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*Health and Safety Plan  
for the  
Former Virginia-  
Carolina Chemical Company  
Phosphate/Fertilizer Plant,  
Wadesboro, North Carolina  
(Revision 1)*

**Exxon Mobil Corporation  
Houston, Texas**

**June 2002**

**BBL<sup>®</sup>**  
BLASLAND, BOUCK & LEE, INC.  
engineers & scientists

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**Attachments**

- A - Material Safety Data Sheets
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- D - Safety Inspection Form
- E - Daily Safety Meeting Log
- F - Daily Air Monitoring Log
- G - Hospital Directions and Map
- H - Underground/Overhead Utility Checklist
- I - Constituents of Concern
- J - Confined Space Entry Checklist
- K - Confined Space Entry Permit
- L - Site Hot Work Permit
- M - Daily/Periodic Excavation Inspection Checklist
- N - Traffic Control Procedures

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# Approvals and Acknowledgments

## Approvals

I have read and approved this HASP with respect to project hazards and regulatory requirements.

Project Name: VCCC Site, Wadesboro, NC

Project Number: 54626

 6/12/02  
Project Manager/Date

\_\_\_\_\_  
Health and Safety Officer/Date

\_\_\_\_\_  
Health and Safety Supervisor/Date

## Acknowledgments

The final approved version of this HASP has been provided to the Site Supervisor. I acknowledge my responsibility to provide the Site Supervisor with the equipment, materials and qualified personnel to implement fully all safety requirements in this HASP. I will formally review this plan with the HS Staff every six months until project completion.

\_\_\_\_\_  
Project Manager/Date

I acknowledge receipt of this HASP from the Project Manager, and that it is my responsibility to explain its contents to all site personnel and cause these requirements to be fully implemented. Any change in conditions, scope of work, or other change that might affect worker safety requires me to notify the Project Manager and/or a Health and Safety Representative.

\_\_\_\_\_  
Site Supervisor/Date

# 1. Introduction

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## 1.1 Objective

The objective of site activities at the former Virginia Carolina Chemical Company (VCCC) site in Wadesboro, North Carolina, is the demolition of several buildings and associated structures, construction of a perimeter security fence; and implementation of an environmental investigation to support an engineering evaluation/cost analysis for the site. The demolition of these structures must address the environmental and safety concerns associated with cleaning and removal of the equipment. The intended result of demolition and removal activities is to leave the facilities in a safe secure manner. Anticipated contractor field activities include the following:

- General Mobilization
- PHASE I – Building Demolition and Fence Construction
  - Clearing and grubbing;
  - Asbestos sampling and investigation with potential for limited removal or abatement;
  - Electrical and mechanical system lockout/tagout;
  - Removal of process equipment;
  - Demolition of building structures;
  - Selective demolition related to equipment removal; and
  - General construction related to fence installation.
- PHASE II – Preliminary Site Investigation
  - Surface and Subsurface soil sampling using a Geoprobe;
  - Monitoring well installation and groundwater sampling; and
  - Surface water and sediment sampling.
- Decontamination
- Demobilization

The objective of this Health and Safety Plan (HASP) is to provide general health and safety information regarding conditions and activities at the site in order to promote a safe and healthy work environment. Each contractor should review their operations to ensure the task(s) for which they are responsible are conducted in a safe manner, and that all policies and procedures provided in this HASP are enforced. The safety procedures and protective equipment presented in this general HASP have been established based on an analysis of potential physical, chemical, and biological hazards. Hazard control methodologies have been evaluated and selected to minimize the potential of accident or injury.

## 1.2 Site and Facility Description

The abandoned VCCC site in Wadesboro, North Carolina consists of approximately 18.38 acres of woodlands. There are several remaining buildings in various stages of decay. Some of the buildings contain equipment that was utilized in the various production activities at the site, including fertilizer and chemical production.

ExxonMobil has agreed to begin implementing security measures at the site. In accordance with the document "ExxonMobil Corporation, Site Security/Stabilization Project, Virginia Carolina Chemical Company, Wadesboro, North Carolina", A Phase II work plan will be submitted for the completion of site investigation activities necessary to define the nature and extent of soil and groundwater contamination. Environmental assessment activities are anticipated to include subsurface and surface soil and water sampling.

## 1.3 General

It is the responsibility of all site Contractors to provide a safe and healthful work environment for their employees, visitors and sub-contractors. A fundamental principle of safety is that all injuries and illnesses are preventable, therefore all reasonable steps must be taken to eliminate or control hazards in order to minimize the possibility of injury, illness, or other incident.

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This HASP describes the minimum general health and safety procedures and requirements that must be followed during work activities at the VCCC site. Given the wide variety of types of work that will occur at the site, each contractor is responsible for continually evaluating their work site for the presence of hazards and adequacy of the prescribed control measures. All contractors must enforce the provisions of this HASP and any additional control measures that may be required as the result of changing site conditions. This document will be periodically reviewed to ensure that it is current and technically correct. Any changes in site conditions and/or the scope of work will require a review and modification to the HASP. Such changes will be completed in the form of an addendum or revision of the plan.

The provisions of this plan are mandatory for all contractors assigned to the project. All visitors to the work site must also abide by the requirements of this plan.

#### 1.4 References

During the preparation of this HASP several references were consulted to obtain health and safety information, including safety and health standards set by the Occupational Safety and Health Administration (OSHA), National Institute for Occupational Safety and Health (NIOSH), and the United States Environmental Protection Agency (EPA). Relevant references consulted during the preparation of this plan include the following:

- *Standard Operating Safety Guides*, USEPA (Publication 9285.1-03, June 1992).
- *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, NIOSH, OSHA, USCG, USEPA (86-116, October 1985).
- Title 29 of the Code of Federal Regulations (CFR), Part 1910.
- Title 29 of the Code of Federal Regulations (CFR), Part 1926.
- *Pocket Guide to Chemical Hazards*, DHHS, PHS, CDC, NIOSH (1997).
- *Threshold Limit Values*, ACGIH (2000).
- *Quick Selection Guide to Chemical Protective Clothing*, Forsberg, K. and S.Z. Mansdorf, 2nd Ed. (1993).

Contractors are encouraged to utilize these resources and any others that they may find helpful to ensure safe conditions are maintained.

#### 1.5 Acronyms

COC – Constituents of Concern  
CRZ – Contamination Reduction Zone  
DPI – Distillation Products Industries  
EPA – United States Environmental Protection Agency  
EZ – Exclusion Zone  
HASP – Health and Safety Plan  
HSE – Health Safety and Environment  
HSO – Health and Safety Officer  
HSS – Health and Safety Supervisor  
NIOSH – National Institute of Occupational Safety and Health  
OSHA – Occupational Safety and Health Administration  
PM – Project Manager  
PPE – Personal Protective Equipment  
SS – Site Supervisor  
SZ – Support Zone

## **2. Roles and Responsibilities**

### **2.1 All Personnel**

Contractor and subcontractor personnel must adhere to all safety and health procedures during the performance of their work. Each person is responsible for completing tasks safely, and reporting any unsafe acts or conditions to his or her immediate supervisor. No person may work in a manner that conflicts with these procedures. After due warning, any person who continues to violate safety procedures will be removed from the site.

The roles of key personnel are outlined in the following sections. Contractors shall designate an individual to fulfill these roles and provide contact numbers (phone, pager, cell phone, etc.) for each individual listed. The designated individuals for the General contractor are listed below in Table 2-1.

Key personnel are listed in Table 2-1 of this HASP.

### **2.2 Health and Safety Supervisor (HSS)**

Each contractor on the project shall designate an HSS. The project HSS is responsible for field health and safety issues, including the execution of this HASP. Questions in the field regarding health and safety procedures, project procedures, and other technical or regulatory issues should be addressed to this individual. The HSS will advise the Project Manager (PM) on health and safety issues, and will establish and oversee the project air monitoring program if one is deemed necessary. The HSS is the primary site contact on health and safety matters.

A contractor may designate the same person to perform the duties of both the HSS and the site supervisor (SS). However, depending on the level of complexity of a contractor's scope of work, it may not be infeasible for one person to perform both functions satisfactorily.

It is the responsibility of the HSS to:

- Provide on-site technical assistance, if necessary;
- Coordinate site and personal air monitoring as required, including equipment maintenance and calibration;
- Conduct site safety orientation training and safety meetings;
- Verify that on-site personnel have received any required physical examinations and medical certifications;
- Maintain required health and safety documents and records; and
- Assist the SS in investigation of all injuries, illnesses, property damage, and near misses; and
- Assist the SS in the instruction of field personnel on project hazards and protective procedures.

### **2.3 Health and Safety Officer (HSO)**

Each contractor shall designate an HSO. The contractor's HSO has overall responsibility for the technical health and safety aspects of the project, including review and compliance with this HASP. Inquiries regarding health and safety procedures, project procedures, and other technical or regulatory issues will be addressed to this individual. Changes or addenda to this HASP must be approved by the General Contractor HSO.

In some organizations it is not uncommon for the duties of the HSO to be carried out by the PM. This is acceptable provided the PM has the required knowledge, training, and experience to properly address all hazards associated with the work.

### **2.4 Project Manager**

Each contractor's PM is responsible for verifying that project activities are completed in accordance with the requirements of this plan. The PM is responsible for ensuring that the SS has the equipment, materials, and qualified personnel to implement fully all project safety requirements.

