

Appendix E

Project Health and Safety Plan (on CD-ROM)

Barr Engineering Co.

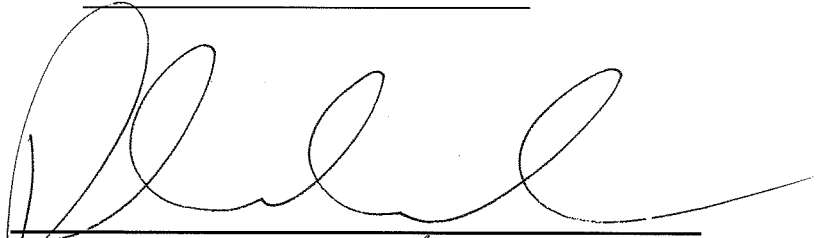
Project Health and Safety Plan

**UMore Park Investigation and Remediation
Dakota County, Minnesota**

Preparation Date: November 2008

Review Date: November 2008

Project Number: 23/19-0B05



**Al Gebhard
Principal in Charge**



**Jim Aiken
Project Manager**



**Tom Mattison
Project Health & Safety Contact**

**Project Health and Safety Plan
UMore Park Investigation and Remediation
November 2008**

Table of Contents

1.0 General.....	1
2.0 Site Characterization	2
3.0 Basis.....	6
4.0 Responsibilities and Administration.....	6
5.0 Medical Surveillance.....	8
6.0 Training and Project Site Meetings	9
7.0 Site Control and Work Zones	11
8.0 Personal Protective Equipment.....	13
9.0 Air Monitoring	16
10.0 Air Monitoring Action Levels	16
11.0 Personal Hygiene.....	17
12.0 Communications.....	19
13.0 Emergency Action Plan (EAP).....	20
14.0 Equipment and Personnel Decontamination	25
15.0 Contamination Migration Control.....	26
16.0 Tables.....	27
17.0 Figures	46
18.0 Forms	56

Table of Contents (continued)

List of Tables

Table 1	Contaminants of Concern
Table 2	Project Task Hazard Analysis
Table 3	Air Monitoring Action Levels
Table 4	Guidelines for Air Monitoring Frequency
Table 5	Emergency Contacts
Table 6	General Emergency Procedures to Potential Exposures
Table 7	First Aid Reference Guide

List of Figures

Figure 1	Site Location
Figure 2	Site Plan
Figure 3	Hospital Route Map
Figure 4a	Work and Exclusion Zones for Drilling Activities
Figure 4b	Example of a Work Zone for Drilling Investigations
Figure 4c	Work and Exclusion Zones for Trenching Activities
Figure 4d	Work and Exclusion Zones for Excavation Activities
Figure 5	Decontamination Procedure
Figure 6	Excavation Entry Decision Tree

List of Forms

Form 1	Project Health and Safety Plan Amendment
Form 2	Project Health and Safety Acknowledgement Sheet
Form 3	Work Area Daily Safety Record
Form 4	Pre-Construction Safety Meeting Checklist
Form 5	Daily Excavation Safety Checklist
Form 6	Soils Classification Checklist

List of Attachments

Attachment A	Heat Stress and Cold Stress Guidelines
Attachment B	Severe Weather Emergency Guidelines
Attachment C	University Training Documents and Memorandum

Table of Contents (continued)

Appendix

(Published October 2007)

Section A	Barr Health and Safety Program
Section B	Hazard Communication (Employee Right-to-Know)
Section C	Hazard Evaluation
Section D	Safety Training Program
Section E	Construction Safety
Section F	Personal Protective Equipment (PPE) Program
Section G	Respirator Program
Section H	Hearing Conservation Program
Section I	Confined Space Entry Procedures
Section J	Lockout/Tagout Program
Section K	Excavation Entry Procedures
Section L	Water and Ice Safety Program
Section M	Boat Safety Program
Section N	Hazardous Materials Transportation Program
Section O	Motor Vehicle Operation Program
Section P	Ladders, Scaffolds, and Fall Protection
Section Q	Barr Hazardous Waste Operations – Standard Operating Procedures
Section R	Decontamination Procedures
Section S	Air Monitoring Program
Section T	Medical Surveillance Program
Section U	Bloodborne Pathogens Exposure Control Plan
Section V	Process Safety Management Plan
Section W	Laboratory Safety
Section X	Material Safety Data Sheets
Section Z	OSHA Posters

1.0 General

Barr Engineering Co. (Barr) has prepared this Project Health and Safety Plan (PHASP) for the UMore Park site (Site) located in Dakota County, Minnesota. This PHASP has been prepared to address the potential health and safety hazards that may exist for elements of investigation activities and the observation of environmental response actions at the Site. The PHASP identifies procedures for protecting Barr employees and Barr subcontractors that have adopted or are required to adopt this plan.

This PHASP has been developed and is applicable to work completed on-site by Barr employees and Barr subcontractors, to ensure that any contact with potentially contaminated material is minimized, and that worker protection from construction related operations is maintained. All Barr personnel and Barr subcontractors will perform their work according to the requirements of this PHASP.

This PHASP is designed to ensure the following:

1. That Barr personnel and Barr subcontractors covered by this PHASP are not adversely exposed to the compounds of concern (COCs), as well as take steps to minimize the physical hazards present on-site.
2. That on-site operations and procedures will meet the requirements of OSHA Federal Regulations, in particular 29 CFR 1926 Hazardous Waste Operations and Emergency Response.

This PHASP and its appendices will be kept at a designated location at each work area. The PHASP appendices provide additional descriptions for standard operating procedures, safety training, medical surveillance, hazard evaluations, excavation safety, confined space entry, material safety data sheets, and OSHA posters.

All on-site operations conducted by personnel covered by this PHASP will be conducted in accordance with the provisions of the PHASP. Amendments to this plan will be documented (Form 1). All site personnel covered by this PHASP are required to sign the PHASP acknowledgement sheet (Form 2).

2.0 Site Characterization

Site Background

UMore Park consists of an approximately 5,000 acre area that includes the grounds of the former Gopher Ordnance Works (GOW) and pre-GOW farmsteads. The GOW was utilized in 1945 by the U.S. Department of Defense for the production of smokeless gun powder and oleum (sulfuric acid). Site ownership was transferred to the Regents of the University of Minnesota (University) by property deed transfers in 1947 and 1948. In the 1950s, the University began leasing former GOW buildings, and parcels to businesses and individuals for a variety of uses. The Site is now used primarily for agricultural research and administrative services by the University, however, many of the above-grade and subsurface GOW structures exist on-Site today.

In 2008, the University began preparing the western one-third of the Site, referred to as the UMore Mining Area (UMA), for mining of sand and gravel. The western one-third of the Site was selected for mining because significant economic sand and gravel deposits underlie the UMA and because the UMA largely excludes identified GOW operational areas (except for AOC#5 and a portion of AOC#3). The work described in this PHASP is being conducted to support the permitting and implementation of the UMA mining operations.

Environmental Conditions

Results of multiple environmental investigations have demonstrated the presence of several Recognized Environmental Conditions (RECs) and/or contaminants of concern (COCs) at concentrations above health-risk based screening criteria at the Site. A Recognized Environmental Condition means that an existing release, a past release, or a material threat of a release of hazardous substances or petroleum products into the ground, groundwater, or surface water of the property has been identified.

A Preliminary Investigation Report by Peer Environmental & Engineering Resources, Inc. (Peer, 2003) identified areas that contained concentrations of heavy metals and polynuclear aromatic hydrocarbons (PAHs) above background concentrations and risk-based screening criteria.

The U.S. Army Corps of Engineers (USACE) conducted a Preliminary Assessment (PA; Bay West, 2006) and Focused Site Investigation (Bay West, 2008) of a portion of the former GOW. Although several sites were identified for further investigation in the PA, the only GOW-related areas within the UMA identified in the PA and carried forward to the FSI were the former DNT storage bunkers

and related drainage area referred to as AOC 5 and AOC3-DA1, respectively. Results of the investigation confirmed the presence of multiple COCs within these AOCs.

Portions of the Site (within the GOW area) were listed on the National Priorities List in June 1986 as response to the detection of high concentrations of polychlorinated biphenyl (PCB) and metals in soil and solvent contamination in groundwater as a result of post-GOW operations. Remedies for these soil and groundwater impacts were implemented in the late 1980s and early 1990s. The last Five Year Review Report was completed in 2007 and indicated that the remedies were constructed in accordance with the requirements of the Record of Decision (ROD) and that conditions remain protective of human health and the environment in the short term. The portions of the Site subject to the ROD requirements will not be accessed as part of the investigation and remediation tasks described in the PHASP.

Potential Chemical Hazards On-Site

Site activities may potentially expose personnel to hazardous substances in the soil, in airborne dust containing environments, or in groundwater; harmful or potentially explosive vapors may be present in confined spaces. The following selected hazardous substances are known or suspected to be present on-site based on laboratory analyses of samples obtained during previous investigations:

Hazardous Substance
*Asbestos
*PAHs
*VOCs
*SVOCs
*Dinitrotoluene (DNT)
*Metals
Nitrocellulose

* = ACGIH or OSHA confirmed or suspected human carcinogen

Health effects, exposure limits, and guidelines for selected hazardous substances of concern on-site as well as their physical and chemical properties are described in Table 1: CONTAMINANTS OF CONCERN.

Anticipated Tasks

Field investigation tasks may include:

- Site reconnaissance activities
- Collection of soil samples from hand auger borings, direct push borings, rotasonic borings, rotary or auger borings, and test trenches,.
- Collection of water samples from groundwater monitoring wells or during drilling operations.
- Collection of soil gas samples from geoprobe equipment

Table 2 summarizes the potential hazards associated with activities at the site through a project task hazard analysis. A hospital route map is provided on Figure 3. Diagrams of typical work zones are shown in Figures 4a, 4b, 4c and 4d. Decontamination procedures are diagramed in Figure 5.

Excavation operations will be conducted in accordance with the OSHA Excavation standard. The Excavation Entry Decision Tree (Figure 6) outlines the procedural steps in determining if an excavation is safe to enter or work around. Accompanying forms for the Daily Excavation Safety Checklist (Form 5) and Soils Classification Checklist (Form 6) are provided in this PHASP. The complete Barr Excavation Safety policy is included in the PHASP appendices. Work conducted in contaminated soils excavations may be considered confined spaces and the Barr Confined Space Entry program (included in the PHASP appendices) should be consulted for additional entry requirements.

Work around water will be conducted in accordance with the Barr Water and Boat Safety and Barr Ice Safety programs. These programs outline the personal protective equipment requirements, buddy system and notification procedures in conducting work around water. These programs are included in the PHASP appendices.

Site Specific Hazards

The Site may contain physical hazards as a result of former GOW operations. These hazards may include:

- Open and abandoned manholes leading to vertical vaults.
- Unmarked pits, basements, trenches, sanitary sewers, woodbox sewers, and tunnels.
- Partially demolished buildings.

- Underground piping system for potable and process water.
- Concrete structures with jagged concrete edges and protruding rebar.
- Asbestos - friable and non-friable forms.
- Nitrocellulose, nitrocellulose (in former GOW production areas or related surface water ponds)
- Existing groundwater wells, semi-buried cisterns, and/or cesspools.

Because of the existence of asbestos-containing materials (ACM) at the site, extra provisions are necessary in order to maintain worker safety and limit exposure to asbestos. Each on-site worker is responsible in avoiding the disturbing of in-place ACM. On-site ACM may include transite siding, which was used in many GOW structures. Transite siding is found on-site at surface level and buried. If disturbed, weathered, or otherwise degraded, the danger of asbestos inhalation exists. Any potential ACM should be immediately reported to the University and managed in accordance with the Emission Control Plan. In general, any ACM material should be wetted with a soap and water solution, covered with plastic sheeting, and the location should be marked for follow-up by University staff. Site specific training information provided by the University and required of all on-site field staff is included in Attachment C.

Site Specific Access Issues

A 5-day notification must be given via e-mail to University staff prior to on-site work to ensure that planned work will not interfere with other site operations (agriculture, asbestos abatement, etc.) The e-mail should be sent to

- Steven Lott, lottx020@umn.edu
- Janet Dalglish, dagl006@umn.edu
- Forrest Izuno, izuno001@umn.edu

Notification should include the following information:

- Description of Work
- Dates
- Working hours
- Locations (by Site grid system)
- Names and companies of individuals doing work

All personnel must follow University check-in/check-out procedures by signing in and out at the Administration Building at 1605 160th Street West (Hours: 8 am – 4:30 pm). If work will start earlier

than 8 am, a field crew member will sign in prior to 12:00 pm. If work will end later than 4:30 pm, leave a voicemail at 651-423-2455 after leaving the site with time and names of personnel departing safely. Field staff should also call the Barr PM or task manager at the end of work shifts.

3.0 Basis

The OSHA Federal Regulations, including 29CFR 1910.120 and 29 CFR 1926.65 Hazardous Waste Operations and Emergency Response provide the basis for this Project Health and Safety Plan.

The safety and health of on-site personnel covered by this PHASP will take precedence over cost and schedule considerations for all project work.

4.0 Responsibilities and Administration

The organizational structure for Site activities is described below:

Al Gebhard, Principal-in-Charge, primary responsibility for project, directs all on-site operations [Office (952) 832-2725].

Jim Aiken, Project Manager, manages operations for consistency with work plans [Office (952) 832-2763].

Tom Mattison, Project Health and Safety Contact, reviewed this PHASP [Office (952) 832-2876].

Project Field Staff: Ellen Considine, Kristen Betz, Matt Marckel, Neal Hines, John Juntilla, Jim Staberg, John Novak, Kim Johansson, Jim Eidem, Sara Gaffin, and Jonathan Carter.

Each day, a Barr individual will be designated as the Project Health and Safety Team Leader (PHSTL). The PHSTL will supervise the implementation of the PHASP for Barr employees and subcontractors and will make all decisions regarding operations and work stoppages due to health and safety considerations for site personnel covered by this PHASP.

The responsibilities of the PHSTL are as follows:

1. Be responsible for implementation of the PHASP at the initiation of site work

2. Conduct the pre-entry safety briefing for all on-site personnel covered by this PHASP and other safety requirements to be observed during field work,.
3. Be responsible to hold daily safety meetings for site personnel covered by this PHASP to discuss health and safety issues.
4. Review and modify the PHASP as more information becomes available concerning the hazardous materials involved.
5. Suspend work activity if unsafe working conditions develop.
6. Coordination of the Emergency Action Plan (Section 13.0).
7. Assure that safety equipment is provided, maintained and accessible to site personnel covered by this PHASP.
8. Assure that site personnel covered by this PHASP are performing and documenting daily equipment operational checks.
9. Track and monitor delineation of work zones and document the location of new work areas.
10. Assure that site personnel covered by this PHASP comply with the “buddy system” while working in the field on UMore property, as well as in Exclusion Zones and DECON Zones
11. Investigate all accidents, injuries, illnesses, spills, fires, incidents, and near misses affecting site personnel covered by this PHASP.
12. Assure that the project field office is equipped with a copy of this PHASP, site maps delineating work zones, Material Safety Data Sheets (MSDS) for all hazardous substances brought to the site by Barr subcontractors for use in the Work, appropriate OSHA postings, first-aid kit, eyewash station, and potable water.
13. Reviewing work area safety audits and work area safety inspections to determine the effectiveness of the PHASP and correct deficiencies as necessary. This information will be communicated to site personnel covered by this PHASP as appropriate.

5.0 Medical Surveillance

In accordance with requirements detailed in OSHA Federal Regulations 29 CFR 1910.120 and 29 CFR 1296.65, all site personnel covered by this PHASP who may be exposed to potentially contaminated materials over the published exposure level for more than 30 days will have received medical surveillance by a licensed physician or physician's group.

The medical records will detail the tests that were taken and will include a copy of the consulting physician's statement regarding the tests and the employee's suitability for work.

All personnel involved in on-site work will have all necessary medical certification prior to commencing work which requires respiratory protection.

Interim medical surveillance will be completed if an individual exhibits poor health or high stress responses due to on-site activity or when accidental exposure to elevated concentrations of contaminants occurs.

6.0 Training and Project Site Meetings

All site personnel covered by this PHASP are required, prior to working on-site, to complete training sessions in accordance with 29 CFR 1926 Hazardous Waste Operations. This training shall consist of a minimum of 40 hours of classroom instruction, and three days of actual field experience under the direct supervision of a trained, experienced supervisor.

Prior to commencing activities, a pre-entry safety briefing will be conducted with site personnel covered by this PHASP. Topics covered during the pre-entry safety briefing will include:

1. Project Site-specific health and safety hazards;
2. Personal Hygiene Practices;
3. Level of PPE required;
4. Safe use of equipment;
5. Decontamination procedures; and
6. Emergency response procedures.

All personnel who attend this briefing will sign the Project Health and Safety Acknowledgment Form presented as Form 2, documented by the PHSTL, and kept on file.

Site personnel covered by this PHASP shall attend regular daily safety (“toolbox”) meetings. These meetings will be conducted by the PHSTL, and will cover specific health and safety issues, work area activities, changes in work area conditions, and a review of topics covered in the Project Site-specific pre-entry briefing. Topics discussed in the safety toolbox meetings will be documented along with a list of personnel who attend. Completed work area daily safety records, including safety toolbox meeting information (Form 3) will be kept on file or the meetings will be documented in the field book.

Training Specific to UMore Park

Before accessing the property, individuals must attend an Asbestos Awareness class provided by University. Training records and certifications must be retained on-site for Barr staff and sub-contractors. This includes ALL individuals who will be entering the property, including:

- Personnel who will be regularly be on-site, involved with drilling, test-pitting, and any other activities.
- Personnel who will be accessing the site occasionally for observation and/or oversight, or for pick-up and drop-off activities, and any other occasional activities.

Note that untrained personnel may access the UMore Park Administration building, located at 1605 160th Street West, Rosemount, MN 55068. Training notes are included in Attachment C.

7.0 Site Control and Work Zones

Specific work zones, as defined below, will be delineated by temporary fencing, a flagged line, cones as appropriate to specific site location needs, or will be noted in field notebook if physical marking is not practical.

- a. **Exclusion Zone** – This zone will include all areas where potentially contaminated soils or materials are to be handled and all areas where contaminated equipment or personnel travel.

- b. **Decontamination Zone** – This zone will occur at the interface of the Exclusion Zone and Support Zone and will provide access for the transfer of construction materials and site equipment to the Exclusion Zone, the decontamination of vehicles prior to leaving the Exclusion Zone, the decontamination of personnel and clothing prior to entering the Support Zone, and for the physical segregation of the Support Zone and Exclusion Zone.

