e., rally points) have been identified. In the event that the workers must evacuate the area immediately adjacent to Beech Creek, personnel should always migrate to the primary rally point first (i.e., **Rally Point A**). If the primary rally point is determined not to be safe due to emergency conditions at any time, personnel will evacuate to the secondary rally point (i.e., **Rally Point B**). Once Site personnel have migrated to the specified rally point, the Site supervisor will account for Site personnel and will report this information to the project manager.

Prior to conducting field tasks, the ENVIRON project manager and Site supervisor will consult the National Weather Service (NWS) Flash Flood Guidance (<http://www.srh.noaa.gov/rfcshare/ffg.php>) to review recent, current, and projected future weather conditions in Wayne County, TN where the Beech Creek Site is located (See image to the right). **Personnel may not conduct tasks at the Beech Creek Site when a flash flood warning has been issued for Wayne County, or when ground**



conditions are determined to be unsafe for any other reason. It will be the Project Manager's and Site Supervisor's responsibility to stay informed of developing weather conditions while personnel are on-site. If storms or heavy rain (equal to or greater than NWS's Flash Flood Guidance intensity values, which vary depending on current soil conditions) commence while conducting a task near Beech Creek, personnel should migrate to **Rally Point A**. If storms are present, personnel should seek shelter in their vehicle. If storms/heavy rain persist or are potentially severe, personnel should leave the Site and seek shelter in a permanent structure (e.g., hotel, restaurant, etc.). **Personnel should also use their common sense when evaluating conditions at the Site. If at any time a worker is uncomfortable concerning the conditions of the creek, personnel should move to Rally Point A and contact the Project Manager and/or local Health and Safety Coordinator for further instructions.** See Appendix H, ENVIRON Standard Practice Instruction Manual 31, Water Safety for more information.

- **Rally Point A:** Parking area, near current entrance pathway to Beech Creek (intersection of Clifton Turnpike and U.S. Highway 64)
- **Rally Point B:** Wayne County Emergency 911 Office (near intersection of Andrew Jackson Boulevard and U.S. Highway 64)