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It is the responsibility of the PM to:

- Consult with the HSO on site safety and health issues;
- Ensure that all hazardous incidents are thoroughly investigated,
- Approve, in writing, addenda or modifications of the HASP that cover the operations of that contractor; and
- Suspend work if health and/or safety-related concerns arise.

## **2.5 Site Supervisor (SS)**

Each contractor's SS is responsible for implementation of this HASP and any specific hazard control methods identified during the course of the project, including communication of site requirements to on-site project personnel (including subcontractors). The SS will be responsible for informing the PM of changes in the work plan or procedures so that those changes may be addressed in the HASP. Other responsibilities include:

- Consulting with the HSS on site safety and health issues;
- Conducting frequent safety inspections of the job site;
- Stopping work, as necessary for personal safety, protection of property, and regulatory compliance;
- Obtaining a site map and determining and posting routes to medical facilities and emergency telephone numbers-;
- Notifying local public emergency representatives of the nature of the site operations, and posting of their telephone numbers (for example: local fire department personnel who would respond for a confined space rescue);
- Observing on-site project personnel for signs of ill health effects;
- Investigating and reporting to the HSO and PM any injuries, illnesses, or near miss incidents;
- Verifying that site personnel have the proper medical clearance (if required) and have met applicable training requirements-;
- Verifying that on-site personnel are informed of the physical, chemical, and biological hazards associated with the site activities, and the procedures and protective equipment necessary to control the hazards;
- Suspending work if health and/or safety-related concerns arise; and
- Issuing/obtaining required work permits.

## **2.6 Subcontractors**

On-site subcontractors and their personnel must understand and comply with the site requirements established in this HASP and any site-specific requirements of the contractor for whom they work. Subcontractors may prepare their own task-specific HASPs which must be consistent with the requirements of this HASP and the contractor's site-specific requirements. Subcontractor personnel must attend and participate in the site safety meetings.

## **2.7 All On-Site Personnel**

Prior to job assignment, all on-site personnel will receive training which is appropriate for their job(s), in accordance with all applicable standards in 29 CFR 1910 and 29 CFR 1926. Additionally, prior to beginning project operations, all on-site personnel will be familiar with the requirements and procedures contained in this document. All on-site personnel must read and acknowledge their understanding of this HASP, and abide by the requirements of the plans.

Site personnel will immediately report the following to their supervisor:

- Personal injuries and illnesses regardless of severity;
- Unexpected or uncontrolled release of chemical substances;
- Symptoms of chemical exposure;
- Unsafe or malfunctioning equipment;
- Changes in site conditions that may affect the health and safety of project personnel;

- 
- Damage to equipment or property;
  - Situations or activities for which they are not properly trained; and
  - Near miss incidents, in which an injury or equipment/property damage did not occur, but could have occurred under slightly different circumstances.

## **2.8 Visitors**

All visitors to the site must check in with the appropriate contractor's SS. Visitors requesting to observe work on the site must don appropriate PPE prior to entry and must meet have the appropriate training and medical clearances (if required) to do so. If respiratory protective devices are necessary, visitors who wish to enter the work area must have been respirator-trained and fit-tested for a respirator within the past 12 months.

**TABLE 2-1  
KEY PERSONNEL**

<u>Client Personnel</u>		
<u>Client</u>	<u>Name/Title</u>	<u>Address/Telephone No.</u>
Corporate Representative ExxonMobil Corp.	Mr. Kyle Harris	601 Jefferson Street, Room 1221 Houston, TX 77002 (713) 656-9059 (office) (713) 702-7649 (mobile)
<u>BBL Personnel</u>		
<u>Role</u>	<u>Name/Title</u>	<u>Address/Telephone No.</u>
Project Manager (PM)	Geoffrey G. Germann, P.E.	3700 Regency Parkway, Suite 140 Cary, NC 27511 (919) 469-1952 ext. 22 (office) (919) 624-5917 (mobile)
Health and Safety Officer (HSO)	Jay D. Keough, CIH	8 South River Road Cranbury, NY 08512 (609) 860-0590 ext. 101
Regional Health and Safety Coordinator	Greg Ertel, CIH, CSP	155 Corporate Circle, Suite 150 Rochester, NY 14623 (716) 292-6740 ext. 25
Site Supervisor (SS)	TBD	TBD
Health and Safety Supervisor (HSS)	TBD	TBD
<u>Subcontractors</u>		
<u>Role</u>	<u>Name/Title</u>	<u>Address/Telephone No.</u>
TBD	TBD	TBD

TBA = To be assigned by the contractor implementing the plan  
TBD = To be determined

## **3. Task-Specific Hazards and Control Measures**

### **3.1 General Hazard Evaluation for all Tasks**

All contractors are required to continually evaluate their operations to ensure that they are consistent with this HASP and their own health and safety policies and procedures. Contractors shall identify and address health and safety hazards associated with the specific tasks, such as hazardous waste operations, demolition, rigging and crane operation, line breaking, confined space entry, etc., that are to be performed, and the measures to control these hazards. Site-specific control measures shall comply with all federal, state, and local standards, the contract documents, and will be incorporated into this HASP in the form of an addendum. Site-specific requirements that should be continually evaluated include the following items:

- Scope of activities to be performed;
- The hazards and conditions of the site;
- Known types and concentrations of constituents of concern (COCs);
- Control procedures for hazards at the site;
- Action levels for PPE upgrades;
- Names and numbers of key project personnel;
- Specific tasks to be performed;
- Procedures to be followed during the work;
- Personal protective equipment (PPE) to be used;
- Training requirements for personnel engaged in this type of work;
- Decontamination procedures (if required);
- Air and personal monitoring (if required);
- Medical monitoring (if required);
- Emergency procedures; and
- Material Safety Data Sheets (MSDSs)

Modifications to site specific requirements should be submitted to the General Contractor prior to commencement of any field activities.

The following sections provide a description of the tasks required for this project and the required hazard control techniques.

### **3.2 Task Specific Hazard Assessment**

The following job hazard assessment (JHA) identifies potential health, safety, and environmental hazards associated with each of the general field activities of this project. As mentioned above, because of the complex nature of this project, contractors are required to continually evaluate activities that are included in their scope of work. Because of the complex and changing nature of field projects, supervisors must continually inspect the work site to identify hazards that may affect site personnel, the community, or the environment. The contractor's SS must be aware of these changing conditions and discuss them with the HSS, HSO and the PM whenever these changes impact employee health, safety, the environment, or performance of the project. The SS will keep personnel and subcontractors informed of the changing conditions, and the HSO will write and/or approve addenda or revisions to this HASP as necessary. Not all tasks are applicable to all Contractors. Each Contractor must follow the prescribed hazard control methodologies applicable to the tasks within their scope-of-work and be aware of the impact to other personnel on-site.

The scope of work includes the following field activities:

- General Mobilization
- PHASE I – Building Demolition and Fence Construction

- 
- Clearing and grubbing;
  - Asbestos sampling and investigation with potential for limited removal or abatement;
  - Electrical and mechanical system lockout/tagout;
  - Removal of process equipment;
  - Demolition of building structures;
  - Selective demolition related to equipment removal; and
  - General construction related to fence installation.
  - PHASE II – Preliminary Site Investigation
    - Surface and Subsurface soil sampling using a Geoprobe;
    - Monitoring well installation and groundwater sampling;
    - Surface water and sediment sampling
  - Decontamination
  - Demobilization

Hazard control techniques for the each activity are presented below:

### 3.2.1 Mobilization/Demobilization

Site mobilization may include establishing a field office, receiving materials and equipment, determining the location of utilities and other installations, installing temporary power, and establishing work zones and support areas (break areas, sanitation facilities, etc.). Mobilization may involve clearing areas for a field office if one is required. During this initial phase, project personnel will walk the site to confirm the existence of anticipated hazards and identify health and safety issues that may have arisen since the writing of this plan.

**Hazards:** The hazards of this phase of activity are associated with movement of heavy equipment, manual materials handling, installation of temporary on-site facilities, and manual site preparation. Installation of a temporary field office or support facilities may expose personnel to electrical hazards, underground and overhead utilities, and physical injury due to manual lifting and moving of materials. Manual materials handling and manual site preparation may cause blisters, sore muscles, and joint and skeletal injuries, and may present eye, contusion and laceration hazards. Additionally, the chance of exposure to low levels of COCs is possible during this phase. The flora and fauna of the site may present hazards; poison ivy, poison oak, ticks, fleas, mosquitoes, wasps, spiders, and snakes all may be present. The work area presents slip, trip, and fall hazards from scattered debris and irregular walking surfaces. Hot weather presents heat stress hazards. Freezing-weather hazards include frozen, slick and irregular walking surfaces. Rainy weather may cause wet, muddy, slick walking surfaces and unstable soil-

Demobilization activities include the removal of all equipment and materials from the site. Hazards associated with this activity are similar to hazards associated with mobilization, and will utilize the same control procedures.

**Control:** The selection of PPE to protect against the physical and chemical hazards will be based on observations and measurements made before and during work activities. The levels of airborne particulates and organic vapors will be monitored as necessary to reduce the risk of personnel exposure. Control procedures for general and environmental hazards are discussed in Section 4, General Safety Practices.

### 3.2.2 Phase I Building Demolition and Fence Construction Activities

Construction/demolition activities involve a potential for exposure to many physical and health hazards. Construction/demolition activities on the site may include but are not limited to the following:

- Clearing and grubbing;
- Construction of temporary facilities;
- Demolition of certain buildings; and

- 
- Construction/fence installation.