- c. **Support Zone** – This area is the portion of the site defined as the area outside the zone of significant air and soil contamination. The Support Zone will be clearly delineated and procedures implemented to prevent active or passive migration of contamination from the work Project Site.

The project field office will be the central location for potable water supply and first-aid kit, communications, safety records, and lunch/break areas.

When a designated project field office has not been located on-site, a support vehicle will serve as the mobile project field office. The location of the lunch/break area will be determined by the PHSTL daily and communicated to site personnel covered by this PHASP.

The general work areas and controlled access points will be delineated on the Project Site map (Figure 2) and will be further detailed on work area location maps at each work area or in the field notebook. When changes occur in the delineation of these work zones or when work areas change, these changes will be documented and kept on file in the project field office. It is understood that the Exclusion Zone concept when working with mobile equipment will change when the location of the equipment moves to a new location.

Potable water, first aid kit, and eyewash, as appropriate, will be provided at each work area. When the support vehicle serves as the mobile project field office, site personnel covered by this PHASP will have transportation readily available to nearby toilet facilities.

The use of the “buddy system” is required for all site personnel covered by this PHASP when working in the field on UMore property, as well as in the Exclusion Zone and DECON Zones. All site personnel covered by this PHASP are to be in communication with at least one other worker in the group while working in the Exclusion Zone and DECON Zones.

8.0 Personal Protective Equipment

Engineering controls and work practices designed to reduce and maintain employee exposure at or below the permissible exposure limits (PELs) for the contaminants of concern will be implemented. Whenever engineering controls and work practices are not feasible, a reasonable combination of engineering controls, work practices and personal protective equipment (PPE) shall be used to reduce and maintain employee exposure at or below the permissible exposure limits for the contaminants of concern.

All on-site personnel covered by this PHASP shall be equipped with PPE appropriate for the nature of work being completed. All safety equipment and protective clothing shall be kept clean, well-maintained, and intact.

For the purpose of this PHASP, all site activities within the Exclusion Zone will require Modified Level D personal protection at a minimum, unless it is determined through the hazard analyses process that a less restrictive level of protection is required and the PHASP is amended. Similar activities conducted outside the established Exclusion Zones will require Basic Level D personal protection. Any deviations from these levels of protection will be documented in the Work Area Daily Safety Record (Form 3).

Basic Level D PPE

<i>Type</i>	<i>Properties</i>	<i>Item</i>
Foot protection	Steel-toe	Boots
Head protection	Meets ANSI Z89.1 standard	Hard hat (during construction activities and when overhead hazards exist)
Hand protection	Abrasion resistant	Leather/cotton gloves (optional)
Eye protection	Meets ANSI Z87.1 standard	Glasses with side shields

Modified Level D PPE

<i>Type</i>	<i>Properties</i>	<i>Item</i>
Foot protection	Steel-toe	Boots
Head protection	Meets ANSI Z89.1 standard	Hard hat (during construction activities and/or when overhead hazard exist)
Hand protection	Chemical resistant	Inner gloves (nitrile). A nitrile outer glove may be used when handling heavily contaminated soils/liquids.
Eye protection	Meets ANSI Z-87.1 standard	Glasses with side shields

In the event that air monitoring indicates that respiratory protection is necessary, Level C PPE will consist of Level D or modified Level D PPE with a half-mask, air-purifying respirator with organic vapor and P95 particulate filtration. Prior to arriving at the Project Site, all on-site personnel covered by this PHASP, involved in intrusive investigation or removal activities where overexposure to airborne particulates is expected, will have received medical surveillance, respirator use training, and have been fit tested for a half-mask respirator. Barr has developed a written respirator program that complies with the federal OSHA 29 CFR 1910.134 standard and can be referenced in the PHASP appendices.

Additional protective equipment guidelines to be implemented include:

1. Prescription eyeglasses in use on the site will be safety glasses with side shields.
2. Protective gloves may be worn over nitrile gloves by site personnel covered by this PHASP involved in any activities where the nitrile gloves may be damaged during project task work.
3. All PPE worn on-site will be decontaminated or discarded at the end of each work day.
4. No watches or other jewelry will be permitted during operation of hand held powered equipment.

Special Considerations

- **Work clothing** that may become contaminated may require an outer disposable body clothing (e.g., Kleengard or tyvek).
- **Heat/cold stress** work activities conducted during colder months may require modification of these PPE levels. Refer to Attachment A: Heat Stress and Cold Stress Guidelines.
- **Hard hat** is not required in the absence of construction activities or overhead physical hazards, unless required by client. Hard hat liners should be used during colder months.
- **Hearing protection** is required during soil boring, monitoring well installation, and excavation activities involving heavy equipment, when personnel may be exposed to high noise levels (for example, cannot hear normal conversation or have to raise voice to be understood).

- **High visibility vests** are required when working on and adjacent to roadways, or working in remote areas during hunting season, or when working on active construction sites or around earth moving equipment (e.g. backhoes, drill rigs).
- **Boot covers** or chemical resistant boots are required if walking in contaminated soil or liquids.
- **Chemical resistant steel-toed boots** may be used instead of steel-toed leather boots and boot covers if water is available for DECON.

9.0 Air Monitoring

During the progress of intrusive work, air quality measurements will be conducted to monitor exposure levels of organic vapors, combustibles, benzene, and hydrogen sulfide in the breathing zone, identified on Air Monitoring Action Level table (Table 3).

The air monitoring program may consist of monitoring with a combustible gas monitor, organic vapor meter, and hydrogen sulfide monitor in the breathing space. Operation and calibration procedures will be according to manufacturers' instructions using a specified calibration gas. During periods when monitoring is necessary (i.e. during initial monitoring and subsequent monitoring when conditions change), daily calibration and maintenance records on the Work Area Daily Safety Record (Form 3) will be kept by the PHSTL and filed in the project field office or documented in the field notebook.

Full shift exposure monitoring will be conducted during remediation activities and sample parameters will be determined for that phase.

Identification of air monitoring results in excess of the action levels cited in Section 10.0 shall be reported to the PHSTL who will determine when PPE should be upgraded or operations shut down and restarted.

If work is stopped because action levels have been exceeded, air monitoring will continue from a safe distance until it is determined that it is safe to continued site operations.

10.0 Air Monitoring Action Levels

The following table, also presented in the back of the document as Table 3, indicates action levels for air monitoring parameters. If action levels are exceeded, the Barr PHSTL should be notified immediately to determine what action should be taken. Background air monitoring for organic vapors and airborne dust particles should be conducted prior to commencement of activities.

Air Monitoring Action Levels

Monitoring Instrument ¹	Hazard	Action Levels	Action
Organic Vapor Analyzer/Organic Vapor Monitor/HNu	Organic vapors/gases	<2.5 ppm above bckgrd ----- ≥2.5 ppm above bckgrd for 10 min. ----- >25 ppm	Level D or modified level D ----- Level C and use detector tubes. If no benzene vapors, may increase action level to 10 ppm in level D. ----- Leave area and reassess
MSA 260/360 or Microgard	Explosive atmosphere	≤10% LEL ----- >10% LEL	Level D or modified level D. ----- Leave area and reassess
Hydrogen Sulfide Meter	Hydrogen Sulfide	<5 ppm ----- ≥5 ppm	Level D or modified level D. ----- Leave area and reassess
Detector Tubes for Benzene	Benzene vapors	<0.5 ppm ----- 0.5 - 2.5 ppm ----- >2.5 ppm	Level D or modified level D. ----- Level C ----- Leave area and reassess

The following table, also presented in the back of the document as Table 4, includes guidelines for air monitoring frequency.

Guidelines for Air Monitoring Frequency

Instrument	Periodic Monitoring Frequency	Notes
Organic Vapor Indicator	<ul style="list-style-type: none"> unusual or unidentified new odors are encountered discolored soils are encountered 	For more information, see APPENDIX SECTION S: AIR MONITORING PROGRAM
Combustible Gas Indicator	<ul style="list-style-type: none"> the organic vapor monitor registers sustained readings above action level intrusive activity when combustible gases may potentially have accumulated the potential exists for a combustible atmosphere to develop 	For more information, see APPENDIX SECTION S: AIR MONITORING PROGRAM
Hydrogen Sulfide (H ₂ S) Meter	<ul style="list-style-type: none"> intrusive activity where H₂S gases may have potentially accumulated 	For more information, see APPENDIX SECTION S: AIR MONITORING PROGRAM
Draeger Monitor for Benzene	<ul style="list-style-type: none"> total organic vapor read-out exceeds the action limit for a 10-minute duration, and organic vapors have not been characterized upgrade to Level C is made and organic vapors have not been characterized 	For more information, see APPENDIX SECTION S: AIR MONITORING PROGRAM

11.0 Personal Hygiene

All personnel performing or supervising work within the Exclusion Zone shall adhere to the personal hygiene-related provisions of this section.

The following equipment/facilities shall be available for the personal hygiene of all on-personnel covered by this PHASP:

1. Disposable coveralls, gloves, and overboots.
2. Disposal containers for used disposable protective equipment will be located in each work area.
3. Potable water will be located at each work areas.
4. First aid kits and eyewash, as appropriate, will also be located at each work area.

The following regulations for personnel actively participating in the field sampling program shall be enforced:

1. On-site personnel covered by this PHASP will wear appropriate PPE when in the Exclusion Zone.
2. Used disposable outerwear will not be reused if deemed to be unsuitable to provide the necessary protection, and when removed, will be placed inside disposal containers provided for that purpose.
3. Smoking, eating and drinking is prohibited within the Exclusion and Decontamination Zone. These activities will be permitted only within designated lunch/break areas and documented on Work Area Daily Safety Record form or in field notebook. On-site personnel covered by this PHASP, upon leaving the Exclusion Zone, will thoroughly cleanse their hands, face, neck area and other exposed areas before smoking, eating or drinking.

12.0 Communications

General

Emergency numbers including the police department, fire department, ambulance, hospital and appropriate Regulatory agencies will be available at all work area locations. Table 5 of the PHASP provides a list of these contact numbers.

Emergency Alarm System

If evacuation of a work area is necessary, three long blasts are to be sounded with an air horn or vehicle horn and/or verbal warnings will be sounded. This signal indicates that immediate evacuation of all persons in the work area is necessary as a result of some immediate or impending danger. Operations should be shut down and all site personnel covered by this PHASP should evacuate to a safe area, as determined by the PHSTL. This safe area should be in the predominantly upwind direction of the Exclusion Zone. The signal method and possible safe area location(s) may vary depending on the type of emergency, size of site, and number of employees. This signal and location(s) to be used as a safe area will be discussed at the Pre-entry Safety briefing, and any changes should be noted at daily "tool-box" meetings.

13.0 Emergency Action Plan (EAP)

Purpose

This plan is intended to provide immediate response to a serious site occurrence such as injury, explosion, spill, or fire. This plan is intended to be compatible with and to integrate the emergency response plan of local emergency service providers, and to satisfy the requirements of 29 CFR 1910.120 (1) (1) and 29 CFR 1926.65 (1) (1) (Emergency Response Plan). Personnel roles and lines of authority are discussed in Section 4.0 and a list of emergency contact numbers is presented above. A hospital route map is provided on Figure 3. The details of this EAP will be communicated in the pre-entry safety briefing and specific scenarios reviewed for clarity on response activities.

Standard site emergency response will generally involve the evacuation of site personnel covered by this PHASP rather than attempting to assist in the handling of a site emergency.

Applicability

These Emergency Action procedures will be communicated to all on-site personnel covered by this PHASP. These emergency action procedures will be introduced at the pre-entry safety briefing and reviewed periodically thereafter. Any emergency response efforts carried out under this EAP will be reviewed by the Barr Project Manager and the PHSTL to determine if procedures need modification.

Pre-emergency Planning

Barr has contacted local emergency response providers regarding site activities, site hazards, and the potential for emergencies occurring at the site and to assure that this Emergency Action Plan is compatible and integrated with the disaster, fire, and/or emergency response plans required by the local emergency service providers. These local emergency response providers have indicated ability to respond to emergencies occurring at the site. Documentation of this contact and any future contacts, as new activities are identified, will be maintained on file or in field notebook.

As part of pre-emergency planning, site personnel covered by this PHASP will review and become familiar with the hospital location map prior to the commencement of site operations to be used in the event of minor injuries. A hospital route map is provided on Figure 3 of the PHASP.

Site Security and Control

Site security and control measures in place for normal work activities will be continued during implementation of this EAP.

Emergency Recognition and Prevention

All site personnel covered by this PHASP are expected to conduct their work in a manner that does not contribute to emergency conditions (i.e., preventing fire, spills of hazardous substances). Furthermore, all site personnel covered by this PHASP performing intrusive activities (e.g., fence installation, drilling, excavation activities) are required to clear utilities prior to the start of intrusive activities.

Site personnel covered by this PHASP are expected to be alert for any conditions that may lead to an emergency condition and to notify the PHSTL immediately if such conditions develop.

Medical Services and First Aid

Contact information for local emergency medical response providers, including the hospital are included on Hospital Location Map (Figure 3), along with driving directions.

Additionally, first aid kits and eyewash, as appropriate, will be available in each work area. The PHSTL is responsible for checking the first aid kit each week to ensure all expendable items are replaced. First aid kits are intended to be stored to protect them from inclement weather.

Medical transport will be made by either the PHSTL or other on-site personnel covered by this PHASP (in the event of minor injuries) or through contacting the local ambulance service (in the event of major injuries). Cellular telephones and/or radios will be on-site for daily and emergency contact purposes.

General emergency procedures for responding to potential exposures to hazardous substances are described in Table 6 for general emergency procedures and Table 7 for an overview of common first-aid incidents. Follow directions of emergency service providers, if available, in lieu of these instructions. Provide emergency service providers with background information regarding chemical/physical exposure. Always call for medical transport in emergencies.

Evacuation Escape Procedures

In the event of an emergency necessitating evacuation (such as fire, explosion, or significant release of a flammable hazardous substance (i.e., hydraulic fluid, gasoline), site personnel covered by this PHASP will evacuate the work area, and rely on emergency service providers such as the local fire department, police department and/or hospital to assist in the handling of the emergency. Site personnel covered by this PHASP should not attempt any emergency service procedures, except those necessary to render first-aid and for the safe evacuation of others. Barr subcontractors should be advised to shut down and all personnel should evacuate to a safe area, as determined by the PHSTL. This safe area should be in the predominantly upwind direction of the Exclusion Zone. The PHSTL will account for site personnel covered by this PHASP after emergency evacuation has been completed.

Evacuation escape procedures, routes, and the location of the “safe zone” will be discussed at the pre-entry briefing and documented daily at the “toolbox” safety meeting for each work area.

Emergency Alarm System

If evacuation of a work area is necessary, three long blasts are to be sounded with an air horn or vehicle horn and/or verbal warnings will be sounded. This signal indicates that immediate evacuation of all persons in the work area is necessary as a result of some immediate or impending danger. Barr subcontractors should be advised to shut down their operations and all personnel should evacuate to a safe area, as determined by the PHSTL. This safe area should be in the predominantly upwind direction of the Exclusion Zone. The signal method and possible safe area location(s) may vary depending on the type of emergency, size of site, and number of employees and will be discussed at the pre-entry safety briefing, and any changes should be noted at daily "tool-box" meetings.

Emergency Evacuation Routes

Evacuation escape procedures, routes, and the location of the “safe zone” will be discussed and documented at the Pre-entry Safety Meeting and daily at the “toolbox” safety meeting for each work area and will be documented in the field notebook.

Reporting Fires and Other Emergencies

The PHSTL is responsible for contacting emergency service providers in the event of a fire or other emergency. The PHSTL should notify the Barr Health and Safety Manager and the Project Manager

upon attainment of nonemergency conditions. The Project Manager should make a recommendation to the Client for notification of local, state, and federal governmental agencies.

Emergency Notification Procedures

The following course of action should be taken if an emergency situation develops:

1. Evacuate as necessary. Maintain site security and control as described in Section 7.0 Work Zones of this PHASP.
2. Notify proper emergency services (fire, ambulance, police, etc.) for assistance. See Table 5 for Emergency Contacts' telephone numbers. Inform emergency services personnel of the type of work being performed so that the need for equipment and decontamination can be assessed.
3. Notify any other affected personnel at the site.
4. Contact the Barr Project Manager or PIC to inform them of the incident as soon as possible. The Barr Project Manager should notify the appropriate parties including the Client and the Barr Health and Safety Manager.
5. Prepare a summary report of the incident for the Barr Project Manager as soon as possible after the incident which should be kept on file.

Accountability of Persons

A clear chain of authority has been established to mobilize the resources necessary to respond to a fire or other emergency. The PHSTL will take the initiative for project emergency notification procedures. This person should be informed of any on site emergencies, and is responsible for making sure appropriate evacuation procedures are followed and conducted in a safe and orderly manner. The PHSTL should determine that all site personnel covered by this PHASP who were working in the evacuation area have been evacuated to safe locations.

The Project Manager has overall responsibility for this Emergency Action Plan and should be notified whenever this plan is utilized or whenever there is a question on proper implementation to allow for critique of the emergency response and subsequent follow-up.

Decontamination Procedures

In the event of emergencies involving serious or potentially serious injuries, the PHSTL will contact emergency service providers immediately. Injured person(s) should be decontaminated as much as

possible prior to transport to a medical facility. Where hazardous substances cannot be removed at the site, consider use of clean tyvek to line the stretcher under the injured. Decontamination procedures described in Sections 14 and 15 should be followed whenever possible.

PPE and Emergency Equipment

In the event of an emergency requiring emergency service providers, those providers should be providing their own personal protective equipment and emergency equipment. Protective equipment used for this evacuation should be consistent with levels of protection and action levels as determined in this PHASP.

14.0 Equipment and Personnel Decontamination

Procedures will be implemented to reduce the amount of contact of both personnel and equipment with potentially contaminated materials. These procedures include the following:

1. Proper work practices that will lead to minimal direct contact with potentially contaminated material.
2. Use of disposable equipment and clothing as much as practicable.

All site personnel covered by this PHASP will remove their protective clothing and wash their hands, face, neck area and other exposed areas with potable water and soap before entering the lunch and break areas to eat, drink or smoke or leaving the site.

Satellite decontamination stations will be set up for each work area and will be supplied with potable water, soap, and disposal containers as appropriate to aid in decontamination procedures. The location of these decontamination areas will be delineated in the field and documented on site work area maps. When an operation is conducted outside an Exclusion Zone, decontamination procedures will not be required.

15.0 Contamination Migration Control

All vehicles and equipment used within the Exclusion Zone by site personnel covered by this PHASP will be decontaminated on the site as determined necessary prior to leaving the site.