**Hazards:** Hazards may be associated with the site itself, the materials and equipment being used, environmental conditions, and the activities themselves. As mentioned before, due to the wide variety of hazards on a construction/demolition site, each contractor is required to evaluate their operations and ensure that adequate control measures are in place.

The physical hazards involved with construction/demolition relate to the work done with heavy equipment, hand and power tools, and the construction/demolition site. During construction/demolition related activities there exists a potential for incidents involving personnel being struck by or against equipment or materials, which may result in fractures, lacerations, punctures, and abrasions. Walking and working surfaces during construction/demolition activities may present slip, trip, or fall hazards. Slippery surfaces can increase the likelihood of slips and falls in addition to back and overexertion injuries. Hot work activities such as cutting and welding may present the risk for burns, and a fire or explosion hazard. Overhead hazards such as power lines, steam lines, etc., are present due to elevated work.

Operations on elevated surfaces (catwalks, mezzanines, roofing operations) may expose workers to falls if they are not utilizing the proper fall protection system. Work from ladders, scaffolding, and aerial lifts also exposes employees to fall hazards and injuries should the equipment be used improperly.

Electricity may pose a hazard to employees during the use of portable electrical equipment and cords. Sources of energy that are not locked out and/or tagged out expose personnel to various forms of energy (electrical, mechanical, high pressure, etc.) that could be hazardous during the performance of site tasks. Additionally, employees installing temporary and permanent wiring are exposed to electrical hazards if proper precautions and procedures are not followed, or inexperienced or unqualified personnel conduct the work.

Improper operation of heavy equipment (forklifts, front end loaders, aerial lifts, cranes, etc.) may result in personnel being struck by the equipment or loads being handled, resulting in contusions, fractures, and lacerations. Personnel may be injured and equipment damaged if it is not used for the purpose intended, overloaded, or used improperly by inexperienced or unauthorized individuals. Loads being lifted by cranes may shift causing them to fall and strike personnel causing serious injury or death.

Demolition activities pose the potential for personnel being struck by debris and objects associated with the demolition activities and the equipment being used. Improper planning and procedures may place employees in unsafe situations that may result in serious injury or death.

Due to the type of work involved in many construction activities, the primary health hazards involve repetitive motion diseases, lifting, pushing/pulling, and other ergonomic disorders. Noise may also present a hazard to employees engaged in operation of heavy equipment, power tools, pneumatic tools, and powder-actuated tools. Exposure to construction materials that may release harmful vapors during their use and curing periods is also possible. Abatement of materials such as asbestos and lead presents serious health hazards to personnel if proper procedures are not followed.

**Control:** Prior to initiating each field activity, the site conditions will be discussed with all employees (including subcontractors). Hazards will be identified and protective measures will be explained. Equipment will be inspected prior to usage and be in proper working condition. Employees will receive training in the use and care of equipment that they will be expected to operate prior to assignment. Tasks should be scheduled in a manner that reduces the likelihood of performing a repetitive task for prolonged periods. Proper lifting techniques should be employed, and mechanical means should be used for heavy lifting tasks. Hearing protection is required for use when exposed to noise levels exceeding 85 dBA, or a level that commonly results in difficult conversation.

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Control procedures for general electrical hazards are discussed in Section 4.11, Electrical Safety. Lockout/tagout procedures as specified in 29 CFR 1910.147 shall be followed by personnel that may be exposed to hazardous energy sources. Line breaking activities shall follow all required procedures and regulations (lockout/tagout), and be performed under the supervision of a competent person. Line breaking activities shall not be conducted until the appropriate facility personnel have been consulted. Control procedures for hot work are discussed in Section 4.14, Hot Work Safety Program. Safety during elevated work will conform to the requirements of 29 CFR 1926 Subpart M, Fall Protection. Contractor-developed safety procedures governing the use of scaffolding and aerial lifts and the use of ladders shall conform to the requirements of 29 CFR 1926 Subpart L, Scaffolds and Subpart X, Stairways and Ladders respectively.

Demolition work shall conform to the requirements of 29 CFR 1926 Subpart T, Demolition. A pre-demolition survey as required by 29 CFR 1926.850(a) shall be completed by the contractor prior to demolition activities. All tasks requiring the use of a crane or rigging will be done in accordance with 29 CFR 1926 Subpart N. Removal of hazardous substances and waste materials and cleaning/decontamination of equipment shall be in compliance with 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response (HAZWOPER). Asbestos sampling and removal or abatement shall be done in accordance with applicable North Carolina requirements and associated federal regulations. Asbestos removal personnel shall be trained and hold a North Carolina asbestos handler's certificate.

Demolition activities pose the potential for personnel being struck by debris and objects associated with the demolition activities and the equipment being used. Improper planning and procedures may place employees in unsafe situations that may result in serious injury or death.

Due to the type of work involved in many construction activities, the primary health hazards involve repetitive motion diseases, lifting, pushing/pulling, and other ergonomic disorders. Noise may also present a hazard to employees engaged in operation of heavy equipment, power tools, pneumatic tools, and powder-actuated tools. Exposure to construction materials that may release harmful vapors during their use and curing periods is also possible.

**Control:** Prior to initiating each field activity, the site conditions will be discussed with all employees (including subcontractors). Hazards will be identified and protective measures will be explained. Equipment will be inspected prior to usage and be in proper working condition. Employees will receive training in the use and care of equipment that they will be expected to operate prior to assignment. Tasks should be scheduled in a manner that reduces the likelihood of performing a repetitive task for prolonged periods. Proper lifting techniques should be employed, and mechanical means should be used for heavy lifting tasks. Hearing protection is required for use when exposed to noise levels exceeding 85 dBA, or a level that commonly results in difficult conversation. Control procedures for hazards associated with construction activities are presented in Section 4, Project Hazards and Control Measures.

### **3.2.2.1 Concrete Demolition**

#### ***Concrete Cutting***

**Hazards:** Employees are exposed to several physical hazards while cutting and removing concrete. The primary hazard is cuts, punctures or abrasions resulting from the cutting of the concrete (or asphalt) as the saw blade penetrates the surface. High-speed saws tend to hurl pieces of material at high rates of speed that can cause serious injury to unprotected areas of the body. Serious injury or death can result if an employee makes contact with the rotating saw blades. Cuts or possible amputation are the likely results of this contact. Only properly trained and supervised employees are permitted to operate the saw. Noise is a significant hazard during this operation. Hand operated power saws generate noise exceeding 85 decibels, and therefore require hearing protection. Airborne concentrations of dust from the cutting procedure may pose a health hazard, and PPE is necessary to protect employees from exposure.

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**Control:** All personnel shall wear hearing protection during this phase of the operation, unless monitoring has been done to determine the areas where the noise level is less than 85 dBA. Personnel operating the saw must wear the PPE described in Section 5, Personal Protective Equipment. Only the personnel using the saw are permitted within 25 feet of the cutting area until the saw has stopped operating.

**Concrete Removal**

This task involves breaking concrete with a jackhammer and removing the pieces with a front-end loader.

**Hazards:** Cuts, punctures, or abrasions resulting from improperly placing the hammer bit. High-pressure hammers tend to hurl pieces of material at high speed that can cause serious injury to unprotected areas of the body. Noise is a definite hazard during this operation. Pneumatic hammers generate noise exceeding 85 dBA, and therefore require hearing protection during their use. Airborne concentrations of dust from the breaking procedure may pose a health hazard, and PPE is necessary to protect employees from exposure.

**Control:** All personnel shall wear hearing protection during this operation, unless monitoring has been done to determine the areas where the noise exposure is safe. Personnel operating the jackhammer must wear the PPE described in Section 5, Personal Protective Equipment. Only the personnel using the jackhammer are permitted within 25 feet of the hammering area until the hammer has stopped operating.

**3.2.3 Operation and Maintenance of Site Equipment**

O&M activities involve potential exposures to numerous physical and health hazards. The hazards are primarily associated with the system components, equipment, and specific activities being conducted.

**Hazards:** The physical hazards involved with O&M activities relate to the work done on equipment, use of hand and power tools, materials handling, and the work environment itself. There exists a potential for incidents involving personnel being struck by or struck against moving equipment parts or materials, resulting in fractures, cuts, punctures, or abrasions. Walking and working surfaces may involve slip, trip, and fall hazards. Working at elevations may create a potential fall hazard. Slippery work surfaces can increase the likelihood of back injuries, overexertion injuries, and slips and falls. Outside work areas may present hazards of uneven walking surface, slick or slippery work surfaces, soft terrain, and heat or cold stress.

**Equipment Operations, Maintenance and Repair:** Site workers are exposed to serious hazards during activities on powered equipment. Workers may be struck by a moving part or by flying material thrown by powered equipment. The potential for exposure to hazardous energy or accidental start-up exists resulting in shock, electrocution, and being caught in or between moving equipment.

O&M activities may include confined space entry, work at elevation, hot work operations (welding, cutting, and grinding), and line breaking. Chemical exposure is also possible during maintenance activities such as line breaking.

**Materials Handling:** Manual materials handling may cause blisters, sore muscles, and joint and skeletal injuries; and may present eye, contusion, and laceration hazards. The most common type of injury that occurs in material handling operations is the "caught between" situation when a load is being handled and a finger or toe gets caught between two objects.

**Health Hazards:** Due to the type of work involved in O&M activities, the primary health hazards involve ergonomic disorders such as repetitive motion and lifting. Noise may also present a hazard. Operation of system components and associated equipment may result in high noise levels. Exposure to environmental media containing site COC is possible. During system O&M activities personnel may handle or use chemicals. The specific material may present a potential for inhalation, skin contact and eye contact hazard.

**Control:** Prior to initiating O&M activities, the equipment operation and scheduled activities will be explained to all employees (including subcontractors). Hazards will be identified and protective measures will be explained. Equipment will be inspected and in proper working condition. Employees shall receive training to address the equipment's operation and care. Only trained employees will perform O&M activities. Mechanical assistance shall be provided for large lifting tasks. Hearing protection is required for use when personnel are exposed to noise levels exceeding 85 dBA, or a level that commonly results in difficult conversation. Confined space entry, hot work, and line breaking activities require the use of a permit. Permits for these activities shall be filled out and reviewed by the SS or HSS prior to initiating work.

### 3.2.3.1 Overhead Electrical Clearances

If excavation activities or mechanical equipment use is required in the vicinity of overhead power lines, the power to the lines must be de-energized, or the equipment must be positioned such that no part, including the excavation boom can come within the minimum clearances as follows:

Nominal System Voltage	Minimum Required Clearance
0 to 50kV	10 feet
51kV to 100kV	12 feet
101kV to 200kV	15 feet
201kV to 300kV	20 feet
301kV to 500kV	25 feet
501kV to 750kV	35 feet
751kV to 1000kV	45 feet

When the equipment is in transit, with the boom lowered and no load, the equipment clearance must be at least 4 feet for voltages less than 50kV, 10 feet for voltages of 50 kV to 345 kV, and 16 feet for voltages above 345 kV.

### 3.2.3.2 Heavy Equipment Materials Handling

To protect on-site personnel against hazards associated with materials handling, and to prevent injury due to unsafe heavy equipment operation, only properly trained and authorized personnel will be allowed to operate heavy equipment. All materials handling equipment will be maintained in a safe operating condition and inspected daily prior to use.

General heavy equipment safety requirements include:

- Prior to operating any heavy equipment, the authorized operator must conduct a pre-operation inspection to determine if the heavy equipment is in safe operating condition prior to each work shift;
- All mobile equipment shall be equipped with an audible back-up alarm;
- Personnel will not be allowed to stand or pass under the elevated portion of any heavy equipment, whether loaded or empty;
- Personnel will not place arms and legs between pinch or scissor points of the equipment or outside the operator enclosure;
- A safe distance shall be maintained from the edge of excavations, ditches, ramps, or platforms;
- Operators will maintain sufficient clearance under overhead utilities, installations, lights, pipes, etc.;
- Heavy equipment must never be used for lifting or transporting personnel;
- The operator is required to look in the direction of, and maintain a clear view of the path of travel;
- Heavy equipment shall not be operated without an overhead guard and roll-over protection to protect the operator against falling objects and equipment roll-over;
- Heavy equipment must not be driven up to anyone standing in front of any object;
- Stunt driving and horseplay are strictly prohibited;

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- Operators will yield the right-of-way to other site vehicles;
  - Other heavy equipment traveling in the same direction, at intersections, blind spots, or other dangerous locations must not be passed;
  - A safe distance must be maintained from other heavy equipment, and the equipment must be kept under control at all times;
  - The heavy equipment operator must slow down for wet and slippery conditions. Under all travel conditions the equipment will be operated at a speed that will permit it to be brought to a stop in a safe manner;
  - Operators will avoid running over loose objects on operating surfaces;
  - Grades and ramps must be ascended and descended slowly;
  - On all grades, the load will be tilted back, and raised only as far as necessary to clear the operating surface;
  - The operator will slow down and sound the horn at intersections, when entering buildings, and other locations where vision may be obstructed;
  - If the load being carried obstructs forward view, the operator will travel with the load trailing;
  - While negotiating turns, speed will be reduced to a safe rate, and turning will be in a smooth, sweeping motion to avoid abrupt turns and potential equipment or load upset; and
  - Authorized operators will only handle stable or safely arranged loads that are within the rated capacity of the heavy equipment and will not affect the stability of the heavy equipment.

### **3.2.3.3 Heavy Equipment Inspection and Maintenance**

All heavy equipment in use shall be checked at the beginning of each shift to assure that the following parts, equipment, and accessories are in safe operating condition and free of apparent damage: brakes, parking brake, tires, horn, steering, coupling devices, set belts, operating controls, back up alarm, and safety devices. All defects affecting safe operation shall be corrected before the vehicle is placed into service. These requirements also apply to equipment such as lights, reflectors, windshield and windshield wipers, fire extinguishers, etc, where such equipment is necessary.

Vehicle engines shall not be allowed to run in enclosed places unless vents are provided which effectively remove the exhaust gases from the building.

Except for emergency repairs, a safety tire rack, cage, or equivalent protection shall be used when inflating truck or equipment tires after mounting on the rim, if such tires depend upon a locking ring or similar device to hold them on the rim.

No repairs shall be attempted on heavy equipment until arrangements are made to eliminate possibility of injury caused by sudden movements or operation of the equipment or its parts.

All controls shall be in a neutral position, with the engine stopped and brakes set, unless work being performed requires otherwise. Trucks with dump bodies shall be equipped with positive means of support, permanently attached, and capable of being locked in position to prevent accidental lowering of the body while maintenance or inspection work is being performed. In all cases where the body is raised for any work, a locking device shall be used.

### **3.3 Phase II Preliminary Site Investigation - Installation of Soil Borings and Wells/Sampling**

This task includes the installation of soil borings and wells at specified locations. After installation, the wells will be developed using the standard operating procedures.

The collection of soil samples will involve the use of direct-push type boring equipment. The equipment poses a hazard if it is not properly operated. The presence of overhead utilities and underground obstacles poses a hazard if boring equipment contacts them. As the hazards are similar to those encountered when using a conventional drill rig, the required control procedures are also the same as a conventional rig and are included in the following sections.

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### 3.3.1 Drilling Hazards

The primary physical hazards for this activity are associated with the use of drilling equipment. Rig accidents can occur as a result of improperly placing the rig on uneven or unstable terrain, or failing to adequately secure the rig prior to the start of operations. Exposure to vehicular traffic may create hazards to personnel involved with drilling activities. Underground and overhead utility services can create hazardous conditions if contacted by drilling equipment. Tools and equipment, such as elevators, cat lines, and wire rope have the potential for striking, pinning, or cutting personnel.

**Wire Rope** - Worn or frayed wire rope presents a laceration hazard if loose wires protrude from the main bundle.

**Cat Lines** - Cat lines are used on drilling rigs to hoist material. Hazardous incidents that occur during cat line operations may injure the employee doing the rigging as well as injure the operator. Minimal hoisting control causes sudden and erratic load movements, which may result in hand and foot injuries.

**Working Surfaces** - Slippery work surfaces can increase the likelihood of back injuries, overexertion injuries, and slips and falls.

**Materials Handling** - The most common type of accident that occurs in material handling operations is the "caught between" situation when a load is being handled and a finger or toe gets caught between two objects. Rolling stock can shift and/or fall from a pipe rack or truck bed.

#### 3.3.1.1 Drilling Safety Procedures

These safety procedures apply to both traditional drill rigs and Geoprobe rigs.

**Drill Crews** - All drillers must possess required state or local licenses to perform such work. All members of the drill crew shall receive site-specific training prior to beginning work.

The driller is responsible for the safe operation of the drill rig, as well as the crew's adherence to the requirements of this HASP. The driller must ensure that all safety equipment is in proper condition and is properly used. The members of the crew must follow all instructions of the driller, wear all PPE, and be aware of all hazards and control procedures. The drill crews must participate in the site safety meetings and be aware of all emergency procedures.

**Rig Inspection** - Each day, prior to the start of work, the drill rig and associated equipment must be inspected by the driller and/or drill crew. The following items must be inspected:

- Vehicle condition;
- Proper storage of equipment;
- Condition and/or operation of all controls, wire rope, and hydraulic lines;
- Fire extinguisher; and
- First aid kit.

**Drill Rig Setup** - The drill rig must be properly blocked and leveled prior to raising the derrick. The wheels that remain on the ground must be chocked. The leveling jacks shall not be raised until the derrick is lowered. The rig will be moved only after the derrick has been lowered.

**Control** - Before drilling, the existence and location of underground pipe, electrical equipment, and gas lines shall be determined. This will be done, if possible, by contacting the appropriate client representative to mark the location of the lines. If the client's knowledge of the area is incomplete, an appropriate device, such as a magnetometer, will be used to locate the line. The Underground/Overhead Utility Checklist (See Attachments) shall be used to document

that nearby utilities have been marked on the ground, and that the drilling areas have been cleared. The completed checklist will be in the possession of the SS prior to commencement of any intrusive investigation.

Combustible gas readings of the general work area will be made regularly (see Section 9, Site Monitoring).

Operations must be suspended and corrective action taken if the airborne flammable concentration reaches 10% of the lower explosive limit (LEL) in the immediate area (a one-foot radius) of the point of drilling, or near any other ignition sources.

Personnel shall not be permitted to ride the traveling block or elevators, nor will the cat line be used as a personnel carrier.

Site Drilling Rules - Before drilling, the existence and location of underground pipe, electrical equipment, gas lines, underground storage tanks (USTs) and other utilities will be determined. The following pre-drilling protocol will be followed to prevent damage to subsurface utilities and structures.