Decontamination, when required, will consist of the thorough cleaning of those parts of the equipment which come in contact with potentially contaminated material. The PHSTL will monitor that equipment is clean or has been decontaminated prior to removal from the site.

16.0 Tables

Table 1	Contaminants of Concern
Table 2	Project Task Hazard Analysis
Table 3	Air Monitoring Action Levels
Table 4	Guidelines for Air Monitoring Frequency
Table 5	Emergency Contacts
Table 6	General Emergency Procedures to Potential Exposures
Table 7	First Aid Reference Guide

Table 1: Toxicity Profile For Selected Hazardous Substances On Site

Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects ¹	Chronic Effects ²	Flamm. Range		Carcinogenicity Class ³	Other
							LEL%	UEL%		
Antimony (7440-36-0)	50 mg/m ³ (as Sb)	0.5 mg/m ³ Antimony and compounds, as Sb	NA	NA	Inhalation of antimony compounds may cause upper respiratory tract irritation. Acute overexposure may also produce symptoms such as nausea, dizziness, and dry throat. eye contact may cause irritation.	Prolonged contact may cause dermatitis. May cause heart, kidney, and liver disorders from chronic antimony exposure.	NA	NA	OSHA: No US EPA: No ACGIH: No	VP: 0 mm (approx.) BP: 2975°F FI P: NA Sol: Insoluble Odor: Odorless
Arsenic (7440-38-2)	Inorganic compounds Ca 5 mg/m ³ (as As)	10 µg/m ³ 0.5 mg/m ³ (PEL for organic compounds) 0.01 mg/m ³ (PEL for inorganic compounds) 0.5 mg/m ³ (TWA for organic compounds (as As)) (MN OSHA)	NA	NA	Inhalation can cause severe respiratory irritation; oral exposure may cause cramps, gastrointestinal (G.I.) damage, swelling and death.	Skin changes may be produced (including pigmentation changes) upon oral or inhalation exposure; vascular, nervous system and liver injury may result if inhaled or ingested.	NA	NA	OSHA: Yes US EPA: A ACGIH: A1 ⁴	Properties vary depending on specific compound; essential element Odor: inorganic-odorless; organic-odor may vary
Asbestos, all forms (1332-21-4) (29 CFR 1910.1001)	Ca	0.1 fiber/cc	1.0 fiber/cc	NA	Acute effects are not expected.	Chronic inhalation exposure to asbestos may cause asbestosis, lung cancer, and mesothelioma (a cancer of the lining of the lung cavity). Asbestosis, characterized by the formation of scar tissue in the lungs, develops several (from 7 to 30) years after the period of exposure. Symptoms include cough, shortness of breath, and chest pain. Asbestos is also a human carcinogen.	NA	NA	OSHA: Yes US EPA: A ACGIH: A1	VP: 0 mm Hg (approx.) BP: Decomposes Sol: Insoluble FI P: NA Appearance: White or greenish (chrysotile), blue (crocidolite), or gray-green (amosite) fibrous Odor: Odorless

¹ Symptoms that may occur upon short-term high level exposure.

² Symptoms that may occur upon long-term low level exposure.

³ Substance identified by other sources as a suspected or confirmed human carcinogen.

Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects ¹	Chronic Effects ²	Flamm. Range		Carcinogenicity Class ³	Other
							LEL%	UEL%		
Barium (7440-39-3)	50 mg/m ³	0.5 mg/m ³ (soluble compounds (as Ba))	NA	NA	Inhalation may cause coughing, bronchial irritation, and pneumoconiosis. Contact with soluble salts may cause irritation of eyes, and mucous membranes; and possibly burns.	Dermatitis may result from repeated or prolonged skin contact.	NA	NA	OSHA: No US EPA: No ACGIH: No	Properties vary depending on specific compound Odor: odorless
Benzene (skin) (71-43-2) (29 CFR 1910.1028)	Ca 500	0.5 1 (PEL) (0.1 NIOSH)	5 1 (NIOSH)	9.24	Eye, skin, respiratory irritant. Inhalation can cause central nervous system (CNS) depression (headache, fatigue, dizziness, nausea).	Toxic to bone marrow cells, leading to anemia (fatigue, headache, nausea, anorexia) upon repeated inhalation exposure; continued exposure may result in leukemia.	1.3	7.9	OSHA: Yes US EPA: A ACGIH: A1	OT: 4.68 ppm VP: 75 mm Hg BP: 176°F Sol: Slightly sol. in water; very sol. in organic solvents and oils FI P: 12°F Odor: aromatic
Benzo(a)pyrene (50-32-8)	Ca 80 mg/ m ³	0.1 mg/m ³	NA	NA	Irritation of the nose and throat.	Kidney and liver damage.	NA	NA	OSHA: Yes	Properties vary depending on specific compound. Found in coal tar pitch.
Beryllium (7440-41-7)	Ca 4 mg/m ³ (as Be)	0.002 mg/m ³	C0.005 mg/m ³ (OSHA)	NA	Irritating to the skin, eyes, and respiratory tract. Acute overexposure may cause pneumonitis.	Long-term chronic exposure may cause lung damage. Liver, spleen and kidney damage may also occur.	NA	NA	OSHA: No US EPA: B2 ACGIH: A1	VP: 0 (approx.) BP: 4532EF Sol: Insoluble F1 P: NA Non-combustible solid in bulk form; slight explosion hazard in the form of a powder or dust Odor: Odorless
Bis(2-ethylhexyl)phthalate (Di-sec octyl phthalate) (117-81-7)	Ca 5,000 mg/m ³	5 mg/m ³	10 mg/m ³ (NIOSH)	NA	Low order of acute toxicity.	Liver and testicular toxic effects were produced in animals following ingestion.	NA	NA	OSHA: No US EPA: B2 ACGIH: No ⁴	BP: 248°F FI P: 410°F Sol: 400 µg/L

¹ Symptoms that may occur upon short-term high level exposure.

² Symptoms that may occur upon long-term low level exposure.

³ Substance identified by other sources as a suspected or confirmed human carcinogen.

Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects ¹	Chronic Effects ²	Flamm. Range		Carcinogenicity Class ³	Other
							LEL%	UEL%		
Cadmium (7440-43-9) (29 CFR 1910.1027)	Ca 9 mg/m ³ (as Cd)	10 µg/m ³ 2 µg/m ³ (respirable fraction) 5 µg/m ³ (PEL)	NA	NA	Ingestion may lead to nausea, diarrhea, muscle cramps; high doses may lead to unconsciousness.	Chronic oral exposure may produce bone and kidney damage.	NA	NA	OSHA: Yes US EPA: B1 ACGIH: A2 ⁴	Cadmium dust properties vary depending on specific compound Odor: odorless
Chromium (hexavalent) (18540-29-9)	Ca	0.05 mg/m ³ (Water soluble Cr VI compounds) 0.01 mg/m ³ (insoluble Cr VI compounds)	0.1 ceiling	NA	Hexavalent forms are more toxic than trivalent; Inhalation of salts may produce severe nasal irritation/damage; skin ulcers and dermatitis result from contact with salts or chromic acid.	Hexavalent forms are more toxic than trivalent; liver, kidney and lung damage may result from inhalation exposure; dermatitis may result from skin contact.	NA	NA	OSHA: No US EPA: A ACGIH: A1	Properties vary depending on specific compound; essential element Odor: Odorless
Coal Tar Pitch Volatiles (benzene solubles: anthracene, benzo(a)pyrene, phenanthrene, acridine, chrysene, pyrene) (65996-93-2)	Ca 80 mg/m ³	0.2 mg/m ³ (0.1 mg/m ³ NIOSH)	NA	NA	Acute toxicity appears low in lab animals, although occupational exposure has caused skin reactions and eye irritation.	Dermatitis may result from skin exposure; animal studies show oral administration may lead to blood disorders and liver, kidney, and ocular effects. Carcinogenic CTPVs may produce immunosuppressive effects in humans by the inhalation route of exposure.	NA	NA	OSHA: Yes US EPA: B2 (benzo(a)pyrene) ACGIH: A1	Properties vary; Low VP Odor: Naphthalene-like odor
Cobalt (7440-48-4)	20 mg/m ³	0.02 mg/m ³ 0.1 (PEL) 0.05 mg/m ³ , as CO (MN OSHA)	NA	NA	Inhalation can cause irritation of the nose and throat, and may cause respiratory disease. Dermal exposure to cobalt may cause an allergic skin rash.	Chronic inhalation may cause inflammation of the lungs (pneumonitis).	NA	NA	OSHA: No US EPA: No ACGIH: No	Properties vary depending on specific compound Odor: Odorless

¹ Symptoms that may occur upon short-term high level exposure.

² Symptoms that may occur upon long-term low level exposure.

³ Substance identified by other sources as a suspected or confirmed human carcinogen.

Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects ¹	Chronic Effects ²	Flamm. Range		Carcinogenicity Class ³	Other
							LEL%	UEL%		
Copper (7440-50-8)	100 mg/m ³ (as Cu)	0.1 mg/m ³ (fume) (PEL) 1 mg/m ³ (dusts and mists, as Cu)	NA	NA	Inhalation of dusts and fumes of metallic copper may cause upper respiratory tract irritation, congestion of nasal mucous membranes, ulceration and perforation of the nasal septum and pharyngeal congestion. May cause irritation to the skin and eyes.	Prolonged or repeated exposure can discolor skin and hair and irritate the skin, may cause mild dermatitis, runny nose and irritation of the mucous membranes. Repeated ingestion may cause damage to the liver and kidneys.	NA	NA	OSHA: No US EPA: No ACGIH: No	VP: 0 mm (approx.) FI P: NA BP: 4703°F Sol: Insoluble Odor: Odorless MLT: 1981°F
Cyanazine (triazine pesticide) (21725-46-2)	NA	NA	NA	NA	Low oral acute toxicity	Structurally related compounds may produce thyroid tumors; decreased weight gain and increased platelet count seen in dogs	NA	NA	OSHA: No US EPA: C ACGIH: No	NA
Dicamba (substituted benzoic acid pesticide) (1918-00-9)	NA	NA	NA	NA	No acute effects found in literature.	Mode of action unknown.	NA	NA	OSHA: No US EPA: No ACGIH: No	NA
Dimethoate (organophosphate pesticide) (60-51-5)	NA	Biological Exposure Index available (organophosphorus cholinesterase inhibitors).	NA	NA	Ingestion may lead to nausea, sweating, headache, dizziness, fatigue; oral human lethal dose probably between 50-500 mg/kg.	Decreased cholinesterase activity seen in the brain and blood upon chronic ingestion by rats.	NA	NA	OSHA: No US EPA: No ACGIH: No	NA
Dinitrotoluene (25321-14-6)	Ca 50 mg/m ³	0.2 mg/m ³ (Skin) 1.5 mg/m ³ (PEL)	NA	NA	Irritation to eyes, skin, respiratory tract.	Central nervous system; reproductive system	NA	NA	OSHA: Yes ACGIH: Yes	VP: 1 mm Hg BP: 572°F FI P: 404°F Combustible solid, but difficult to ignite.
Fuel Oil	NA	NA	NA	NA	Inhalation or ingestion exposure may cause headache, nausea, confusion, drowsiness, convulsions, and coma. No. 2 Fuel Oil: Mild eye and moderate skin irritation, practically nontoxic.	May produce kidney damage.	0.6	7.5	Some fuel oils may be carcinogenic	VP: 2-26 mm Hg at 21°C BP: 304-1090°F FI P: 100-336°F Sol: ~5 mg/L

¹ Symptoms that may occur upon short-term high level exposure.

² Symptoms that may occur upon long-term low level exposure.

³ Substance identified by other sources as a suspected or confirmed human carcinogen.

Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects ¹	Chronic Effects ²	Flamm. Range		Carcinogenicity Class ³	Other
							LEL%	UEL%		
Kerosene (Fuel Oil No. 1) (8008-20-6)	NA	100 mg/m ³ (NIOSH)	NA	NA	Inhalation exposure to the vapor is not expected since kerosene has a low vapor pressure. Potential respiratory irritant and CNS depressant (headache, nausea, dizziness, lightheadedness, and vomiting if heated or misted. Skin irritant and possible eye irritant. Aspiration hazard. Kerosene can enter lungs during swallowing or vomiting and cause lung inflammation, lung damage, and, in some cases, death.	Long-term dermal exposure to kerosene may produce dermatitis. Limited data regarding other chronic effects.	0.7	5	OSHA: No US EPA: No ACGIH: No	BP: 347-617°F Sol: Insoluble Fl.P: 100-162°F VP: 5mm (100°F) OT: 0.55 Predominantly C ₉ - C ₁₆ Odor: Characteristic, mild petroleum
Lead (inorganic) (7439-92-1) (29 CFR 1910.1025)	100 mg/m ³	0.05 mg/m ³ (8 hrs.)	NA	NA	Early signs of acute inhalation exposure are fatigue, metallic taste in mouth, and sleep disturbance.	Inhalation and ingestion may produce abdominal pain, weakness, muscle cramps. Effects of chronic exposure to low lead levels are subtle (blood lead of 40-60 µg/L); chronic intoxication is thought to produce anemia and have an adverse effect on nervous system development.	NA	NA	OSHA: No US EPA: B2 ACGIH: No ⁴	Properties vary depending on compound. Pregnant women and children are especially sensitive to low level effects.

¹ Symptoms that may occur upon short-term high level exposure.

² Symptoms that may occur upon long-term low level exposure.

³ Substance identified by other sources as a suspected or confirmed human carcinogen.

Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects ¹	Chronic Effects ²	Flamm. Range		Carcinogenicity Class ³	Other
							LEL%	UEL%		
Mercury (all forms except alkyl) (skin) (7439-97-6)	10 mg/m ³ as Hg	0.025 mg/m ³ inorganic forms including metallic mercury 0.10 mg/m ³ , as Hg-aryl NA (inorganic and aryl forms), as Hg .01 mg/m ³ ((organo)alkyl compounds), as Hg .05 mg/m ³ (vapor), as Hg (MN OSHA)	NA	NA	Inhalation of high concentrations of mercury vapor can cause bronchitis and chest pains; ingestion may result in abdominal pain, diarrhea, shock, and liver and kidney damage.	Chronic inhalation or ingestion exposure to both inorganic and organic mercury compounds may result in nervous system disorders; psychic and emotional disturbances, kidney damage and digestive disturbances. Exposure to organic mercury may cause visual disturbances and tunnel vision.	NA	NA	OSHA: No US EPA: D ACGIH: No	VP: 0.0012 mm Hg BP: 674°F Sol: Insoluble FI P: NA Odor: Odorless
Naphthalene (skin) (91-20-3)	250	10	15	8.12	Oral exposure may produce abdominal pain, nausea, vomiting. Skin/eye contact can lead to systemic effects, conjunctivitis (pink eye), dermatitis.	Inhalation of vapors and ingestion of dusts may lead to cataracts and retinal degeneration. Dermatitis may result from skin contact.	0.9	5.9	OSHA: No US EPA: No ACGIH: No	OT: 0.08 ppm VP: 0.08 mm Hg FI P: 174°F BP: 424°F Sol: 0.003% Odor: Mothballs or coal tar odor

¹ Symptoms that may occur upon short-term high level exposure.

² Symptoms that may occur upon long-term low level exposure.

³ Substance identified by other sources as a suspected or confirmed human carcinogen.

Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects ¹	Chronic Effects ²	Flamm. Range		Carcinogenicity Class ³	Other
							LEL%	UEL%		
Nickel (7440-02-0)	Ca 10 mg/m ³ as Ni	1.5 mg/m ³ Elemental/ Metal 0.1 mg/m ³ soluble compounds as Ni 0.2 mg/m ³ insoluble compounds as Ni 1 mg/m ³ metal and insoluble compounds, as Ni (MN OSHA) (inhalable fraction)	NA	NA	Inhalation exposure to nickel-containing dust may result in chemical pneumonitis and nasal irritation.	Metallic nickel and certain nickel compounds upon repeated skin contact cause "nickel-itch". Sensitization dermatitis; damage to the nasal mucosa and loss of smell have been reported among workers exposed to nickel aerosols. Nickel refining has been associated with an increased risk of nasal and lung cancer by the inhalation route of exposure.	NA	NA	OSHA: No US EPA: A (nickel refinery dust) ACGIH: No ⁴ A1 for insoluble compounds	Properties vary depending on specific compound Odor: Odorless

¹ Symptoms that may occur upon short-term high level exposure.

² Symptoms that may occur upon long-term low level exposure.

³ Substance identified by other sources as a suspected or confirmed human carcinogen.

Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects ¹	Chronic Effects ²	Flamm. Range		Carcinogenicity Class ³	Other
							LEL%	UEL%		
Nitrocellulose (cellulose nitrate) (9004-70-0)	NA	NA	NA	NA	<p>Routes of entry: Inhalation, Ingestion.</p> <p>Skin and Eyes: Severely irritates skin/eyes and may result in severe pain.</p> <p>Ingestion: Harmful if swallowed. Swallowing may result in severe stomach pain.</p>	NA	NA	NA	<p>OSHA: No</p> <p>US EPA: NA</p> <p>ACGIH: NA</p> <p>Highly flammable in presence of open flames, sparks, heat. Unusually severe fire hazard. When dry, ignites readily and burns explosively.</p> <p>MECHANICAL SHOCK HAZARD: HANDLE DECOMPOSED MATERIAL AS AN EXPLOSIVE THAT MAY DETONATE WITH MILD SHOCK USING EXPLOSIVE DISPOSAL PROCEDURES.</p> <p>Reactive with oxidizing agents, may undergo hazardous decomposition, condensation or polymerization, it may react violently with water to emit toxic gases or it may become self-reactive under conditions of shock or increase in temperature or pressure. Decomposes when exposed to light.</p>	

¹ Symptoms that may occur upon short-term high level exposure.

² Symptoms that may occur upon long-term low level exposure.

³ Substance identified by other sources as a suspected or confirmed human carcinogen.

Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects ¹	Chronic Effects ²	Flamm. Range		Carcinogenicity Class ³	Other
							LEL%	UEL%		
Carcinogenic Polynuclear Aromatic Hydrocarbons (cPAHs)	Ca	NA	NA	NA	Acute toxicity appears low in lab animals, although occupational exposure has caused skin reactions and eye irritation. Acute and chronic effects of cPAHs and nPAHs are similar.	Dermatitis may result from skin exposure; animal studies show oral administration may lead to blood disorders and liver, kidney, and ocular effects. cPAHs may produce immuno-suppressive effects in humans.	NA	NA	OSHA: Yes US EPA: B2 (benzo(a) pyrene) ACGIH: A1 (coal tar pitch volatiles) A2 (benzo(a) pyrene)	Properties vary; Low VP
Noncarcinogenic (nPAHs)	NA	NA	NA	NA	Acute toxicity appears low in lab animals, although occupational exposure has caused skin reactions and eye irritation. Acute and chronic effects of cPAHs and nPAHs are similar.	Dermatitis may result from skin exposure; animal studies show oral administration may lead to blood disorders, and liver, kidney, and ocular effects.	NA	NA	OSHA: No US EPA: No ACGIH: No	Properties vary; Low VP
Pentachlorophenol (skin) (87-86-5)	2.5 mg/m ³	0.5 mg/m ³	NA	NA	Short dermal exposure causes skin irritation and first degree burns; secondary burns may occur on long exposure; absorbed through the skin.	Dermal exposure may lead to contact dermatitis. Lung, liver and kidney damage may result from long-term inhalation, ingestion and skin absorption exposure.	NA	NA	OSHA: No US EPA: B2 ACGIH: No	OT: NA VP: 0.0001 mm Hg @ 77°F BP: 588°F Decomposes FI P: NA Sol: Insoluble Odor: Benzene-like odor
Phenol (skin) (108-95-2)	250	5	C15.6	8.50	Corrosive to tissue; may cause severe eye damage and blindness; systemic effects from any route of exposure may include weakness, sweating, headache, ringing in ears, excitement or shock.	Skin discoloration; possible liver and kidney damage by the inhalation and skin absorption exposure.	1.8	8.6	OSHA: No US EPA: No ACGIH: No	OT: 0.05 ppm VP: 0.4 mm Hg BP: 359°F FI P: 175°F Sol: 9% Odor: Sweet, acrid odor
Prometon (triazine pesticide) (161-01-8)	NA	NA	NA	NA	Low oral acute toxicity.	Reduced body weight seen in animals upon ingestion.	NA	NA	OSHA: No US EPA: No ACGIH: No	NA
Selenium	1 mg/m ³ , as Se	0.2 mg/m ³ , as Se	NA	NA	Inhalation exposure may cause headache, fever, chill, sore throat, and bronchitis. Garlic odor of breath and sweat a sign of acute poisoning.	Loss of hair, teeth, nails, depression, nervousness, giddiness, gastrointestinal disturbance, dermatitis, and blurred vision.	NA	NA	OSHA: No US EPA: No ACGIH: No	Properties may vary depending on specific compound

¹ Symptoms that may occur upon short-term high level exposure.

² Symptoms that may occur upon long-term low level exposure.

³ Substance identified by other sources as a suspected or confirmed human carcinogen.

Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects ¹	Chronic Effects ²	Flamm. Range		Carcinogenicity Class ³	Other
							LEL%	UEL%		
Silvex (chlorophenoxy compound pesticide) (93-72-1)	NA	NA	NA	NA	Most chlorophenoxy compounds are relatively nontoxic but may contain more toxic contaminants (e.g., dioxin)	Ingestion causes anorexia and dehydration in animals; contact causes irritation to skin and mucous membranes.	NA	NA	OSHA: No US EPA: No ACGIH: No	NA
Simazine (triazine pesticide) (122-34-9)	NA	NA	NA	NA	Low acute oral toxicity in experimental rodents; delayed neurological symptoms occurred (10-20 days) in sheep (e.g. paralysis) upon single oral dose of 500 mg/kg.	Decreased weight gain and blood effects seen in laboratory animals upon chronic ingestion; mammary tumors seen in rats.	NA	NA	OSHA: No US EPA: C ACGIH: No	NA
Terbufos (organophosphate pesticide) (13071-79-9)	NA	Biological Exposure Index available (organophosphorus cholinesterase inhibitors).	NA	NA	Ingestion may lead to central nervous system effects (nausea, sweating, headache, dizziness, and fatigue).	Decreased cholinesterase activity seen in the brain and blood upon chronic ingestion by rats.	NA	NA	OSHA: No US EPA: No ACGIH: No	NA
Toluene (skin) (108-88-3)	500	50 100 (MN OSHA)	150 (MN OSHA)	8.82	Respiratory, eye, skin irritant; inhalation exposure may cause CNS depression (nausea, dizziness, headache, fatigue); vomiting; abdominal pain.	Repeated or prolonged skin contact may cause dermatitis; inhalation exposure may cause bronchitis.	1.1	7.1	OSHA: No US EPA: No ACGIH: No	OT: 0.17 ppm VP: 21 mm Hg BP: 232°F FI P: 40°F Sol: 0.07% Odor: Sweet, pungent, benzene-like odor
1,2,4-Trimethylbenzene (95-63-6)	NA	25 (mixed isomers)	NA	8.27	Irritating to eyes, respiratory system and skin; inhalation of high concentrations may cause CNS depression (drowsiness, fatigue, dizziness, nausea)	Prolonged or repeated skin contact may cause dermatitis. Repeated inhalation may cause chronic bronchitis. May cause anemia and other blood cell abnormalities. Prolonged exposure may produce a narcotic effect. Prolonged or repeated exposure may cause nausea, dizziness, and headache.	0.9	6.4	OSHA: No US EPA: No ACGIH: No	OT: 2.4 ppm VP: 1 mm BP: 337°F FI P: 112°F Sol: Insoluble Sp.Gr.: 0.88 Odor: Distinctive, aromatic odor

¹ Symptoms that may occur upon short-term high level exposure.

² Symptoms that may occur upon long-term low level exposure.

³ Substance identified by other sources as a suspected or confirmed human carcinogen.

Chemical	IDLH Level (PPM)	TLV (PPM)	STEL (PPM)	I.P. (eV)	Acute Effects ¹	Chronic Effects ²	Flamm. Range		Carcinogenicity Class ³	Other
							LEL%	UEL%		
1,3,5-trimethylbenzene (108-67-8)	NA	25 (mixed isomers)	NA	8.39	Irritating to eyes, respiratory system and skin; inhalation of high concentrations may cause CNS depression (drowsiness, fatigue, dizziness, nausea)	Prolonged or repeated skin contact may cause dermatitis. Repeated inhalation may cause chronic bronchitis. May cause anemia and other blood cell abnormalities. Prolonged exposure may produce a narcotic effect. Prolonged or repeated exposure may cause nausea, dizziness, and headache.	NA	NA	OSHA: No US EPA: No ACGIH: No	OT: 2.4 ppm VP: 2 mm BP: 329°F FI P: 122°F Sol: Insoluble Sp.Gr.: 0.86 Odor: Distinctive, aromatic odor
Xylene (1330-20-7)	900	100	150	8.56	Respiratory, eye, skin irritant; CNS depression (nausea, dizziness, headache, fatigue) at high concentrations by the inhalation route of exposure; vomiting; abdominal pain may also occur.	Skin contact may cause dermatitis; inhalation exposure may cause bronchitis.	1	7	OSHA: No US EPA: No ACGIH: No	OT: 0.05 ppm VP: 9 mm Hg FI P: 63°F (ortho) Sol: Insoluble Odor: Aromatic odor
Zinc (7440-66-6)	NA	NA	NA	NA	Accidental ingestion of high concentrations of zinc causes fever, vomiting, stomach cramps and diarrhea.	Metal fume fever, an influenza-like illness can result from inhalation of freshly generated zinc oxide fumes. Consistent handling of zinc salts can lead to dermal toxicity. Inhalation of zinc chloride mists or fumes can cause irritation of the GI and respiratory tract, as well as a gray cyanosis, dermatosis and ulceration of the nasal passages.	NA	NA	OSHA: No US EPA: No ACGIH: No	Properties vary depending on specific compound; essential element for humans-daily intake is 12 mg. Odor: Odorless

¹ Symptoms that may occur upon short-term high level exposure.

² Symptoms that may occur upon long-term low level exposure.

³ Substance identified by other sources as a suspected or confirmed human carcinogen.

**References for
Table 1 – Contaminants of Concern**

American Conference of Governmental Industrial Hygienists (ACGIH), Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, 1999.

National Academy of Sciences, 1977. Drinking Water and Health. Vol. 1, NAS, Washington, D.C.

Clayton and Clayton, ed. 1981-1982 Patty's Industrial Hygiene and Toxicology. 3rd ed., John Wiley & Sons, New York.

Cassarret and Doull, 1975. Toxicology. Ed. C.D. Klaasen, M.O. Amdur, and J. Doull. 2nd ed. Macmillan Publishing Company, New York.

EPA, 1990. Integrated Risk Information System (IRIS) on-line database.

Gosselin, R.E., et al., 1984. Clinical Toxicology of Commercial Products. 5th ed. Williams & Wilkins, Baltimore, MD.

Harry G. Armstrong Medical Research Laboratory, 1985. The Installation Restoration Program Toxicology Guide, Vol. 1. Arthur D. Little, Inc., Cambridge, MA.

NIOSH, 1977. Occupational Diseases - A Guide to Their Recognition. U.S. Department of Health, Education & Welfare. National Institute for Occupational Safety & Health (NIOSH). DHEW (NIOSH) Publication No. 77-181.

National Institute for Occupational Safety and Health (NIOSH) Pocket Guide to Chemical Hazards. June 1997.

Proctor, N.H. and J.P. Hughes, 1978. Chemical Hazards of the Workplace. J.B. Lippincott Company, Philadelphia, Toronto.

Sax, N.I. and R.J. Lewis, 1988. Dangerous Properties of Industrial Materials. 7th ed. Van Nostrand Reinhold, NY.

Sax, N.I. and R.J. Lewis, 1987. Hawley's Condensed Chemical Dictionary. 11th ed. Van Nostrand Reinhold, NY.

Weiss, 1986. Hazardous Chemicals Data Book. 2nd ed. Noyes Data Corporation, Park Ridge, N.J.

**Table 2
Project Task Hazard Analysis**

Site Activities	Hazards	Prevention
Construction Operations: <ul style="list-style-type: none"> • Trenching/excavation observation • Drilling observation • Equipment decontamination • Demolition observation • Earthwork construction observation • Collection of soil samples 	Chemical hazards due to inhalation and dermal contact	Proper Use of PPE Engineering Controls to control airborne dust levels
	Exposure to temperature extremes	Monitor for heat or cold stress
	Physical hazards associated with construction	Maintain a safe distance from equipment Avoid overhead power lines (20 feet) Check and mark underground utilities before excavation Daily Excavation Safety Checklist (Form 5) and Soil Classification Checklist (Form 6)
	Physical hazards including steep grades and unstable surfaces, and hidden manholes	Use "buddy system" during Project Site activities
	Biological hazards (insects, poison ivy, rattlesnakes) ¹	Proper PPE, exercising ordinary caution, use of "buddy system" during Project Site activities. (See biological hazard* detail at end of this table.)
	High noise level	Use hearing protection
	Slip, trip, fall	Clean mud, snow or grease from shoes and equipment
	Suspect asbestos-containing materials (ACM)	Only certified asbestos personnel are permitted to collect suspect ACM samples
Sampling Operations <ul style="list-style-type: none"> • Groundwater sampling • Sediment sampling • Soil sampling 	Chemical hazards due to inhalation and dermal contact	Proper Use of PPE
	Exposure to temperature extremes	Monitor for heat or cold stress
	Physical hazards associated with operation of sampling equipment	Maintain a safe distance from equipment Avoid overhead power lines (20 feet) Check and mark underground utilities
	Physical hazards including steep grades and unstable surfaces while transporting hand-held equipment	Use "buddy system" during Project Site activities
	Biological hazards (insects, poison ivy, rattlesnakes)	Proper PPE, exercising ordinary caution, use of "buddy system" during Project Site activities. (See biological hazard* detail at end of this table.)

**Table 2
Project Task Hazard Analysis**

Site Activities	Hazards	Prevention
	High noise level	Use hearing protection
	Slip, trip, fall	Clean mud, snow or grease from shoes and equipment
Transportation Operations <ul style="list-style-type: none"> • Transport soil/water samples to laboratory Reconnaissance <ul style="list-style-type: none"> • Surface geophysical surveys • Mapping and surveying 	Chemical hazards due to inhalation and dermal contact	Proper Use of PPE
	Slip, trip, fall	Clean mud, snow or grease from shoes and equipment
	Physical hazards including steep grades and unstable surfaces	Use "buddy system" during Project Site activities
	Biological hazards (insects, poison ivy, rattlesnakes)	Proper PPE, exercising ordinary caution, use of "buddy system" during Project Site activities. (See biological hazard* detail at end of this table.)

¹Biological Hazards

Potential biological hazards include plants, snakes, and various stinging insects. Some of the most common biological hazards can be prevented or the effects reduced by over the counter medications. Workers who know they are sensitized to any biological hazard should not perform any task that would increase their risk for anaphylactic shock.

Poisonous Plants

Common poisonous plants onsite may include plants from the poison ivy group, including poison oak and sumac. The most distinctive features of poison ivy and oak are that their leaves are composed of three leaflets. Both of these plants have greenish-white flowers and berries that grow in clusters. These plants can produce a severe rash characterized by redness, blisters, swelling, and intense burning and itching. The victim may also develop a headache, high fever and feel very ill. The rash will usually begin to appear within a few hours but may be delayed for 24 to 48 hours.

If contact occurs with a poisonous plant, remove all contaminated clothing and wash the exposed areas thoroughly with soap and water, followed by rubbing alcohol. Apply calamine lotion if rash is mild. Seek medical advice if a severe reaction occurs or if there is a known history of previous sensitivity. If a poisonous plant is found in the work area, the PHSTL should be notified so that it can be removed. All personnel entering an area with poison ivy should wear a tyvek suit, at a minimum, to avoid skin contact.

Snakes

They are most commonly found in wood piles, in abandoned buildings, and under rocks. Don't reach into these places without first inspecting them carefully. Always watch out for snakes and keep a respectful distance if you see one.

If a snakebite occurs, remain calm. Since swelling may occur, any jewelry such as rings, watches or bracelets around the effected area should be removed. The wound should be immobilized and held below the level of the heart. The victim (and snake if possible) must be immediately taken to the nearest hospital. Identification of the snake is helpful, but no time should be wasted or safety compromised since the symptoms will give medical personnel an accurate diagnosis.

Insect Stings

Stings from insects are often painful, cause swelling and can be fatal if a severe allergic reaction such as anaphylactic shock occurs. If a sting occurs, the stinger should be scraped out of the skin, opposite of the sting direction. Never use tweezers to remove the stinger as it will force additional venom into the victim. The area should be washed with soap and water followed by an ice pack.

If the victim has a history of allergic reaction, he should be taken to the nearest medical facility. If the victim has medication to reverse the effects of the sting, it should be taken quickly.

If the victim experiences a severe reaction, a constricting band should be placed between the sting and the heart. The bitten area should be kept below the heart if possible. A physician should be contacted immediately for further instructions.

**Table 3
Air Monitoring Action Levels**

Monitoring Instrument ¹	Hazard	Action Levels	Action
Organic Vapor Analyzer/Organic Vapor Monitor/HNu	Organic vapors/gases	<2.5 ppm above bckgrd ----- ≥2.5 ppm above bckgrd for 10 min. ----- >25 ppm	Level D or modified level D ----- Level C and use detector tubes. If no benzene vapors, may increase action level to 10 ppm in level D. ----- Leave area and reassess
MSA 260/360 or Microgard	Explosive atmosphere	≤10% LEL ----- >10% LEL	Level D or modified level D. ----- Leave area and reassess
Hydrogen Sulfide Meter	Hydrogen Sulfide	<5 ppm ----- ≥5 ppm	Level D or modified level D. ----- Leave area and reassess
Detector Tubes for Benzene	Benzene vapors	<0.5 ppm ----- 0.5 - 2.5 ppm ----- >2.5 ppm	Level D or modified level D. ----- Level C ----- Leave area and reassess

**Table 4
Guidelines for Air Monitoring Frequency**

Instrument	Periodic Monitoring Frequency	Notes
Organic Vapor Indicator	<ul style="list-style-type: none"> unusual or unidentified new odors are encountered discolored soils are encountered 	For more information, see APPENDIX SECTION S: AIR MONITORING PROGRAM
Combustible Gas Indicator	<ul style="list-style-type: none"> the organic vapor monitor registers sustained readings above action level intrusive activity when combustible gases may potentially have accumulated the potential exists for a combustible atmosphere to develop 	For more information, see APPENDIX SECTION S: AIR MONITORING PROGRAM
Hydrogen Sulfide (H ₂ S) Meter	<ul style="list-style-type: none"> intrusive activity where H₂S gases may have potentially accumulated 	For more information, see APPENDIX SECTION S: AIR MONITORING PROGRAM
Draeger Monitor for Benzene	<ul style="list-style-type: none"> total organic vapor read-out exceeds the action limit for a 10-minute duration, and organic vapors have not been characterized upgrade to Level C is made and organic vapors have not been characterized 	For more information, see APPENDIX SECTION S: AIR MONITORING PROGRAM

**Table 5
Emergency Contacts**

Agency/Firm	Emergency Telephone Number	Business Telephone Number
<u>Local Emergency Services</u>		
Fire Department:	911	
Hospital:	911	
Police Department:	911	
Ambulance:	911	
National Poison Center:		(800) 222-1222
National Response Center:		(800) 424-8802
University Asbestos Contact:		(612) 625-7547 (Work) (612) 875-8857 (Cell)
Barr Principal in Charge: Al Gebhard		(952) 832-2725 (Work) (952) 884-9042 (Home)
Barr Project Field Managers: Jim Eidem		(952) 832-2763 (Work) (612) 803-5156 (Cell)
Client: Steven Lott, UMore Park		(651) 423-2562

Figure 3 - Hospital Map provides direct route to nearest hospital.