If available, a thorough review of site plans and/or as built will be conducted. Prior to any subsurface activities, the necessary permits and utility clearances must be obtained. A utility markout will be conducted at the site to locate all subsurface utilities (gas, electrical, telephone, sewers). If conditions allow, a thin metal rod will be used to probe the surface by had to a depth of 3 to 4 feet to identify subsurface utilities. The site plans will then be updated with the information obtained from the markout. During the markout the location of all above ground utilities and existing remediation systems will also be identified. No drilling will be performed with five (5) feet of a utility mark out. The Underground/Overhead Utility Checklist (see Attachment H) shall be used to document that nearby utilities have been identified and marked out on the ground. The checklist must be in the possession of the SS prior to commencement of intrusive activities at the site.

Drilling locations will be selected based on the information obtained from the review of site plans, the utility markout, and regulatory requirements. Drilling locations will avoid "critical zones" when possible. Critical zones are established on a site by site basis and vary depending on the business operation and site layout. Critical zones will be identified by contacting the appropriate client representative. Following identification of drilling locations and prior to intrusive activities, the drilling plan must be reviewed and approved by the ExxonMobil Global Remediation Project Manager. If for any reason a drilling location must be relocated outside of approved limits the ExxonMobil Global Remediation Project Manager must be contacted prior to proceeding.

In order to prevent scheduling conflicts and to arrange for site access, the following ExxonMobil personnel must be contacted, as applicable, prior to arriving on the site:

- Global Remediation Project Manager; and
- Property owner for private property.

All BBL and subcontractor personnel will receive training in accordance with applicable regulations, and be familiar with the requirements and procedures contained in this HASP prior to initiating site activities. In addition, all personnel will attend an initial hazard briefing prior to beginning work at the site.

The SS must observe all surface removal, hand digging/augering, and drilling on the site. No intrusive work is to be conducted without the SS in attendance. If at any time, during intrusive work, the SS notes any warning signs of unidentified or previously unknown subsurface structures or utilities, all work in the area shall cease and the ExxonMobil Global Remediation Project Manager will be contacted. The following are warning signs that may indicate the presence of subsurface structures:

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- Pea gravel, sand, or non-indigenous material;
  - The absence of soil recovery in a hand auger;
  - Any unexpected departure from native soil conditions as established in other on site digging.

If any portion of a tank, line, utility, or other subsurface structure is encountered or may have been encountered, all work in the area is to cease and the ExxonMobil Global Remediation Project Manager must be contacted immediately. The ExxonMobil Global Remediation Project Manager will decide if additional uncovering by hand is required. Under no circumstances is the area to be backfilled without notifying the ExxonMobil Global Remediation Project Manager and receiving an approval to proceed.

**Overhead Electrical Clearances** – If drilling is conducted in the vicinity of overhead power lines, the lines must be de-energized, or the equipment must be positioned such that no part, including the rig boom can come within the minimum clearances as indicated in the electrical clearance section in 3.2.3.1.

**Rig Setup** – The driller shall inspect all proposed well sites prior to drilling operations to verify a stable surface exists for the setup of the drill rig. This is especially important in areas where soft, unstable terrain is common.

All rigs will be properly blocked and leveled prior to raising the derrick. Blocking provides a more stable drilling structure by evenly distributing the weight of the rig. Proper blocking ensures that differential settling of the rig does not occur. When the ground surface is soft or otherwise unstable, wooden blocks, at least 24 inches by 24 inches and 4 inches to 8 inches thick, shall be placed between the jack swivels and the ground. The emergency brake shall be engaged, and the wheels that are on the ground shall be chocked.

**Hoisting Operations** – Drillers shall not engage the rotary clutch without watching the rotary table, and ensuring it is clear of personnel and equipment.

Unless the drawworks is equipped with an automatic feed control, the brake should not be left unattended without first being tied down.

Auger strings or casing shall be picked up slowly.

During instances of unusual loading of the derrick or mast, such as when making an unusually hard pull, only the driller should be on the rig floor; no one else should be on the rig or derrick.

The driller shall test the brakes on the drawworks of the drill rig each day. The brakes shall be thoroughly inspected by a competent individual each week.

A hoisting line with a load imposed shall not be permitted to be in direct contact with any derrick member or stationary equipment, unless it has been specifically designed for line contact.

Workers shall not stand near the borehole whenever any wire line device is being run.

Hoisting control stations shall be kept clean and controls labeled as to their functions.

**Cat Line Operations** – Only experienced personnel will be allowed to operate the cathead controls. The kill switch must be clearly labeled and operational prior to operation of the cat line. The cathead area must be kept free of obstructions and entanglements.

The operator should not use more wraps than necessary to pick up the load. More than one layer of wrapping is not permitted.

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Personnel shall not stand near, step over, or go under a cable or cat line that is under tension.

Employees rigging loads on cat lines shall:

- Keep out from under the load;
- Keep fingers and feet where they will not be crushed;
- Be sure to signal clearly when the load is being picked up;
- Use standard visual signals only and not depend on shouting to co-workers; and
- Make sure the load is properly rigged, since a sudden jerk in the cat line will shift or drop the load.

**Wire Rope** – When two wires are broken, or rust or corrosion is found adjacent to a socket or end fitting, the wire rope shall be removed from service or resocketed. Special attention shall be given to the inspection of end fittings on boom support, pendants, and guy ropes.

Wire rope removed from service due to defects shall be cut up or plainly marked as being unfit for further use as rigging.

Wire rope clips attached with U-bolts shall have the U-bolts on the dead or short end of the rope; the clip nuts shall be re-tightened immediately after initial load carrying use and at frequent intervals thereafter.

When a wedge socket fastening is used, the dead or short end of the wire rope shall have a clip attached to it or it shall be looped back and secured to itself by a clip; the clip shall not be attached directly to the live end.

Protruding ends of strands in splices on slings and bridles shall be covered or blunted.

Except for eye splices in the ends of wires and for endless wire rope slings, wire rope used in hoisting, lowering, or pulling loads, shall consist of one continuous piece without knot or splice.

An eye splice made in any wire rope shall have not less than five full tucks.

Wire rope shall not be secured by knots. Wire rope clips shall not be used to splice rope.

Eyes in wire rope bridles, slings, or bull wires shall not be formed by wire clips or knots.

**Auger Handling** – Auger sections shall be transported by cart or carried by two persons. Individuals should not carry auger sections without assistance. Personnel carrying auger sections shall use proper lifting techniques.

Workers should not be permitted on top of the load during loading, unloading, or transferring of rolling stock.

When equipment is being hoisted, personnel should not stand where the bottom end of the equipment could whip and strike them.

Augers stored in racks, catwalks, or on flatbed trucks should be secured to prevent rolling.

### **3.3.2 Soil Sampling**

Field sampling operations will involve the collection of soil for subsequent analysis and evaluation of potential site contamination. The physical hazards of these operations are primarily associated with the sample collection methods and procedures utilized.

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During the course of this project, the sampling methods may include hand-auger/sampling probes, manual coring devices, and hand trowels. Inhalation and absorption (contact) of contaminants are the primary routes of entry associated with soil sampling due to the manipulation of sample media and equipment, manual transfer of media into sample containers, and proximity of operations to the breathing zone. To control dermal exposure during soil sampling activities, a minimum of Level D protection will be worn. Air sampling may be conducted during soil sampling to assess the potential for exposure to airborne contaminants. The SS will make decisions regarding PPE usage for the protection against chemical hazards based on the information in Section 5, Personal Protective Equipment, and measurements made before and during work activities. Refer to Section 8, Air Monitoring for a description of air monitoring requirements and action levels.

### 3.3.3 Groundwater Sampling/Monitoring

Groundwater sampling/monitoring will involve uncapping, purging (pumping water out of the well), and sampling/monitoring new and existing monitoring wells. A mechanical pump may be utilized to purge the wells and can be hand-, gas-, or electric-operated. Water samples taken from the wells are then placed in containers and shipped to the analytical laboratory for analysis. The physical hazards of these operations are primarily associated with the sample collection methods and procedures utilized.

**Hazards:** Inhalation and absorption (contact) of COCs are the primary routes of entry associated with groundwater sampling due to the manipulation of sample media and equipment, manual transfer of media into sample containers, and proximity of operations to the breathing zone. During the course of this project, several different groundwater sampling methodologies may be utilized based on equipment accessibility and the types of materials to be sampled. These sampling methods may include hand or mechanical bailing. The primary hazards associated with these specific sampling procedures are not potentially serious; however, other operations in the area, or the conditions under which samples must be collected may present chemical and physical hazards. The hazards directly associated with groundwater sampling procedures are generally limited to strains/sprains from hand bailing and potential eye hazards. Exposure to soil and water containing COCs is also possible. In addition to the safety hazards specific to sampling operations, hazards associated with the operation of vehicles, especially large vehicles with limited operator visibility, is a concern. Of particular concern will be the backing up of trucks, excavation equipment, and other support vehicles.

The flora and fauna of the site may present hazards of poison ivy, poison oak, ticks, fleas, mosquitoes, wasps, spiders, and snakes. The work area presents slip, trip, and fall hazards from scattered debris and irregular walking surfaces. Freezing-weather hazards include frozen, slick, and irregular walking surfaces. Rainy weather may cause wet, muddy, slick walking surfaces and unstable soil.

**Control:** To control dermal exposure during groundwater sampling/monitoring activities, a minimum of Level D protection will be worn. Air monitoring may be conducted during groundwater sampling/monitoring activities to assess the potential for exposure to airborne COCs. If the results of air monitoring indicate the presence of organic vapors in a concentration causing concern, personnel will upgrade to Level C protection. Refer to Section 8, Site Monitoring for a description of air monitoring requirements and action levels. A description of each level of personal protection is included in Section 5, Personal Protective Equipment. Control procedures for environmental and general hazards are discussed in Section 4, General Safety Practices.

### 3.3.4 Excavation Hazards and Control Procedures

This task involves removing earthen materials from a designated area, thereby creating a man-made cut, trench, or depression in the earth's surface. It is not anticipated that excavation work will be required, however if it is required the following procedures will be followed.

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The physical hazards involved in the excavation of soils are related to the excavation itself and the operation of heavy equipment. The presence of overhead utilities such as power lines requires careful positioning of the excavating equipment in order to maintain a safe distance between the lines and the closest part of the equipment. The presence of underground utilities such as gas lines, power lines, water lines and sewer pipes must be determined prior to beginning the excavation.

Excavations pose significant hazards to employees if they are not carefully controlled. There exists a chance for the excavation to collapse if it is not dug properly, sloped, benched or shored as required by 29 CFR 1926 Subpart P. The excavation also is a fall hazard, and employees must pay careful attention to what they are doing or they risk a fall into the excavation.

Some activities may require personnel to enter an excavation. Whenever feasible, equipment placement and other activities shall be done remotely, without entering the excavation. If entry is absolutely unavoidable, the safety procedures for excavation entry and employee protective systems consistent with 29 CFR 1926 Subpart P, shall be followed for each such activity. Air monitoring in accordance with Section 9, Site Monitoring, is required for all excavation entry activities.

Noise also may present a hazard. Heavy equipment operation frequently results in noise levels exceeding 85 dBA, requiring the use of hearing protection.

At the end of each workday, open test pit excavations will be backfilled or covered and fenced to prevent access. Equipment will be moved to a location away from high-voltage electrical equipment and away from routes necessary to access high-voltage electrical equipment.

Airborne concentrations of COCs in the site soil and the dust from the excavation procedure pose the potential for exposure at this stage. PPE for this phase is described in Section 6, Personal Protective Equipment. Airborne particulate generation will be controlled during site excavations. Dry, dusty soil will be wetted with a water spray from a potable water source to control the generation of dust. Soil will not be wetted to a degree which will cause runoff or erosion.

Before excavation activities commence, the existence and location of underground pipe, electrical equipment, and gas lines shall be determined. This will be done, if possible, by contacting the appropriate client representative to mark the location of the lines. If the client's knowledge of the area is incomplete, an appropriate device, such as a magnetometer, will be used to locate the line. The SS will conduct a site walkover with the appropriate client representative to visually identify each location where excavation and drilling activities are to be completed during site operations. The Underground/Overhead Utility Checklist (See Attachments) shall be used to document that nearby utilities have been marked on the ground, and that the excavation and drilling areas have been cleared. The completed checklist will be in the possession of the SS prior to commencement of any intrusive investigation.

All excavation activities shall be conducted in accordance with 29 CFR 1926 Subpart P. If excavation operations are located near underground installations, the exact location of the installations must be determined by safe and acceptable means. While the excavation is open, underground installations must be protected, supported or removed as necessary to safeguard employees.

#### **3.3.4.1 Excavation Access, Egress, and General Requirements**

Structural ramps used for access or egress of personnel and equipment must be designed by a competent person qualified in structural design, and must be constructed in accordance with the design. Ramps and runways constructed of two or more structural members must have the structural members connected together to prevent displacement. Structural members used for ramps and runways must be of uniform thickness. Cleats or other appropriate means used to connect runway structural members must be attached to the bottom of the runway or must be attached in a manner

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to prevent tripping. Structural ramps used in lieu of steps must be provided with cleats or other surface treatments to the top surface to prevent slipping.

A stairway, ladder, ramp or other safe means of egress must be located in trench excavations that are 4 feet or more in depth, so as to require no more than 25 feet of lateral travel for employees.

No person shall be permitted underneath loads handled by lifting or excavating equipment. Site personnel must be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped to provide adequate protection for the operator during loading and unloading operations.

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

To prevent exposure to harmful levels of atmospheric constituents and to assure acceptable atmospheric conditions, the following requirements apply:

- Where oxygen deficiency (atmospheres containing less than 19.5% oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are stored nearby, the atmosphere in the excavation must be tested before employees enter the excavation.
- Adequate precautions must be taken to prevent employee exposure to atmospheres containing less than 19.5% oxygen and other hazardous atmospheres.
- Adequate precaution must be taken such as providing ventilation, to prevent employee exposure to an atmosphere containing a concentration of a flammable gas in excess of 10% of the LEL of the gas.
- When controls are used that are intended to reduce the level of hazardous atmospheric constituents to acceptable levels, testing must be conducted as often as necessary to ensure that the atmosphere remains safe.

Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, must be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. Support personnel must attend this equipment when in use.

Employees must not work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees adequately vary with each situation, but could include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline. If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operations must be monitored by a competent person to ensure proper operation.

If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes, or other suitable means must be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation. Excavations subject to runoff from heavy rains will require an inspection by a competent person.

Where the stability of adjoining buildings, walls, or other structures may be compromised by excavation operations, support systems such as shoring, bracing, or underpinning must be provided to ensure the stability of such structures for the protection of employees. Excavation below the level of the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard to employees is not permitted except when:

- 
- A registered professional engineer has approved the determination that the structure is sufficiently removed from the excavation so as to be unaffected by the excavation activity; or
  - A registered professional engineer has approved the determination that such excavation work will not pose a hazard to employees.

Sidewalks, pavements and appurtenant structures must not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures. Adequate protection must be provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection must consist of scaling to remove loose material; installation of protective barricades at intervals as necessary on the face to stop and contain falling material; or other means that provide equivalent protection.

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

Personnel entering an excavation must do so under controlled conditions. The excavation must be properly sloped, benched, or shored, and ladders or ramps must be available every 25 feet laterally in the excavation. Each entry shall have an attendant who observes the entrant(s) and is prepared to render assistance.

#### *Duties of Personnel Entering an Excavation*

- Knows the hazards that may be encountered during entry into the excavation, including information on the mode, signs or symptoms, and consequences of exposure to site contaminants;
- Communicates with the attendant as necessary to enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate the excavation;
- Alerts the attendant to any symptom of exposure or warning sign of a dangerous situation; and
- Exits from the excavation as quickly as possible if an order to evacuate is given by the attendant or a supervisor, and if an entrant recognizes any symptom of exposure or warning sign of a dangerous situation.

#### *Duties of Attendants*

- Knows the hazards that may be encountered during entry into the excavation, including information on the mode, signs or symptoms, and consequences of exposure to site contaminants;
- Maintains a count of entrants in the excavation;
- Remains outside the excavation during and until the conclusion of entry operations or relieved by another attendant;
- Communicates with the entrant(s) as necessary to monitor entrant status and to alert entrants of the need to evacuate the excavation under any of the following conditions:
  - If the attendant detects a hazardous condition either inside or outside of the excavation that could endanger the entrant(s);
  - If the attendant detects the behavioral effects of exposure to a hazardous atmosphere in an entrant; and
  - If the attendant cannot effectively and safely perform his duties.
- Summons rescue and other emergency services if entrants may need assistance to evacuate the excavation.

### 3.3.4.2 Inspections by a Competent Person

Daily inspections of excavations, the adjacent areas, and protective systems must be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection must be conducted by the competent person prior to the start of work and as needed throughout the shift. See the attached Daily/Periodic Excavation Inspection Form in Attachment M.

Inspections also must be made after every rainstorm or other hazard-increasing occurrence. These inspections are only required when employee exposure can be reasonably anticipated. Where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees must be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

Walkways must be provided where employees or equipment are required or permitted to cross over excavations. Guardrails must be provided where walkways are 6 feet or more above lower levels. Adequate barrier protection must be provided at all remotely located excavations. All wells, pits, shafts, etc., must be barricaded or covered. Upon completion of exploration and other similar operations, temporary wells, pits, shafts, etc., must be backfilled.

### 3.3.4.3 Soil Classification

29 CFR 1926 Subpart P describes methods of classifying soil and rock deposits based on site and environmental conditions and on the structure and composition of the earth deposits. The subpart contains definitions, sets forth requirements, and describes acceptable visual and manual tests for use in classifying soils. This section also applies when timber shoring for excavations is designed as a method of protection from cave-ins.

Maximum allowable slope means the steepest incline of an excavation face that is acceptable for the most favorable site conditions as protection against cave-ins, and is expressed as the ratio of horizontal distance to vertical rise (H:V). Short-term exposure means a period of time less than or equal to 24 hours that an excavation is open. Soil and rock deposits must be classified in accordance with Subpart P. The maximum allowable slope for a soil or rock deposit must be determined from Table 3-1. The actual slope must not be steeper than the maximum allowable slope. The actual slope must be less steep than the maximum allowable slope, when there are signs of distress. If that situation occurs, the slope must be cut back to an actual slope which is at least ½ horizontal to one vertical (1/2H:1V) less steep than the maximum allowable slope. When surcharge loads from stored material or equipment, operating equipment, or traffic are present, a competent person must determine the degree to which the actual slope must be reduced below the maximum allowable slope, and must assure that such reduction is achieved. Surcharge loads from adjacent structures must be evaluated in accordance with this table.