**Table 6
General Emergency Procedures to Potential Exposures**

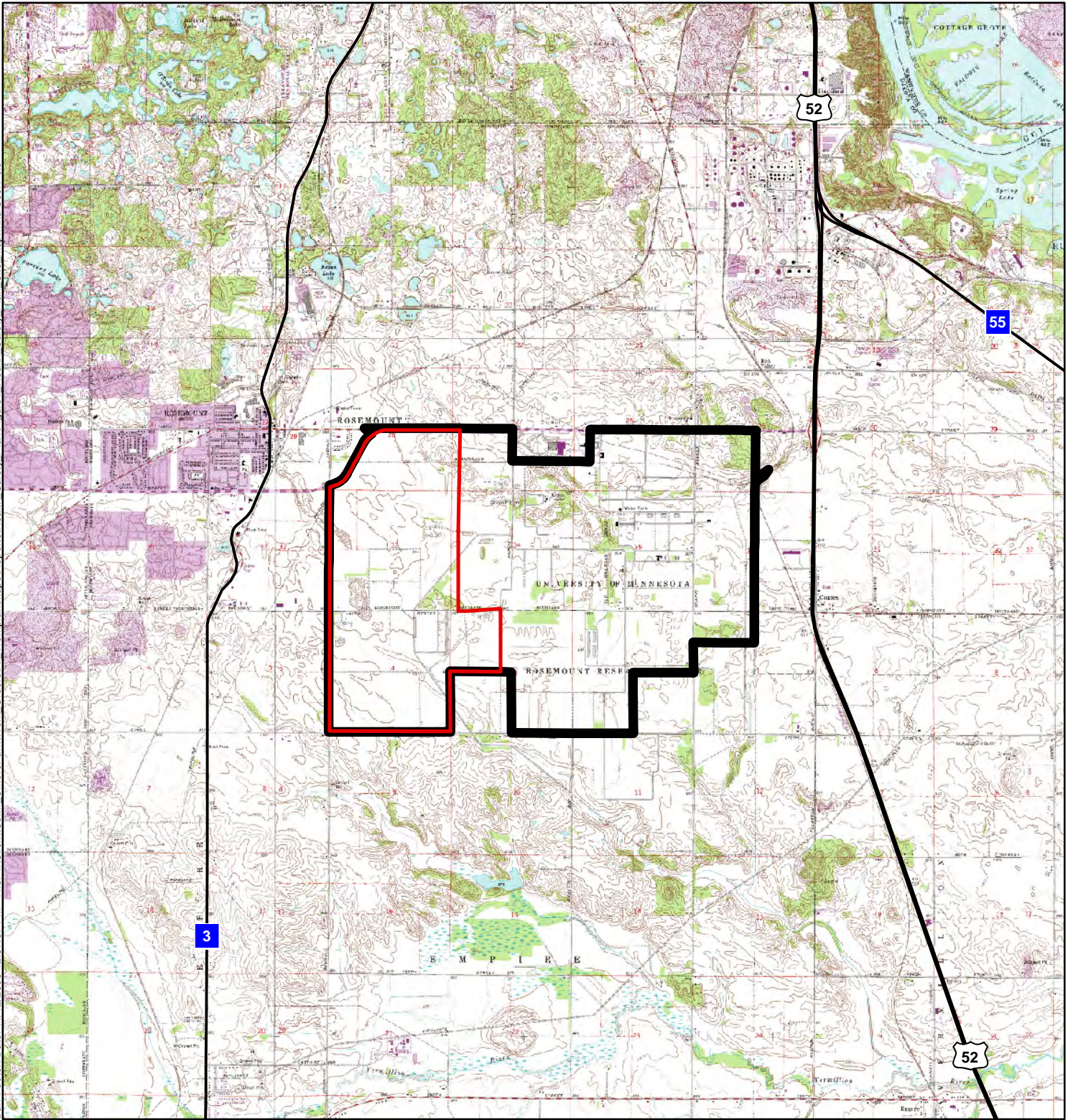
Hazardous Substance Exposure Route	Emergency Procedure
Eye Contact:	Flush eyes with eyewash and saline solution and follow with an eye flush for at least 15 minutes with clean water, if available while awaiting emergency medical services. Seek emergency medical attention.
Skin Contact:	Flush skin with clean water, for at least 15 minutes, if possible. Remove contaminated clothing while flushing skin. Seek emergency medical attention as needed.
Inhalation:	Remove person to fresh air, away from active work area. Seek emergency medical attention. If breathing has stopped, a qualified individual should provide artificial respiration, while awaiting emergency medical services.
Ingestion:	Do not induce vomiting. Immediately seek emergency medical attention.

**Table 7
First Aid Reference Guide**

WHOA!	Wounds & Bleeding	Amputated Parts
<p>Safety First! What happened? What do you observe?</p> <ul style="list-style-type: none"> <input type="checkbox"/> # of victims <input type="checkbox"/> # of witnesses <input type="checkbox"/> Mechanism of Injury <input type="checkbox"/> Nature of Illness <p>Are there any hazards? ABCs/AVTPU</p>	<p>Remember PIE, children love it!</p> <ul style="list-style-type: none"> <input type="checkbox"/> Direct pressure to control bleeding <input type="checkbox"/> Ice or cold application. In a pinch? Look in the fridge (ice, frozen veggies, pop, frozen juice, frozen rice, etc.) <input type="checkbox"/> Elevate extremity <input type="checkbox"/> Clean with soap & water, then bandage 	<ul style="list-style-type: none"> <input type="checkbox"/> Remember PIE! <input type="checkbox"/> Treat for shock: Calm & reassure, monitor ABCs, elevate legs, maintain normal body temperature <input type="checkbox"/> Place amputated tissue in clean or sterile dressing that is dampened but not wet. Wrap the tissue in plastic or foil and cool with ice. Avoid freezing the tissue.
Nosebleed	Avulsed Tooth	Serious Burns
<ul style="list-style-type: none"> <input type="checkbox"/> Squeeze one or both nostrils <input type="checkbox"/> Apply cold directly to the nose <input type="checkbox"/> Patient should lean forward with head tilted down 	<ul style="list-style-type: none"> <input type="checkbox"/> Do not place in milk, mouthwash or alcohol. Milk contains sugar which can destroy tooth tissue <input type="checkbox"/> Do place in saline solution, water, or in patient's saliva <input type="checkbox"/> Time is crucial. See the dentist immediately! 	<ul style="list-style-type: none"> <input type="checkbox"/> Stop the burning by using profuse water or <input type="checkbox"/> Stop, drop, and roll <input type="checkbox"/> Ensure ABCs <input type="checkbox"/> Treat for shock <input type="checkbox"/> Place dry dressing on burn <input type="checkbox"/> Call 9-1-1
Minor Burn	Sunburns	Heat Illness
<ul style="list-style-type: none"> <input type="checkbox"/> Cool with water until pain stops <input type="checkbox"/> Cover with dressing to prevent contamination <input type="checkbox"/> DO NOT use ointments, creams, lotions, or butter. This will trap heat and increase tissue damage <input type="checkbox"/> Some over-the-counter remedies such as aloe should not be used until the burn has been cooled and clean 	<p>Prevention is the best cure!</p> <ul style="list-style-type: none"> <input type="checkbox"/> Limit exposure to sun between 11 AM – 2 PM <input type="checkbox"/> Apply sunscreen with a sun protection factor of 15 SPF. This should be done 30 minutes before going outside <p>If sunburn occurs:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Remove patient from direct exposure to sun <input type="checkbox"/> Cool by taking a cool shower or bath <input type="checkbox"/> DO NOT use ointments, creams, lotions, or butter <input type="checkbox"/> Check with your physician before using pain medications or other over-the-counter remedies <input type="checkbox"/> If sunburn is serious, see your physician immediately 	<p>The best treatment is prevention!</p> <ul style="list-style-type: none"> <input type="checkbox"/> Keep hydrated! Drink lots of water <input type="checkbox"/> Avoid sugar treats, pop, & caffeine. These make it difficult for a person to absorb fluid <input type="checkbox"/> Avoid nicotine <p>Symptoms of heat exhaustion are pale, cool, clammy/sweaty skin, nausea, dizziness, weakness, fatigue. This progresses to heat stroke when the level of consciousness changes</p> <ul style="list-style-type: none"> <input type="checkbox"/> Remove to a cool place <input type="checkbox"/> Cool rapidly <input type="checkbox"/> Give fluids if tolerated <input type="checkbox"/> Monitor patient's mental status <input type="checkbox"/> Treat for shock <input type="checkbox"/> Call 9-1-1 if necessary
Insect Bites & Stings		
<p>Don't slap at an insect when it is on you. It is better to blow or brush off</p> <ul style="list-style-type: none"> <input type="checkbox"/> If stinger is left in, it should be scraped off <input type="checkbox"/> Apply ice or cold application <input type="checkbox"/> If itching, pain, hives, & difficulty breathing occur, call 9-1-1 		
Frostbite	Head & Neck Injuries	Seizures
<p>This is preventable. Avoid tobacco use, caffeine, and alcohol. The three stages of frostbite is incipient, superficial, & deep frostbite. Signs & symptoms are tingling and numbness in cold, white or gray skin, & pain. General treatment is:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Remove from cold environment <input type="checkbox"/> Warm in water 104-108 degree F <input type="checkbox"/> Once rewarmed, elevate part <input type="checkbox"/> If you can't go indoors, place hands under armpit (if hands are affected) <input type="checkbox"/> Do not rub, this may cause tissue damage <input type="checkbox"/> Avoid rewarming & refreezing cycle 	<p>S&S-Altered mental status, any significant mechanism of injury, unconsciousness, unequal pupils, clear fluid or blood coming from ears, unusual sleepiness, confusion, dizziness, severe headache, difficulty with speech or vision, vomiting, difficulty walking, pale, sweaty. General treatment is:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Call 9-1-1 <input type="checkbox"/> Stabilize head <input type="checkbox"/> Check for consciousness <input type="checkbox"/> Do not move an unconscious person <input type="checkbox"/> Keep in position found <input type="checkbox"/> Treat for shock 	<p>General treatment for tonic-clonic seizures are:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Protect the head <input type="checkbox"/> Do not place anything in the mouth <input type="checkbox"/> Do not restrain the person <input type="checkbox"/> If possible, time the seizure <p>When seizure stops, place in recovery position</p>
Diabetic Emergencies/Hypoglycemia	Diabetic Emergencies/Hyperglycemia	Fractures, Sprains, & Dislocations
<p>Hypoglycemia is low blood sugar and is the most common of diabetic emergencies. S&S is: altered mental status (giddy, sleepy, aggressive, or cranky). The skin will appear pale, cool & clammy</p> <ul style="list-style-type: none"> <input type="checkbox"/> When in doubt, and as long as the patient remains conscious, give sugar in the form of juices, honey, sugar, candy, or soda pop <input type="checkbox"/> Do not give diet products such as nutrasweet <input type="checkbox"/> Follow up with a sandwich or more substantial meal <input type="checkbox"/> Call 9-1-1 	<p>Hyperglycemia is high blood sugar. Most often this is an undiagnosed diabetic or a diabetic who is not taking proper care of themselves. This is not the emergency that hypoglycemia is. However, if left untreated, this can progress to diabetic coma:</p> <ul style="list-style-type: none"> <input type="checkbox"/> S&S are excessive thirst, excessive urination, fruity breath odor, flushed and dry skin <input type="checkbox"/> If in doubt, give sugar. This will not hurt the patient <input type="checkbox"/> Call 9-1-1 	<p>It is not necessary to know the difference between these three conditions. An x-ray is the only definitive diagnosis. S&S are similar and first aid is the same. Some general S&S are: pain, tenderness, swelling, deformity, and loss of mobility. Some general treatment guidelines are:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Stabilize or immobilize the injury site <input type="checkbox"/> Apply cold application <input type="checkbox"/> Rest <input type="checkbox"/> Elevate extremity, if possible <input type="checkbox"/> Call 9-1-1 if needed or see your physician

17.0 Figures

Figure 1	Site Location Map
Figure 2	Site Map
Figure 3	Hospital Location Map
Figure 4a	Work and Exclusion Zones For Drilling Activities
Figure 4b	Example of a Work Zone for Drilling Investigations
Figure 4c	Work and Exclusion Zones For Trenching Activities
Figure 4d	Work and Exclusion Zones For Excavation Activities
Figure 5	Decontamination Procedures
Figure 6	Excavation Entry Decision Tree





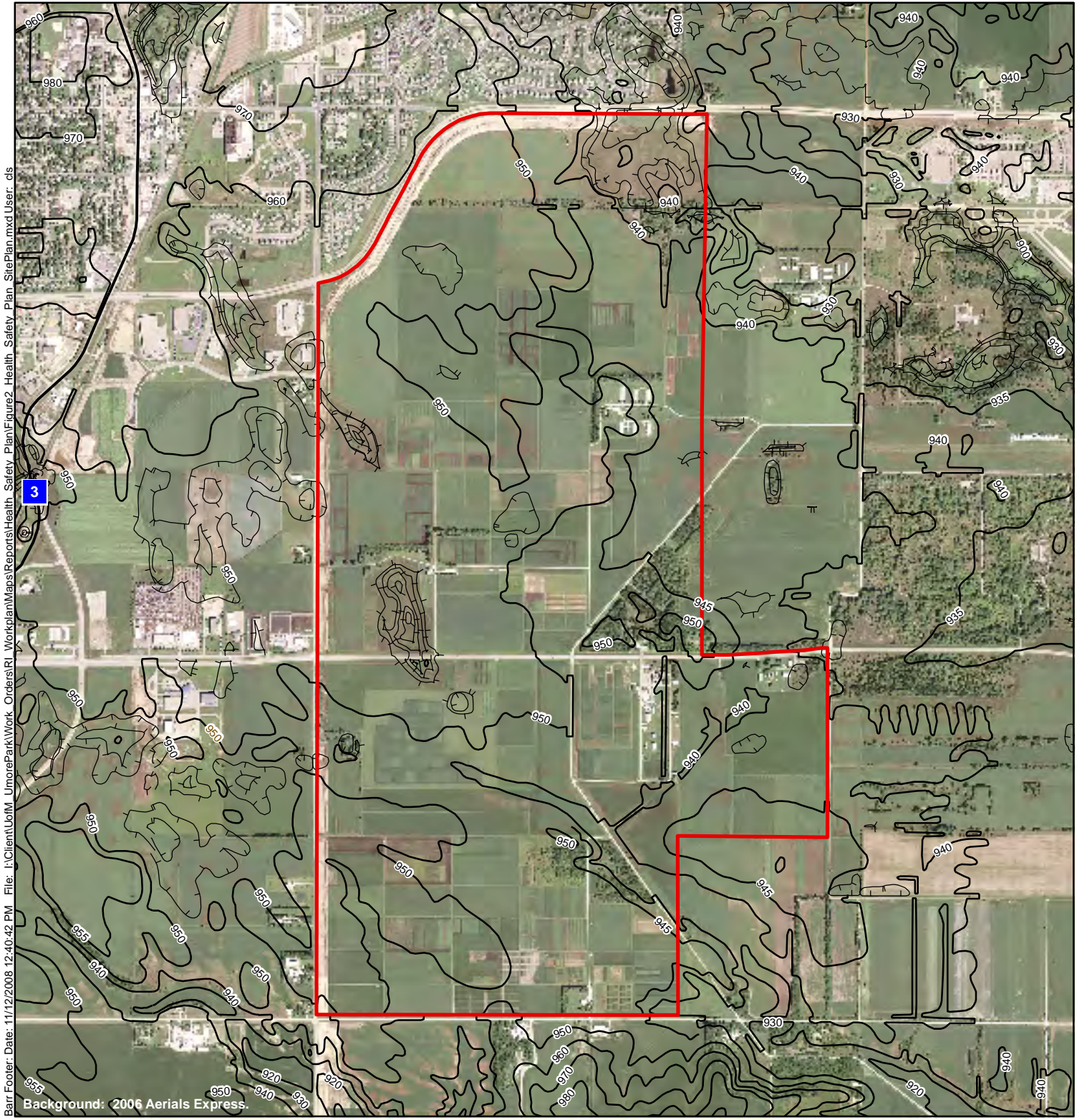
-  UMore Mining Area (UMA)
-  UMore Park Boundary

Figure 1

SITE LOCATION

UMore Mining Area
Project Health and Safety Plan
Dakota County, MN





Barr Footer: Date: 11/12/2008 12:40:42 PM File: I:\Client\UofM\UmorePark\Work Orders\RI\Workplan\Maps\Reports\Health_Safety_Plan\Figure2_Health_Safety_Plan_SitePlan.mxd User: ds

- UMore Mining Area (UMA)
- Ground Surface Contour
- Depressional Ground Surface Contour



Figure 4

SITE PLAN

UMore Mining Area
Project Health and Safety Plan
Dakota County, MN



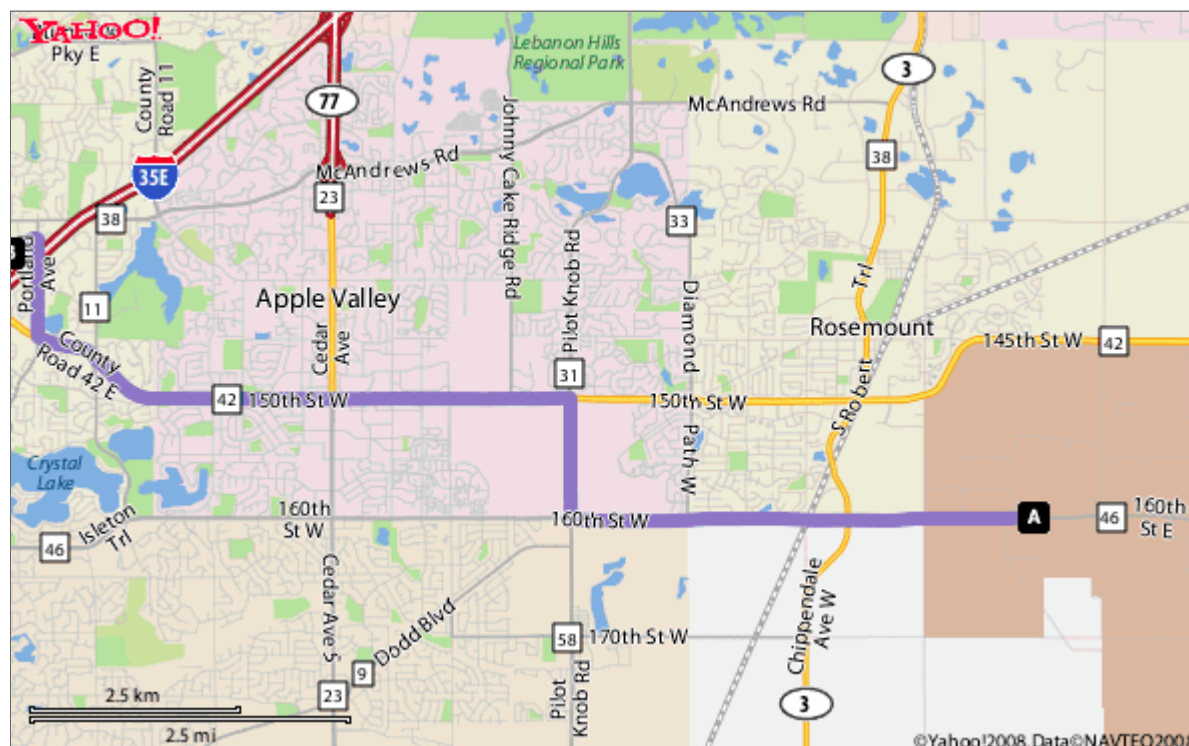
Directions to 201 E Nicollet Blvd, Burnsville, MN 55337-5714



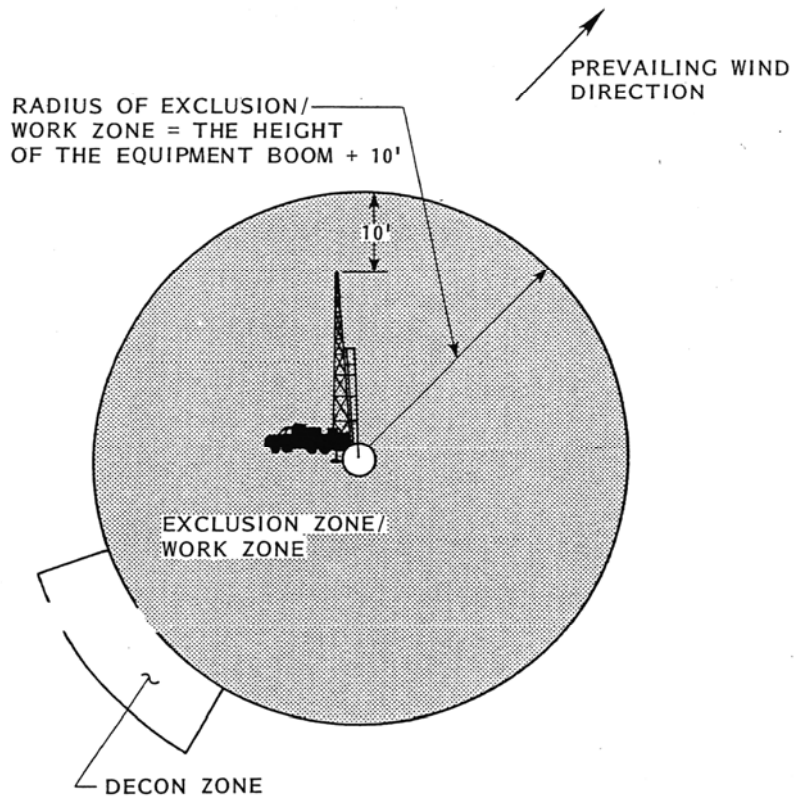
Total Time: 19 mins, Total Distance: 10.89 miles

	Distance
A 1. Start at 1605 160TH ST W, ROSEMOUNT going toward 160TH ST W	go 3.92 mi
2. Turn R on PILOT KNOB RD(CR-31 N)	go 1.02 mi
3. Turn L on 150TH ST W(CR-42 W)	go 1.24 mi
4. Continue on FOLIAGE AVE	go 106 ft
5. Continue on 150TH ST W(CR-42 W)	go 2.26 mi
6. Continue on COUNTY ROAD 42 E(CR-42 W)	go 1.15 mi
7. Turn R on PORTLAND AVE	go 0.83 mi
8. Turn L on E NICOLLET BLVD	go 0.36 mi
9. Make a U-Turn at FAIRVIEW DR onto E NICOLLET BLVD	go 475 ft
B 10. Arrive at 201 E NICOLLET BLVD, BURNSVILLE, on the R	

Time: 19 mins, Distance: 10.89 miles



When using any driving directions or map, it's a good idea to do a reality check and make sure the road still exists, watch out for construction, and follow all traffic safety precautions. This is only to be used as an aid in planning.



Safety Work Zones to be Established at Each Boring/Monitoring Well Installation.

Enter and Exit Exclusion Zone Only Through Decon Zone.

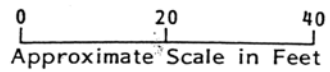


Figure 4a
WORK AND EXCLUSION ZONES
FOR DRILLING ACTIVITIES

Work Zones for Drilling Investigations

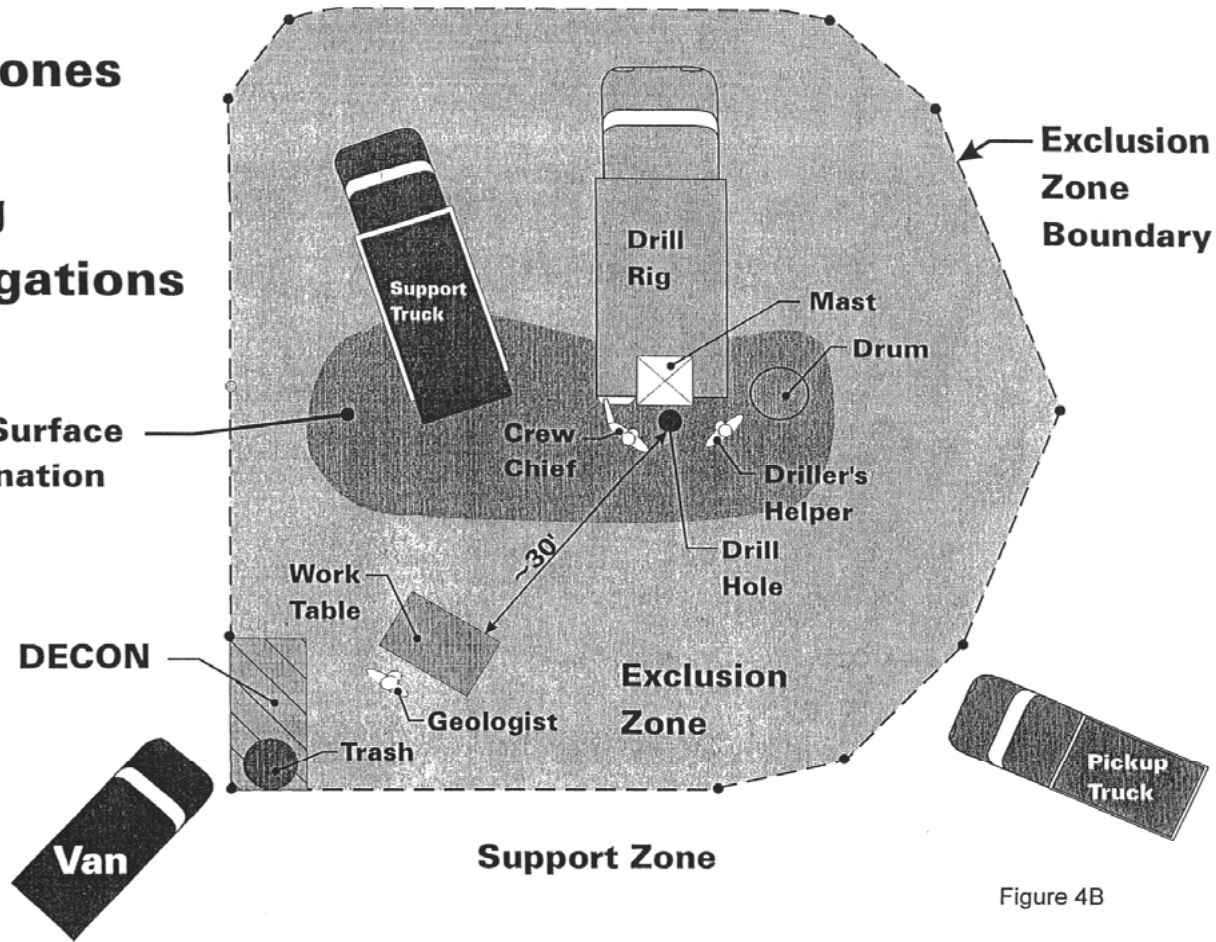
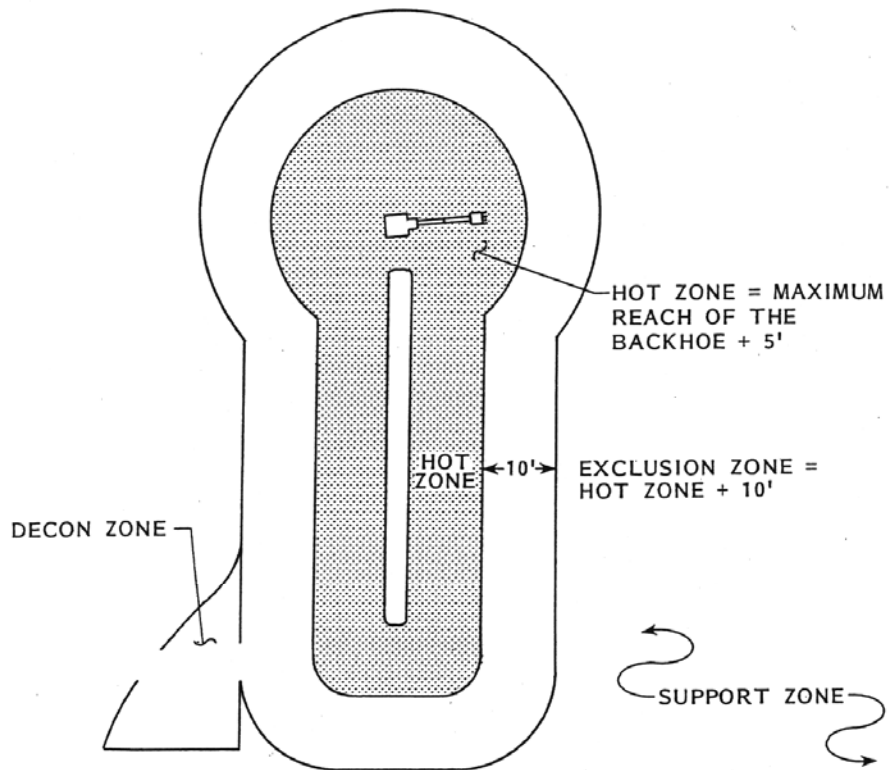


Figure 4B

EXAMPLE OF A WORK ZONE FOR DRILLING INVESTIGATIONS



Safety Work Zones to be Established at Each Trench Location.
 Exit Exclusion Zone Only Through Decon Zone.
 Contamination Reduction Zone Should be Located Upwind of Operations if Possible.

Figure 4c
 WORK AND EXCLUSION ZONES
 FOR TRENCHING ACTIVITIES

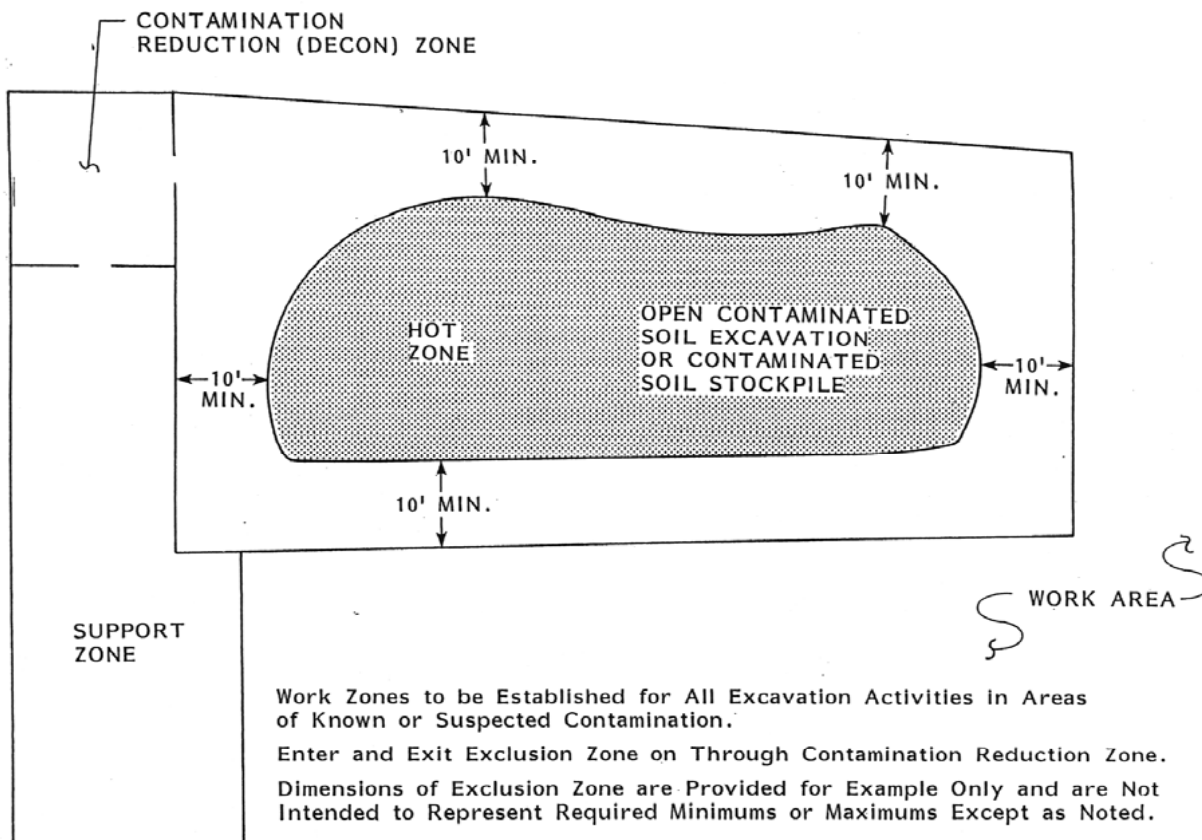
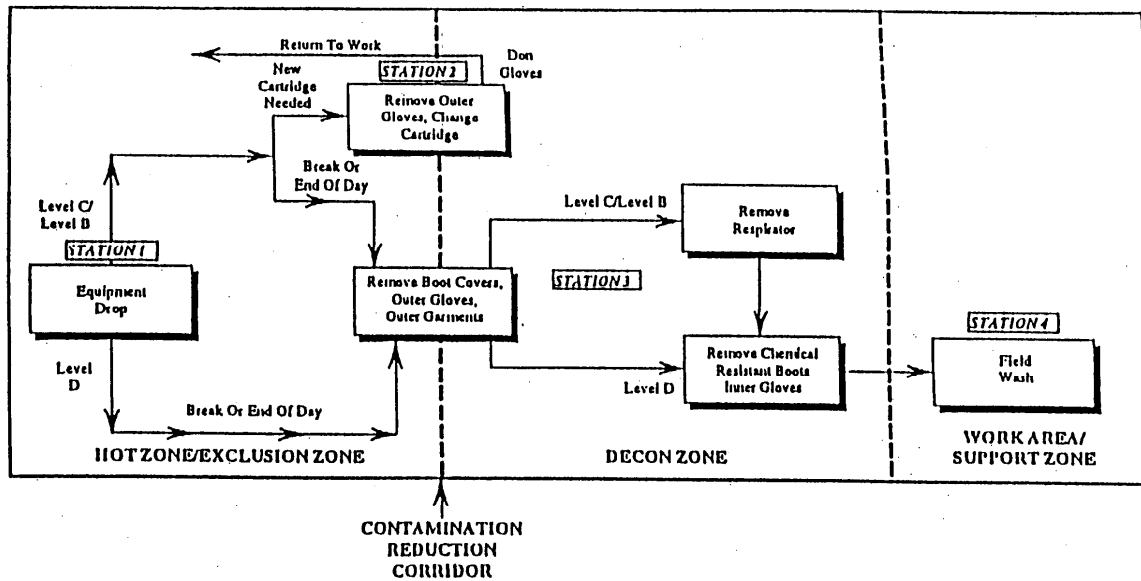


Figure 4d
 WORK ZONES
 FOR EXCAVATION ACTIVITIES



1. Decontaminate Equipment
2. Remove boot covers
3. Remove outer gloves and tyvek
4. Remove respirator
5. Place all disposed PPE in garbage bags or drum
6. Remove inner gloves and place in garbage bags or drum
7. Wash hands and face with water, alcohol wipes, other cleaning wipes
8. Shower as soon as possible off-site

Figure 5
DECONTAMINATION PROCEDURES

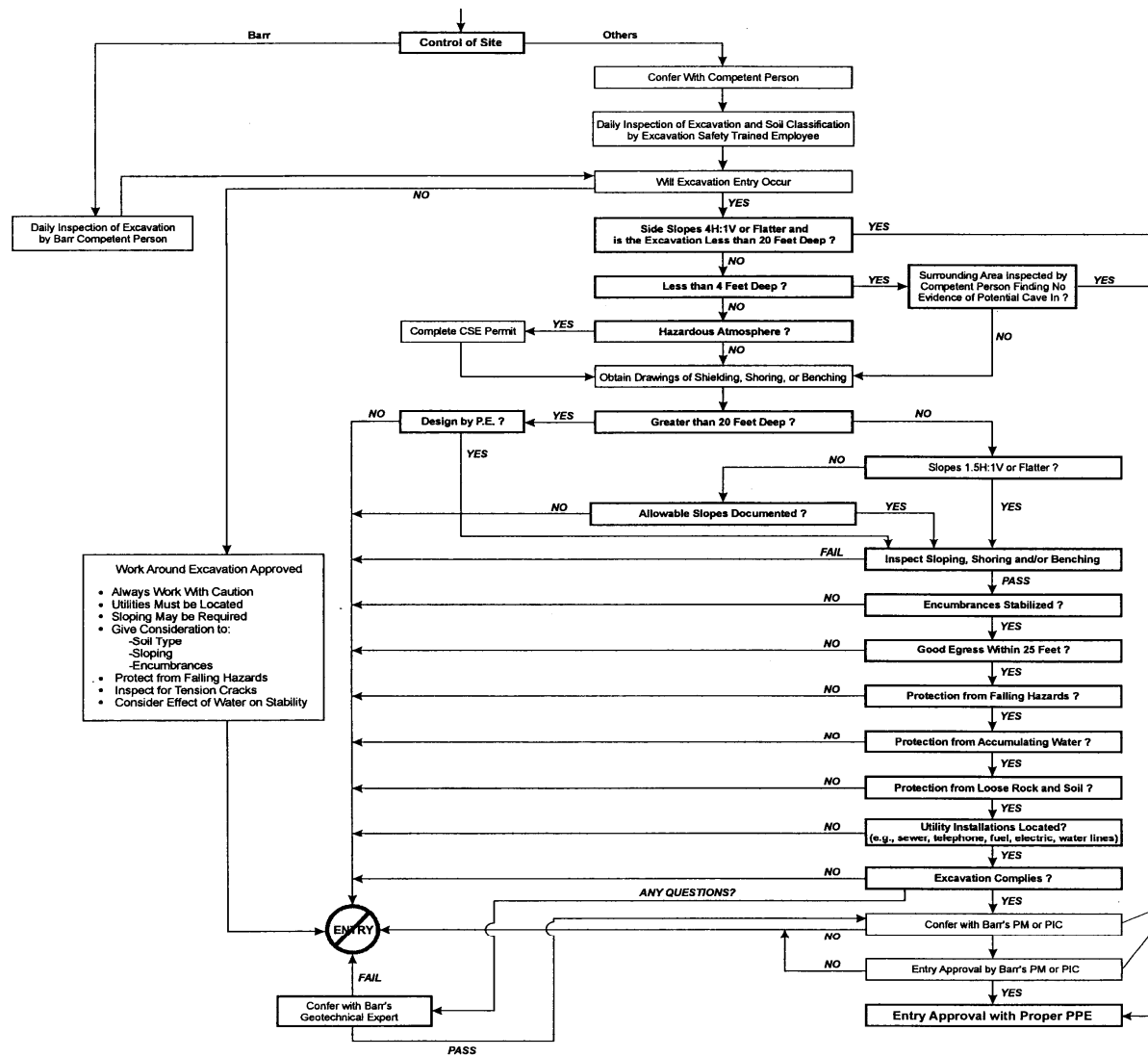


Figure 6
EXCAVATION SAFETY CHECKLIST

P:\ACAD\2010\Exam\Checklist.CDR

18.0 Forms

Form 1	Project Health and Safety Plan Amendment
Form 2	Project Health and Safety Acknowledgement Sheet
Form 3	Work Area Daily Safety Record
Form 4	Pre-Construction Safety Meeting Checklist
Form 5	Daily Excavation Safety Checklist
Form 6	Soils Classification Checklist

Form 1
Project Health and Safety Plan Amendment

Amendment #:

Date:

Amendment Section:

Amendment:

Reason For Amendment:

___ Amendment discussed with Project Manager on _____ and approved.

___ Amendment discussed with Project Health and Safety Team Leader on _____ and approved.

Form 2
Project Health and Safety Acknowledgement Sheet

(By signing your name, you acknowledge that you have attended a pre-work safety meeting for work at _____ project site and that you have read both the PHASP and agree to abide by the requirements of these plans.)