TABLE 3-1  
MAXIMUM ALLOWABLE SLOPES

Soil Type	Maximum Allowable Slopes (H:V) <sup>(1)</sup> for Excavations Less Than 20 Feet Deep <sup>(3)</sup>
Stable Rock	Vertical (90°)
Type A <sup>(2)</sup>	¾:1 (53°)
Type B	1:1 (45°)
Type C	1 ½:1 (34°)

Footnote (1) Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.

Footnote (2) A short-term maximum allowable slope of ½:1 (63°) is allowed in excavations in Type A soil that are 12 feet or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet in depth must be ¾:1 (53°).

Footnote (3) Sloping or benching for excavations greater than 20 feet deep must be designed by a registered professional engineer.

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### 3.4 Confined Space Entry

A confined space is defined as a space that has the following characteristics:

- Limited entry and exit
- Not designed for continuous human occupancy
- Can be entered to perform work.

It is not anticipated that any confined space work will be required for this project. If at all possible confined space entry will be avoided through use of remote techniques. If confined space entry is required, the space must be completely evaluated for hazards and a confined space entry addendum added to this plan. No one will enter a confined space without first notifying the General contractor and developing an addendum to this plan that covers the confined space entry.

# 4. General Safety Practices

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## 4.1 General Practices

General safety procedures for site activities include, but are not limited to the following:

- All on-site personnel must receive a contractor HSE orientation prior to beginning work on the site.
- At least one copy of this plan must be at the project site, in a location readily available to all personnel, and reviewed by all project personnel prior to starting work.
- Each contractor shall keep at least one copy of any site-specific procedures and/or Company specific policies at the project site, in a location readily available to their personnel and reviewed by their personnel and personnel that may be affected by their operations.
- Food and beverages shall only be consumed in designated areas.
- Smoking will only be allowed in designated areas.
- All injuries, illnesses, near misses, or property damage must be reported immediately to the SS or HSS.
- All unsafe conditions or work practices must be reported immediately to the SS or the HSS.
- Maintain all work areas in a neat and orderly manner. Do not let debris and trash accumulate.
- Use only the correct tool for the job.
- Obey all warning signs, tags, and barriers. Do not remove any warnings unless authorized to do so.
- Keep all exits, entrances, and aisles clear and free from obstructions.
- Use, adjust, alter, and repair equipment only if trained and authorized to do so, and then only according to the manufacturer's directions.
- Employees shall perform only tasks for which they have been properly trained; employees will advise the SS or HSS if they have been assigned a task for which they are not trained.
- Properly handle, store, and transport all hazardous substances (i.e. gasoline, diesel fuel, acetylene etc.).
- Perform all work in a manner which is safety conscious and appropriate to the trade.
- Always use proper lifting techniques.
- Emergency equipment such as eyewash, fire extinguishers, etc., must be staged in readily accessible locations, known to all project personnel.
- Follow all applicable health and safety policies, procedures, and regulations.
- Correctly use all PPE as required.

## 4.2 Hazard Communication

A Material Safety Data Sheet (MSDS) must accompany all materials brought to the site and all identified COCs. Copies of MSDSs shall be submitted to the engineer for review. No material shall be used or installed by any contractor prior to the MSDS for the product being reviewed. Copies shall be made and placed in the on-site MSDS binder as designated by the engineer. The location of the MSDS binder shall be communicated to all on-site employees. All provisions of 29 CFR 1910.1200 are to be followed with regard to materials that are to be used during site activities. A copy of each contractor's Hazard Communication Program must be available for review. At a minimum the Hazard Communication Program shall contain the following components:

- List of chemicals brought to the site;
- MSDS management procedures;
- Employee training procedures;
- Container labeling procedures;
- Employer-employee information flow; and
- Communication procedures for multi-employer work sites.

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#### 4.2.1 Chemical Hazards

The chemical hazards associated with site operations are related to inhalation of, ingestion of, and skin or eye contact with site COCs. A list of COCs potentially present on the site is included in Attachment I.

Airborne concentrations of COCs during certain site tasks may present a hazard, and may require air monitoring of potentially toxic and flammable atmospheres during such operations. Air monitoring requirements for site tasks are covered in Section 8 of this HASP.

#### 4.3 Buddy System

All on-site personnel involved in hazardous waste operations must use the buddy system. Use of the buddy system is required during all operations requiring Level C to Level A PPE, and when appropriate, during Level D operations. Additionally, the buddy system must be used during work along roadways or any other area where vehicles may pose a risk to field personnel. Visual contact must be maintained between crew members at all times, and crew members must observe each other for signs of chemical exposure, heat or cold stress. Indications of adverse effects include, but are not limited to:

- Changes in complexion and skin coloration;
- Changes in coordination;
- Changes in demeanor;
- Excessive salivation and pupillary response; and
- Changes in speech pattern.

Team members must also be aware of potential exposure to possible safety hazards, unsafe acts, or non-compliance with safety procedures.

Employees must inform their fellow team members of non-visible effects of exposure to toxic materials. The symptoms of such exposure may include:

- Headaches;
- Dizziness;
- Nausea;
- Blurred vision;
- Cramps; and/or
- Irritation of eyes, skin, or respiratory tract.

If protective equipment or noise levels impair communications, prearranged hand signals must be used for communication. Personnel must stay within line of sight of another team member.

#### 4.4 Emergency Equipment

Adequate emergency equipment for the activities conducted on-site and as required by applicable sections of 29 CFR 1910 and 29 CFR 1926 shall be maintained by each contractor. Personnel will be provided with access to emergency equipment including but limited to the following:

- Emergency eyewash and shower meeting ANSI Z358.1-1998.
- Fire extinguishers of adequate size, class, number, and location as required by applicable sections of 29 CFR 1910 and 29 CFR 1926.

- 
- Industrial First Aid Kit of adequate size for number of personnel on-site. All first aid kits should include PPE necessary for Body Substance Isolation (BSI) to protect emergency first aid providers from bloodborne pathogens (BBP). These items may include, but are not limited to the following:
    - Latex examination gloves;
    - Eye protection;
    - Mouth shield for cardiopulmonary resuscitation (CPR);
    - Face protection (disposable mask); and
    - Biohazard bags for the disposal of materials used during treatment.

#### 4.5 Heat Stress

Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, etc., as well as the physical and conditioning characteristics of the individual. Since heat stress is one of the most common illnesses associated with heavy outdoor work conducted with direct solar load and, in particular, because wearing PPE can increase the risk of developing heat stress, workers must be capable of recognizing the signs and symptoms of heat-related illnesses. Personnel must be aware of the types and causes of heat-related illnesses and be able to recognize the signs and symptoms of these illnesses in both themselves and their co-workers.

*Heat rashes* are one of the most common problems in hot work environments. Commonly known as prickly heat, a heat rash is manifested as red papules and usually appears in areas where the clothing is restrictive. As sweating increases, these papules give rise to a prickling sensation. Prickly heat occurs in skin that is persistently wetted by unevaporated sweat, and heat rash papules may become infected if they are not treated. In most cases, heat rashes will disappear when the affected individual returns to a cool environment.

*Heat cramps* are usually caused by performing hard physical labor in a hot environment. These cramps have been attributed to an electrolyte imbalance caused by sweating. It is important to understand that cramps can be caused both by too much and too little salt.

Cramps appear to be caused by the lack of water replenishment. Because sweat is a hypotonic solution (plus or minus 0.3% NaCl), excess salt can build up in the body if the water lost through sweating is not replaced. Thirst cannot be relied on as a guide to the need for water; instead, water must be taken every 15 to 20 minutes in hot environments.

Under extreme conditions, such as working for 6 to 8 hours in heavy protective gear, a loss of sodium may occur. Drinking commercially available carbohydrate-electrolyte replacement liquids is effective in minimizing physiological disturbances during recovery.

*Heat exhaustion* occurs from increased stress on various body organs due to inadequate blood circulation, cardiovascular insufficiency, or dehydration. Signs and symptoms include pale, cool, moist skin; heavy sweating; dizziness; nausea; headache, vertigo, weakness, thirst, and giddiness. Fortunately, this condition responds readily to prompt treatment.

Heat exhaustion should not be dismissed lightly, however, for several reasons. One is that the fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation that should not be left unattended; moreover, the victim may be injured when he or she faints. Also, the signs and symptoms seen in heat exhaustion are similar to those of heat stroke, which is a medical emergency.

Workers suffering from heat exhaustion should be removed from the hot environment, be given fluid replacement, and be encouraged to get adequate rest.

**Heat stroke** is the most serious form of heat stress. Heat stroke occurs when the body's system of temperature regulation fails and the body's temperature rises to critical levels. This condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict.

Heat stroke is a medical emergency. The primary signs and symptoms of heat stroke are confusion; irrational behavior; loss of consciousness; convulsions; a lack of sweating (usually); hot, dry skin; and an abnormally high body temperature. If body temperature is too high, it causes death. The elevated metabolic temperatures caused by a combination of work load and environmental heat load, both of which contribute to heat stroke, are also highly variable and difficult to predict.

If a worker shows signs of possible heat stroke, professional medical treatment should be obtained immediately. The worker should be placed in a shady area and the outer clothing should be removed. The worker's skin should be wetted and air movement around the worker should be increased to improve evaporative cooling until professional methods of cooling are initiated and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible. The medical outcome of an episode of heat stroke depends on the victim's physical fitness and the timing and effectiveness of first aid treatment.

Regardless of the worker's protestations, an employee suspected of being ill from heat stroke should not be sent home or left unattended unless a physician has specifically approved such an order.

Proper training and preventive measures will help avert serious illness and loss of work productivity. Preventing heat stress is particularly important because once someone suffers from heat stroke or exhaustion, that person may be predisposed to additional heat injuries.