No.	Date	Name	Signature	Affiliation	Date of Pre-Entry Safety Briefing
1)					
2)					
3)					
4)					
5)					
6)					
7)					
8)					
9)					
10)					
11)					
12)					
13)					
14)					
15)					
16)					
17)					
18)					
19)					
20)					
21)					
22)					
23)					
24)					
25)					

Form 3 Work Area Daily Safety Record

DATE: _____ PHSTL: _____

	WORK LOCATION											
Location Identifier												
Time Interval at Location												
Typical Combustible Gas Monitoring Readout (% LEL)												
Organic Vapor Readout (ppm)												
Hydrogen Sulfide Readout (ppm)												
Level of PPE worn (circle all that apply)	D	Modified D	C	D	Modified D	C	D	Modified D	C	D	Modified D	C

CHECK () THE FOLLOWING AFTER COMPLETION

Daily "Tool-Box" Safety Meeting Time _____ Conducted by: _____

 Topic: _____

 Attended: _____

Instrument Calibration

 Instrument
 Time _____

Calibration Check

Battery Check

 Instrument
 Time _____

Calibration Check

Battery Check

 Instrument
 Time _____

Calibration Check

Battery Check

Comments (Field Deviations, Incidents, Visitors On Site, Etc.):

Form 4
Pre-Construction Safety Meeting Checklist

Project Name: _____ Project Number: _____

Meeting Conducted by: _____ Date: _____

Attendees: _____

CHECK () TOPICS COVERED DURING SAFETY MEETING

ADMINISTRATIVE

- Location of telephone and emergency numbers
- Smoking and eating areas
- Fire extinguisher, eyewash, and First Aid kit on site
- Potable water, restrooms on site, or location of nearest facilities
- Emergency alarm signals
- Emergency evacuation routes and location of posting
- Hospital and route to hospital
- Accidents/illnesses/injuries/near misses
- Work/Break schedule
- Location of PHASP (including APPENDIX)
- Work zones
- Buddy system
- Site control and/or site security
- First Aid/CPR qualified persons on site
- Subcontractor's MSDS collection labeling system and precautionary measures
- Subcontractor's MSDS collection labeling system and precautionary measures

PERSONAL PROTECTIVE EQUIPMENT

- Levels of Personal Protective Equipment (PPE)
(D, modified D, C)
- Respirator protection
- PPE limitations

AIR MONITORING

- Actions taken when action levels exceeded
- Air monitoring to be conducted

DECONTAMINATION (DECON)

- DECON area and procedures
- Containers for contaminated materials

Form 4
Pre-Construction Safety Meeting Checklist

PHYSICAL HAZARDS ON SITE

- ___ Underground/overhead utilities
- ___ Confined space entry (permit required)
- ___ Excavation entry (permit required)
- ___ Water hazards
- ___ Winter hazards (e.g., ice hazards)
- ___ Traffic near or on site
- ___ Noise
- ___ Slip/trip hazards
- ___ Overhead hazards
- ___ Radiation (from radioactive wastes like hospital wastes, etc.)

CHEMICAL HAZARDS

- ___ Hazardous substances on site
- ___ Symptoms of overexposure
- ___ Fire and explosion
- ___ Reactive/unstable
- ___ Oxygen deficient atmosphere

BIOLOGICAL HAZARDS

- ___ Poisonous vegetation (poison ivy, poison oak)
- ___ Pests (snakes, rodents, bees, wasps)
- ___ Animals (dogs, bears)
- ___ Biological wastes (hospital wastes, animal wastes)

___ **OTHER** _____

- ___ Cold stress
- ___ Hypothermia
- ___ Frostbite
- ___ Heat stress
- ___ Availability of warm fluids
- ___ Availability of shade

NA = Not Applicable

Form 5
Barr Engineering Company
Daily Excavation Safety Checklist
(To be completed by Barr Competent Person or Excavation Safety Trained Barr Employee)

Project Name:		Project Number:	
Site Location:		Checklist Completed by:	
Date:	Time:		
Control of Site: (check one) Barr _____ Others _____			
Competent Person Onsite:			
Soil Classification (Attach form):			
Excavation Depth:		Excavation Width:	
Type of Protective System Used:			
(Check each item: Yes – No – and Read Comment. If yes, Continue with Checklist. If no, continue as directed or Skip to Line D2.)		Yes	No
A) Site Control/Will Excavation Entry Occur?			
1. Is Barr in Control of the Site?			If no, skip to line A3.
2. Are you Barr's Competent Person for this project?			If no, have Barr's Competent Person complete this checklist. If yes, skip to line A8.
3. Have you conferred with the Competent Person for the site?			
4. Have you completed inspection of the excavation and surrounding area?			
5. Does the Competent Person have the authority to take prompt corrective measures (remove employees from the excavation immediately if needed)?			
6. Has Competent Person conducted daily inspections of excavations, adjacent areas, and protective systems?			
7. Does the Competent Person confirm that, in their opinion, the excavation complies with the OSHA Standard?			
8. Will a Barr Employee or Barr Subcontractor enter the excavation? If no: Always work with caution around excavations, whether or not the excavation is entered. Utilities must be located for all excavation work (call first before you dig). Some soils may require sloping to work safely on the surface adjacent to excavations. Work around excavations (without entry) may require consideration of soil type and sloping, encumbrances, protection from falling hazards, inspection for tension cracks, and consideration of the effects water on the stability of the excavation. Checklist is complete.			If no, excavation entry cannot occur without completing the rest of the checklist. If yes, continue with the rest of the checklist.
B) General Inspection of Jobsite:			
1. Are side slopes 4H:1V or flatter and is the excavation less than 20 feet deep?			If yes, checklist is complete and Excavation complies. Go to line C1. If no, continue.
2. Is the excavation less than 4-feet deep and has the surrounding area been inspected by finding no evident of potential cave-in?			If yes, checklist is complete and Excavation complies. Go to line C1. If no, continue.

Form 5
Barr Engineering Company
Daily Excavation Safety Checklist
(To be completed by Barr Competent Person or Excavation Safety Trained Barr Employee)

<p>3. Is there a known hazardous atmosphere or potential to create a hazardous atmosphere?</p> <ul style="list-style-type: none"> • The atmosphere within the excavation must be tested when there is a reasonable possibility of an oxygen deficiency, combustible, or other harmful contaminant exposing employees to a hazard. • Confined space entry procedures must be followed to protect employees from exposure to an atmosphere containing less than 19.5% oxygen, greater than 20% of the LEL, and/or to other hazardous atmosphere. • Ventilation may have to be provided to prevent employee exposure to oxygen deficiency, combustible or other hazardous atmospheres • Employees must be trained in confined space entry, use of personal protective equipment, and the use of other rescue equipment. 			<p>If no, continue to line B4. If yes, complete confined space entry permit and continue.</p>
<p>4. If used, obtain drawings of shielding, shoring or benching.</p>			<p>Go to next line.</p>
<p>5. Is the excavation greater than 20 feet deep?</p>			<p>If yes, the answer to B6 must also be yes. If no, skip to line B7.</p>
<p>6. Has a Professional Engineer designed the excavation, and do you possess copies of the signed design drawings?</p>			<p>If yes, skip to line B9.</p>
<p>7. Are the side slopes 1.5:1V or flatter?</p>			<p>If yes, skip to line B9.</p>
<p>8. Have the soils been classified and has the allowable slope been determined in accordance with the OSHA Excavation Standard and documented?</p>			<p>If no, perform the classification, determination, and documentation before proceeding.</p>
<p>9. Inspect sloping, shielding, shoring and/or benching. Have these protective systems been found to be in good state of repair and, if applicable, been found to conform to the certified design drawings?</p>			
<p>10. Have surface encumbrances been removed, protected, or stabilized?</p> <ul style="list-style-type: none"> • Surface encumbrances are any surface or subsurface obstruction located so as to create a hazard to employees. 			
<p>11. Inspect access and egress. Is there good access and egress?</p> <ul style="list-style-type: none"> • A stairway, ladder, ramp or other safe means of egress shall be located in trench excavations that are greater than 4-feet deep as to require no more than 25 feet of lateral travel for employees. • Ladders used in excavations must be secured and extend 3 feet above the edge of the trench. • Structural ramps used by employees must be designed by a Competent Person. • Structural ramps used for equipment must be designed by a Registered Professional Engineer (RPE). • Employees must be protected from cave-ins when entering or exiting the excavation. • Walkways and bridges over excavations 4 feet or more in depth must be equipped with standard guardrails and toeboards. 			
<p>12. Have protective measures from falling hazards been adopted or implemented?</p> <ul style="list-style-type: none"> • Employees are prohibited from going under suspended loads and equipment. • Employees are prohibited from working on the faces of sloped or benched excavations above other employees. 			

Form 5
Barr Engineering Company
Daily Excavation Safety Checklist
(To be completed by Barr Competent Person or Excavation Safety Trained Barr Employee)

<p>13. If there is accumulating water in the excavation, have precautions been taken to protect employees? Water in the excavation, whether accumulating or accumulated, requires adequate precautions.</p> <ul style="list-style-type: none"> • Surface water runoff should be diverted or controlled to prevent accumulation in the excavation. • Inspections of the excavation should be made after every rainstorm (or after any other hazard-increasing occurrence). 			
<p>14. Is there protection from loose rock or soil or other material or equipment that may fall or roll from the face or edge of the excavation?</p>			
<p>15. Have utility companies been contacted and/or have utilities been located?</p> <ul style="list-style-type: none"> • Location of utilities must be marked. • Underground installations must be protected, supported, or removed when excavation is open. 			
C) Barr PM/PIC Approval			
<p>1. Can it be concluded that the excavation complied with the requirements of the OSHA Excavation Standard?</p>			<p>If there are any questions about conditions, call Barr geotechnical expert before continuing.</p>
<p>2. Has Barr's Competent Person onsite given approval for the excavation entry?</p>			
<p>3. Have you conferred with Barr's PM or the PIC regarding your observations and conclusions and the need to enter excavation?</p>			
<p>4. Has Barr's PM or the PIC given their approval for the excavation entry?</p>			
<p>5. Have you documented the procedures followed, the conditions observed, and the specific authorization for the excavation entry?</p>			
D) Excavation Approval			
<p>1. Excavation entry is APPROVED consistent with proper personal protection equipment.</p>	Excavation Entry Approved		
<p>2. Excavation entry is NOT APPROVED and under no circumstances shall the excavation be entered by:</p> <ul style="list-style-type: none"> • Any Barr employee, employee of Barr's subcontractor(s), or other such as representatives of owner or regulatory agency where the site is controlled by Barr. • Any Barr employee where the site is controlled by others. 	Excavation Entry NOT Approved		

Form 6
Barr Engineering Company
Soils Classification Checklist

This checklist must be completed when soil analysis is made to determine the soil type(s) present in the excavation. A separate analysis must be performed if the excavation (trench) is stretched over a distance where soil type changes.

Site Location:		
Date:	Time:	Competent Person:
Where was the sample taken from:		
Excavation Depth:	Excavation Width:	Excavation Length:

Visual Test			
Particle type: Fine grained (cohesive) _____		Granular (sand/silt or gravel) _____	
Water conditions: Wet _____		Dry _____	
present _____		Seeping water _____	
Submerged _____		Surface water _____	
Previously disturbed soils:		Yes _____ No _____	
Underground utilities:		Yes _____ No _____	
If yes, what type?			
Layered soils? Note: <i>The less stable layer controls soil type.</i>		Yes _____ No _____	
Layered soils dipping into excavation:		Yes _____ No _____ Unknown _____	
Excavation exposed to vibrations:		Yes _____ No _____	
If yes, from what?			
Crack like openings or spalling observed:		Yes _____ No _____	
Conditions that may create a hazardous atmosphere:		Yes _____ No _____	
If yes, identify condition and source:			
Surface encumbrances:		Yes _____ No _____	
If yes, what type?			
Work to be performed near public vehicular traffic:		Yes _____ No _____	
Possible confined space exposure:		Yes _____ No _____	

Manual Test			
Plasticity: Cohesive _____		Non-cohesive _____	
Dry strength: Granular (crumbles easily) _____		Cohesive (broken with difficulty) _____	
Wet shake: Water comes to surface (granular material) _____		Surface remains dry (clay material) _____	

Note: The following unconfined compressive strength tests should be performed on undisturbed soils.

Form 6
Barr Engineering Company
Soils Classification Checklist

This checklist must be completed when soil analysis is made to determine the soil type(s) present in the excavation. A separate analysis must be performed if the excavation (trench) is stretched over a distance where soil type changes.

Thumb Test used to estimate unconfined compressive strength of cohesive soil:

Test performed:	Yes _____	No ____	
_____	Type A – soil indented by thumb with very great effort.		
_____	Type B – soil indented by thumb with some effort.		
_____	Type C – soil easily penetrated several inches by thumb with little or not effort. If soil is submerged, seeping water, subjected to surface water, runoff, exposed to wetting.		

Penetrometer or Shearvane used to estimate unconfined compressive strength of cohesive soils:

Test performed:	Yes _____	No_ _____	Device used:
_____	Type A – soil with unconfined compressive strength of 1.5 tsf or greater.		
_____	Type B – soil with unconfined compressive strength greater than 0.5 tsf and less than 1.5 tsf.		
_____	Type C – soil with unconfined compressive strength of 0.5 tsf or less. If soil is submerged, seeping water, subjected to surface water, runoff, exposed to wetting.		

Note: Type A – no soil is type A if soil is fissured, subject to vibration, previously disturbed, layered dipping into excavation on a slope of 4H:1V.

Soil Classification

Stable Rock _____	Type A _____	Type B _____	Type C _____
-------------------	--------------	--------------	--------------

Selection of Protective System (29 CFR 1926, Subpart P, Appendix F)

Protective System: _____	Sloping (29 CFR 1926, Subpart P, Appendix B)	Specify angle _____
_____	Timber shoring (29 CFR 1926, Subpart P, Appendix C)	
_____	Aluminum hydraulic shoring (29 CFR 1926, Subpart P, Appendix D)	
_____	Trench shield	Maximum depth in this soil _____

ATTACHMENT A
HEAT STRESS AND COLD STRESS GUIDELINES

Attachment A

Heat Stress and Cold Stress Guidelines

The purpose of this guideline is to outline procedures and practices designed to help prevent disorders that occur from working in hot work environments. This guideline also is designed to prepare personnel to recognize signs and symptoms of heat related illnesses and provide for prompt and adequate treatment.

Definitions

Acclimatization: The process the body goes through to enable it to function properly in a particular environment. Acclimatization to the environment in this standard refers to high heat conditions.

Heat Cramps: Painful muscle cramps caused by exposure to excessive heat when workers may or may not drink large quantities of water, but fail to replace their body's salt loss.

Heat Exhaustion: Extreme weakness or fatigue, giddiness, nausea, or headache resulting from loss of fluid and/or salt through sweating.

Heat Rash: Red and inflamed bumps on the skin, usually accompanied by a prickly sensation, caused by a combination of excessive sweating and blocked sweat pores.

Heat Stress: The stress experienced by the body from heat and humidity, and complicated by personal characteristics such as age, weight, fitness, medical condition and lack of acclimatization to heat.

Heat Stroke: The failure of the body's internal mechanism to regulate its core temperature, resulting in the body becoming overheated to a dangerous degree.

Maximum Internal Body Temperature: It is recommended that the employee's deep body (core) temperature not exceed 100.4 degrees F (38 degrees C). This temperature is to be used as an over all gauge to determine if a worker is in any danger of having a heat related illness. This deep body temperature is based on the assumption that the employee is nearly acclimatized, fully clothed and is consuming adequate water and salts. On jobs where deep body temperature monitoring is required or being conducted, this temperature, when exceeded, must trigger the removal of the employee from the source of heat. (A reevaluation of the heat stress prevention procedures must be conducted along

with an accident investigation to determine why the protective measures did not work or if another unseen factor contributed to the over exposure.)

Procedure Overview

Four environmental factors affect the amount of stress a worker faces in a hot working environment. These factors are temperature, humidity, radiant heat (such as from the sun), and air velocity.

Personal factors affect the ability of the body to resist heat stress illnesses. They include characteristics such as age, weight, fitness, medical condition and acclimatization to the heat. Short-term personal factors include alcohol, medication (prescription and non-prescription), diet, water and salt intake, sleep, and caffeine consumption.

The body reacts to high external temperature by circulating blood to the skin, which increases skin temperature and allows the body to release excess heat through the skin. However, if the muscles are being used for physical labor, less blood is available to flow to the skin and release the heat.

Sweating is another means the body uses to maintain a stable internal body temperature. However, sweating is effective only if the humidity level is low enough to permit evaporation and if the fluids and salts lost are adequately replaced.

If the body cannot dispose of excess heat, it will store it. When this happens, the body's core temperature rises, and the heart rate increases. As the body continues to store heat, the individual begins to lose concentration and has difficulty focusing on a task, may become irritable or sick, and often loses the desire to drink and eat. The next stage is most often fainting, and death is possible if the person is not removed from the heat.

A time of the year when heat stress should not be ignored is during spring and fall. During these times of year, the temperatures often range from below freezing to cool in the same day. The employee's susceptibility to heat stress occurs when he/she fails to wear sufficient layers of warm clothing. As the day grows warmer, the employee starts to sweat under his shirt and heavy jacket or insulated coveralls. At this point the employee takes off his jacket or coveralls and realizes that it still is too cold without it, so they put their jacket or coveralls back on. With this thick insulation around the body, the body's sweating mechanism will not work. The body will sweat, but little heat will dissipate. This stored heat can eventually lead to heat stress.

The key to protecting the employee is multi-layered clothing underneath the heavy jacket or coveralls. As it gets warmer, remove a layer of clothing. At some point, the jacket or coveralls get too warm and will need to be removed and replaced with some of the removed layers of clothing.

Heat Stroke Identification and Treatment

Heat Stroke: This is the most serious health problem for workers in hot environments and is caused by the failure of the body's internal mechanism to regulate its core temperature. Sweating stops and the body can no longer rid itself of excess heat. Signs may include:

- mental confusion, delirium, loss of consciousness, convulsions or coma
- a body temperature of 106 degrees F (41 degrees C) or higher
- loss of consciousness
- hot dry skin which may be red, mottled, or bluish
- victims of heat stroke may die unless treated promptly

Heat Stroke First Aid: Get the employee suffering from heat stroke to a Doctor/Hospital immediately. While awaiting medical help, the employee must be moved to a cool area and his or her clothing soaked with cool water. Place the injured in a comfortable position and fan them vigorously to increase cooling. Prompt first aid can prevent permanent injury to the brain and other vital organs. Water may be given to a conscious person. Don't let the employee drink too quickly. Give the employee 4 ounces of water every 15 minutes. If the employee begins to vomit, stop giving water and place employee on their side.

Heat Exhaustion Identification and Treatment

Heat Exhaustion: Results from the loss of fluid through sweating and when a worker has failed to drink enough fluids or take in enough salt, or both. The employee with heat exhaustion still sweats but experiences extreme weakness or fatigue, giddiness, nausea, or headache. The skin is clammy and moist, the complexion pales or flushed, and the body temperature is normal or slightly higher.

Heat Exhaustion First Aid: The person should rest in a cool place and drink water or can be given an electrolyte solution (a beverage used by athletes to quickly restore potassium, calcium, and magnesium salts). These fluids should be given in 4-ounce portions, every 15 minutes. For severe cases involving victims who vomit or lose consciousness, medical attention is strongly recommended.

Heat Cramp Identification and Treatment

Heat Cramps: Painful muscle spasms are caused when workers are exposed to high heat and may or may not drink large quantities of water but fail to replace their bodies' salt loss. Tired muscles, those used for performing the work, are usually the ones most susceptible to cramps.

Heat Cramp First Aid: Cramps may occur during or after working hours and may be relieved by taking liquids by mouth or saline solutions intravenously for quicker relief if medically determined to be required.

Heat Rash Identification and Treatment

Heat Rash: Also known as prickly heat may occur in hot and humid environments where sweat is not easily evaporated from the surface of the skin. When extensive or complicated by infection, heat rash can be so uncomfortable that it inhibits sleep, impedes a worker's performance or even results in temporary total disability. It can be prevented by periodically resting in a cool place and allowing the skin to dry.

Heat Rash First Aid: Antibiotic ointment can help prevent the rash from getting infected. Keep the rash as dry as possible.

Heat Stress Prevention

Heat-related health problems can be prevented or the risk of developing them reduced. Listed below are a few basic precautions which will help prevent heat stress.

Engineering controls including general ventilation (this can actually create a problem, ventilation with hot air affects the ability of the body to deal with the heat) and spot cooling by local exhaust ventilation at points of high heat production may be helpful. Evaporative cooling and mechanical refrigeration are other ways to reduce heat. Cooling fans can also reduce heat. Personal cooling devices using compressed air, ice packs, special fabrics that cool when wetted or reflective protective clothing are other ways to reduce the hazards of heat exposure for workers.

Recommended Practices

Increased air velocity. Fans are simple way to increase the body's ability to cool off. Fans become less effective at around 95 degrees F. (35 degrees C.) especially when the humidity is >70%. A good rule of thumb is that fans don't cool you off above 98 degrees F. (37 degrees C.) and if air temperature is above body temperature it will increase the heat stress.

Cooling PPE. Ice vest or bandannas, wristlets, and head bands which have crystals contained in fabric which, when soaked for 30 minutes in water, will keep the fabric well below body temperature all day. These products can be reused.

Monitor core temperature of at risk workers with baby ear thermometer. If temperature above 100.4 degrees stop work.

Schedule rest breaks in a cool area when feasible.

Work practices such as providing plenty of drinking water, as much as a quart per worker per hour, at the workplace can help reduce the risk of heat stress. Workers should be encouraged to frequently drink small amounts, one cup every 15-20 minutes, of water. The water should be kept reasonable cool, 50 to 60 degrees F (10 to 15 degrees C) and should be kept near the workplace so the worker can reach it without abandoning the work area. In addition to water the use of electrolyte replacement drinks are recommended, but shall not replace water.

Alternating work and rest periods are required where high heat conditions exist. Scheduled rest periods in a cool area can help workers avoid heat stress. . If possible, heavy work should be scheduled during the cooler parts of the day and appropriate protective clothing provided, such as bandannas, or ice vest. Extra heavy clothing such as coveralls over street clothes must be avoided.

Training

Training all employees to recognize and treat heat stress disorders is essential to heat stress prevention.

Employee education is vital for all workers to ensure they are aware of the need to replace fluids and salt lost through sweating. Training should include the ability to recognize dehydration, heat cramps, salt deficiency, heat exhaustion, and heat stroke as heat disorders. Training should also include how

to avoid heat related disorders and advice to stop work when they appear and seek treatment. Training should be conducted at the beginning of a project, initiated in the hot season and once a month until seasonal conditions change. Training shall be conducted for new employees during the pre-entry safety briefing.

The PHSTL will be trained to detect early signs of heat stress and will permit workers to interrupt their work if they are extremely uncomfortable.

Cold Stress

Fatal exposures to cold have been reported when persons fail to escape from low environmental air temperatures or from immersion in low temperature water. Hypothermia, a condition in which the body's deep core temperature falls significantly below 98.6EF, can be life-threatening. A drop in core temperature to 95EF or lower must be prevented.

Air temperature is not sufficient to determine the cold hazard of the work environment. The windchill must be considered as it contributes to the effective temperature. The body's physiologic defense against cold includes constriction of the blood vessels, inhibition of the sweat glands to prevent loss of heat via evaporation, glucose (fuel) production, and involuntary shivering to produce heat by rapid muscle contraction.

The frequency of accidents increases with cold exposures as the body's nerve impulses slow down, individuals react sluggishly and numb extremities make for increased clumsiness. Additional safety hazards include ice, snow blindness, reflections from the snow, and possible skin burns from contact with cold metal.

There are certain predisposing factors that make an individual more susceptible to cold stress. It is the responsibility of the project team members to inform the PHSTL if any of the predisposing factors listed below apply to that individual. This enables the PHSTL to monitor the individual if necessary, or use other means of preventing/reducing the individual's likelihood of experiencing a cold-related illness/disorder.

Predisposing Factors

Predisposing factors that will increase an individual's susceptibility to cold stress are listed below.

- Dehydration – The use of diuretics and alcohol, and diarrhea can cause dehydration. Dehydration reduces blood circulation to the extremities.
- Fatigue during physical activity – Exhaustion reduces the body’s ability to contract blood vessels. This results in the blood circulation occurring closer to the surface of the skin and the rapid loss of body heat.
- Age – Some elderly and very young individuals may have an impaired ability to sense cold.
- Alcohol consumption – Alcohol dilates the blood vessels near the skin surface resulting in body heat loss.
- Sedative drugs – Sedatives may interfere with the transmission of impulses to the brain thereby interfering with the body’s physiological defense against cold.
- Poor circulation – Vasoconstriction of peripheral vessels reduces blood flow to skin surface.
- Heavy workload – Heavy workloads generate metabolic heat and make an individual perspire. If perspiration is absorbed by the individual’s clothing and is in contact with skin, cooling of the body will occur.
- The use of PPE – PPE usage which traps sweat inside the PPE may increase an individual’s susceptibility to cold stress.
- Lack of acclimatization – Acclimatization, the gradual introduction of workers into a cold environment allows the body to physiologically adjust to cold working conditions.
- History of cold injury – Previous injury due to cold exposures may result in increased cold sensitivity.

Preventing Cold Stress

There are a variety of measures that can be implemented to prevent or reduce the likelihood of employees developing cold related illness/disorders. These include acclimatization, fluid and electrolyte replenishment, eating a well-balanced diet, wearing warm clothing, the provision of shelter from the cold, thermal insulation of metal surfaces, adjusting work schedules, and employee education.

- **Acclimatization:** Acclimatization is the gradual introduction of workers into a cold environment to allow their body to physiologically adjust to cold working conditions. However, the physiologic changes are usually minor and require repeated uncomfortably cold exposures to induce them.
- **Fluid and Electrolyte Replenishment:** Cold, dry air can cause employees to lose significant amounts of water through the skin and lungs. Dehydration affects the flow of blood to the extremities and increases the risk of cold injury. Warm, sweet, caffeine-free, nonalcoholic drinks and soup are good sources to replenish body fluids.
- **Eating a Well-Balanced Diet:** Restricted diets including low-salt diets can deprive the body of elements needed to withstand cold stress. Eat high-energy food throughout the day.
- **Warm Clothing:** It is beneficial to maintain air space between the body and outer layers of clothing in order to retain body heat. However, the insulating effect provided by such air spaces is lost when the skin or clothing is wet.
- **Work Schedule Adjustment:** Schedule work during the warmest part of the day if possible; rotate personnel; and, adjust the work schedule to enable employees to recover from the effects of cold stress.

The parts of the body most important to keep warm are the feet, hands, head and face. As much as 40% of body heat can be lost when the head is exposed.

- **Recommended Clothing includes:**
 - Inner layers (t-shirt, shorts, socks) should be of thin, thermal insulating, nonmoisture absorbent material, moisture wicking, such as polypropylene.
 - Wool or thermal trousers. Denim is not a good protective fabric since it absorbs moisture very well.
 - Felt-lined, rubber-bottomed, leather-topped boots with a removable felt insole is preferred. Wool socks with polypropylene inner socks. Consider winter boots one half size larger than regular size to accommodate thick socks.
 - Wool or thermal shirts/sweaters should be worn over inner layer.

- A wool cap is good head protection. Use a liner under a hard hat.
 - Mittens are better insulators than gloves. Wool liners for either mittens or gloves.
 - Face masks or scarves are good protection against wind.
 - Tyvek/polycoated tyvek provide good wind protection.
 - Wear loose fitting clothing, especially footwear. Consider winter boots a half size larger than regular shoes to accommodate thick socks.
 - Carry extra clothing in vehicle. Change out of wet clothes or socks.
- **Provision of Shelter from the Cold:** Shelters with heaters should be provided for the employees rest periods if possible. Sitting in a heated vehicle is a viable option. Care should be taken that the exhaust is not blocked and that windows are partially open to provide ventilation.
 - **Thermal Insulation of Metal Surfaces:** At temperatures of 30 degrees F or lower, cover metal tool handles with thermal insulating material if possible.
 - **Employee Education:** Employees have already been trained to recognize and treat the effects of cold stress during their 40-hour training. Signs, symptoms and treatment of cold stress should be reviewed in project safety meetings where applicable. The Buddy System will help in preventing cold stress once the employees are trained to recognize the signs and symptoms of cold stress.

Suggested Cold Stress Prevention Guidelines

It may not be practically or economically feasible to implement all the above prevention measures. Follow the guidelines given below when the **ambient air temperature is -5 degrees F or lower:**

- Contact the PHSTL to determine if the Site worker should continue working in such temperatures.
- Dress warm.
- Replenish fluids and electrolytes at regular intervals.

- Provide shelter from the cold.
- Adjusting work-rest schedules.

Cold Stress First-Aid Treatment Guidelines

TABLE A-1: COLD STRESS FIRST-AID TREATMENT GUIDELINES describes symptoms of different stages in cold stress and first aid treatment guidelines.

Table A-1. Cold Stress First-Aid Treatment Guidelines

Frostbite	
Stages:	
• Incipient (frost nip)	May be painless. Tips of ears, nose, cheeks, fingers, toes, chin affected. Skin blanched white.
• Superficial	Affects skin/tissue just beneath skin; turns purple as it thaws. Skin is firm, waxy; tissue beneath is soft, numb.
• Deep	Tissue beneath skin is solid, waxy, and white with purplish tinge. Entire tissue depth is affected.
First-Aid Treatment Guidelines:	
• Incipient	Warm by applying firm pressure— no rubbing ; or blow warm breath on spot; or submerge in warm water (102-110°F).
• Superficial	Provide dry coverage, steady warmth; submerge in warm water.
• Deep	Hospital care is needed. Don't thaw frostbitten part if needed to walk on. Don't thaw if there is danger of refreezing. Apply dry clothing over frostbite. Submerge in water; do not rub.
General Hypothermia	
Stages:	
Shivering	Muscle Tension Coordination Loss
Indifference	Uncontrollable Shivering Stumbling
Decreased Consciousness	Decreased Muscle Function Fatigue
Unconsciousness	Speech Distortion Forgetfulness
Death	Glassy Stare Freezing Extremities
	Blue, Puffy Skin Dilated Pupils
	Slow Pulse Shallow Breathing
Emergency Response:	
<ul style="list-style-type: none"> • Keep person dry; replace wet clothing • Apply external heat to both sides of patient using available heat sources, including other bodies • Give warm liquids—not coffee or alcohol—after shivering stops and if conscious • Handle gently • Transport to medical facility as soon as possible • If more than 30 minutes from a medical facility, warm person with other bodies 	

Windchill Index

The human body senses cold as a result of both air temperature and wind velocity. Cooling of exposed flesh increases rapidly as the wind velocity goes up. Frostbite can occur at relatively mild temperatures if wind penetrates the body insulation. For example, when the actual air temperature of the wind is 40°F and its velocity is 30 mph, the exposed skin would perceive this situation as an equivalent still air temperature of 13°F.

If the actual wind speed is not known, the following examples are provided to approximate wind speed.

- 5 mph = Light flag moves
- 10 mph = Light flag fully extended
- 15 mph = Raise newspaper sheet
- 20 mph = blowing and drifting snow

TABLE A-2: WINDCHILL INDEX shows a chart that can help in determining the windchill index. Site work should be terminated when there is a great danger of freezing exposed flesh.

Table A-2. Windchill Index

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.)	<i>LITTLE DANGER</i> In <hr with dry skin. Maximum danger of false sense of security.				<i>INCREASING DANGER</i> Danger from freezing of exposed flesh within one minute.				<i>GREAT DANGER</i> Flesh may freeze within 30 seconds.			

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

From: *Threshold Limit Values and Biological Exposure Indices*, ACGIH 2005. Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA.

ATTACHMENT B
SEVERE WEATHER EMERGENCY PROCEDURES

Attachment B

Severe Weather Emergency Procedures

Severe Weather

1.0 Scope

As most projects are conducted outside, the potential for severe weather must be considered. Thunderstorms, tornadoes, and winter storms can develop quickly, jeopardizing worker safety. The following emergency procedures are to be followed in case of severe weather.

2.0 Thunderstorms and Lightning

Monitor weather conditions at all times while working. Monitor for a sign of an impending storm such as increased cloudiness, darkened skies, and increased wind. If any of these signs are observed, contact PHSTL to get current assessment of weather conditions.

When a thunderstorm accompanied by lightning is in the project area, cease work immediately. All powered equipment, such as drill rigs, are to be shut down. Seek shelter inside nearby buildings or trailers. If there are no buildings nearby, seek shelter inside your vehicle.

If you are caught outside, do not stand beneath tall, isolated trees or telephone poles. Avoid areas projecting above the landscape such as hilltops. In open areas, go to a low place such as a ravine or valley. Stay away from open water, metal equipment, wire fences, and metal pipes. If you are in a group of people in the open, spread out, staying several yards apart.

If you are caught in a level field or open area far from shelter and you feel your hair stand on end, lightning may be about to strike you. Drop to your knees and bend forward, putting your hands on your knees. **DO NOT LIE FLAT ON THE GROUND.**

If someone has been struck by lightning, monitor life signs and begin administering mouth-to-mouth resuscitation or cardiopulmonary resuscitation as needed. Send for medical assistance. Check conscious victims for burns, especially at the fingers and toes and next to buckles and jewelry. Administer first aid for shock. Do not let the victim walk around.

3.0 Tornadoes

Tornadoes usually develop from thunderstorms and normally occur at the trailing edge of the storm. Most tornadoes occur in the months of April, May, June, and July in the late afternoon and early evening hours.

When storms are predicted for the project area, the PHSTL will monitor weather conditions. A tornado watch is issued when favorable conditions exist for the development of a tornado. A tornado warning is issued by the local weather service office whenever a tornado has actually been sighted or is strongly indicated by radar.

If a tornado warning is issued, seek shelter immediately. If there are permanent buildings located on Site, go there immediately, moving toward interior hallways or small rooms on the lowest floor.

If a tornado warning is issued and you are in a vehicle, leave and go to the nearest building. If there are no buildings nearby, go in the nearest ditch, ravine, or culvert, with your hands shielding your head.

If a tornado is sighted or a warning issued while you are in open country, lie flat in a ditch or depression. Hold onto something on the ground, such as a bush or wooden fence post, if possible. Once a tornado has passed the site, Site personnel covered by this PHASP are to assemble at the designated assembly area to determine if anyone is missing. Administer first aid and seek medical attention as needed.

4.0 Winter Storms

When snow or ice storms are predicted for the project area, the PHSTL will monitor weather conditions. A winter storm watch is issued when a storm has formed and is approaching the area. A winter storm warning is issued when a storm is imminent and immediate action is to be taken.

When a storm watch is issued, monitor weather conditions and prepare to halt Site activities. Notify the project manager of the situation. Seek shelter at Site buildings or leave the Site and seek warm shelter. If you are caught in a severe winter storm while traveling, seek warm shelter if road conditions prevent safe travel.

If you are stranded in a vehicle during a winter storm:

- STAY IN THE VEHICLE – disorientation comes quickly in blowing and drifting snow;
- Wait for help;
- Keep a window open an inch or so to avoid carbon monoxide poisoning;
- Run the engine and heater sparingly;
- Keep watch – do not let everyone sleep at the same time; and
- Exercise occasionally.