**Heat Stress Safety Precautions**

Heat stress monitoring and work rest cycle implementation should commence when the ambient adjusted temperature exceeds 72°F. A minimum work rest regimen and procedures for calculating ambient adjusted temperature are described in Table 4-1.

**TABLE 4-1  
WORK/REST SCHEDULE**

<i>Adjusted Temperature<sup>b</sup></i>	<i>Work-Rest Regimen Normal Work Ensemble<sup>c</sup></i>	<i>Work-Rest Regimen Impermeable Ensemble</i>
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5°-90°F (30.8°-32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5°-87.5°F (28.1°-30.8°C)	After each 90 minutes of work	After each 60 minutes of work
77.5°-82.5°F (25.3°-28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5°-77.5°F (30.8°-32.2°C)	After each 150 minutes of work	After each 120 minutes of work

- <sup>a</sup> For work levels of 250 kilocalories/hour (Light-Moderate Type of Work)
- <sup>b</sup> Calculate the adjusted air temperature (ta adj) by using this equation: ta adj °F = ta °F + (13 x % sunshine). Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)
- <sup>c</sup> A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.
- <sup>d</sup> The information presented above was generated using the information provided in the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) Handbook.

To determine if the work rest cycles are adequate for the personnel and specific site conditions, additional monitoring of individuals heart rates will be conducted during the rest cycle. To check the heart rate, count the radial pulse for 30 seconds at the beginning of the rest period. If the heart rate exceeds 110 beats per minute, shorten the next work period by one-third and maintain the same rest period

Additionally, one or more of the following control measures can be used to help control heat stress and are mandatory if any site worker has a heart rate (measure immediately prior to rest period) exceeding of 115 beats per minute:

- Site workers will be encouraged to drink plenty of water and electrolyte replacement fluids throughout the day.
- On-site drinking water will be kept cool (50 to 60°F).
- A work regimen that will provide adequate rest periods for cooling down will be established, as required.
- All personnel will be advised of the dangers and symptoms of heat stroke, heat exhaustion, and heat cramps.
- Cooling devices, such as vortex tubes or cooling vests, should be used when personnel must wear impermeable clothing in conditions of extreme heat.
- Employees should be instructed to monitor themselves and co-workers for signs of heat stress and to take additional breaks as necessary.
- A shaded rest area must be provided. All breaks should take place in the shaded rest area.
- Employees must not be assigned to other tasks during breaks.
- Employees must remove impermeable garments during rest periods. This includes white Tyvek-type garments.
- All employees must be informed of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress disorders.

#### 4.6 Cold Stress Hazards

Cold stress normally occurs in temperatures at or below freezing, or under certain circumstances, in temperatures of 40°F. Extreme cold for a short time may cause severe injury to exposed body surfaces or result in profound generalized cooling, causing death. Areas of the body, which have high surface area-to-volume ratio, such as fingers, toes, and ears, are the most susceptible. Two factors influence the development of a cold weather injury: ambient temperature and the velocity of the wind. For instance, 10°F with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at -18°F. An equivalent chill temperature chart relating the actual dry bulb temperature and wind velocity is presented in Table 4-2.

Local injury resulting from cold is included in the generic term frostbite. There are several degrees of tissue damage associated with frostbite. Frostbite of the extremities can be categorized into:

- *Frost Nip or Incipient Frostbite* - characterized by suddenly blanching or whitening of skin.
- *Superficial Frostbite* - skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.
- *Deep Frostbite* - tissues are cold, pale, and solid; extremely serious injury.

Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. It can be fatal. Its symptoms are usually exhibited in five stages: 1) shivering; 2) apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body to less than 95°F; 3) unconsciousness, glassy stare, slow pulse, and slow respiratory rate; 4) freezing of the extremities; and 5) death. Trauma sustained in freezing or sub-zero conditions requires special attention because an injured worker is predisposed to secondary cold injury. Special provisions must be made to prevent hypothermia and secondary freezing of damaged tissues in addition to providing for first aid treatment. To avoid cold stress, site personnel must wear protective clothing appropriate for the level of cold and physical activity.

**TABLE 4-2  
CHILL TEMPERATURE CHART**

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

[This chart was developed by the U.S. Army Research Institute of Environmental Medicine, Natick, MA (Source: ACGIH Threshold Limit Values for Chemical Substances and Physical Agents)].

In addition to protective clothing, preventive safe work practices, additional training, and warming regimens may be utilized to prevent cold stress.

***Safety Precautions for Cold Stress Prevention***

- For air temperature of 0°F or less, the hands should be protected by mittens. For exposed skin, continuous exposure should not be permitted when air speed and temperature results in a wind chill temperature of -25°F.
- At air temperatures of 36°F or less, field personnel who become immersed in water or whose clothing becomes wet must be immediately provided with a change of clothing and be treated for hypothermia.
- If work is done at normal temperature or in a hot environment before entering the cold, the field personnel must ensure that their clothing is not wet as a consequence of sweating. If wet, field personnel must change into dry clothes prior to entering the cold area.
- If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work must be modified or suspended until adequate clothing is made available or until weather conditions improve.
- Field personnel handling evaporative liquid (e.g., gasoline, alcohol, or cleaning fluids) at air temperatures below 40°F must take special precaution to avoid soaking of clothing or gloves with the liquids because of the added danger of cold injury due to evaporative cooling.

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## **Safe Work Practices**

- Direct contact between bare skin and cold surfaces (< 20°F) should be avoided. Metal tool handles and/or equipment controls should be covered by thermal insulating material.
- For work performed in a wind chill temperature at or below 10°F, workers should be under constant protective observation (buddy system). The work rate should be established to prevent heavy sweating that will result in wet clothing. For heavy work, rest periods must be taken in heated shelters and workers should be provided with an opportunity to change into dry clothing if needed.
- Field personnel should be provided the opportunity to become accustomed to cold-weather working conditions and required protective clothing.
- Work should be arranged in such a way that sitting or standing still for long periods is minimized.

During the warming regimen (rest period), field personnel should be encouraged to remove outer clothing to permit sweat evaporation or to change into dry work clothing. Dehydration, or loss of body fluids, occurs insidiously in the cold environment and may increase susceptibility to cold injury due to a significant change in blood flow to the extremities. Fluid replacement with warm, sweet drinks and soups is recommended. The intake of coffee should be limited because of diuretic and circulatory effects.

### **4.7 Biological Hazards**

Biological hazards may include poison ivy, snakes, thorny bushes and trees, ticks, mosquitoes, and other pests.

#### **4.7.1 Tick-Borne Diseases**

Lyme disease, erlichiosis, and Rocky Mountain Spotted Fever (RMSF) are diseases transmitted by ticks and occur throughout the United States during spring, summer, and fall.

**Lyme Disease** - The disease commonly occurs in summer and is transmitted by the bite of infected ticks. "Hot spots" in the United States include New York, New Jersey, Pennsylvania, Massachusetts, Connecticut, Rhode Island, Minnesota and Wisconsin. Few cases have been identified in other states.

**Erlichiosis** - The disease also commonly occurs in summer and is transmitted by the bite of infected ticks. "Hot spots" in the United States include New York, Massachusetts, Connecticut, Rhode Island, Minnesota and Wisconsin. Few cases have been identified in other states.

These diseases are transmitted primarily by the deer tick, which is smaller and redder than the common wood tick. The disease may be transmitted by immature ticks, which are small and hard to see. The tick may be as small as a period on this page.

Symptoms of Lyme disease include a rash or a peculiar red spot, like a bull's eye, which expands outward in a circular manner. The victim may have headache, weakness, fever, a stiff neck, swelling and pain in the joints, and eventually, arthritis. Symptoms of erlichiosis include muscle and joint aches, flu-like symptoms, but there is typically no skin rash.

**Rocky Mountain Spotted Fever** - This disease is transmitted via the bite of an infected tick. The tick must be attached 4 to 6 hours before the disease-causing organism (*Rickettsia rickettsii*) becomes reactivated and can infect humans. The primary symptom of RMSF is the sudden appearance of a moderate-to-high fever. The fever may persist for two to three weeks. The victim may also have a headache, deep muscle pain, and chills. A rash appears on the hands and feet on about the third day and eventually spreads to all parts of the body. For this reason, RMSF may be confused with measles or meningitis. The disease may cause death, if untreated, but if identified and treated promptly, death is uncommon.

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**Control** - Tick repellent containing diethyltoluamide (DEET) should be used when working in tick-infested areas, and pants legs should be tucked into boots. In addition, workers should search the entire body every three or four hours for attached ticks. Ticks should be removed promptly and carefully without crushing, since crushing can squeeze the disease-causing organism into the skin. A gentle and steady pulling action should be used to avoid leaving the head or mouth parts in the skin. Hands should be protected with surgical gloves when removing ticks.

#### **4.7.2 Poisonous Plants**

Poison ivy may be present in the work area. Personnel should be alerted to its presence, and instructed on methods to prevent exposure.

**Control** - The main control is to avoid contact with the plant, cover arms and hands, and frequently wash potentially exposed skin. Particular attention must be given to avoiding skin contact with objects or protective clothing that have touched the plants. Treat every surface that may have touched the plant as contaminated, and practice contamination avoidance. If skin contact is made, the area should be washed immediately with soap and water, and observed for signs of reddening.

#### **4.7.3 Snakes**

The possibility of encountering snakes exists, specifically for personnel working in wooded/vegetated areas. Snake venoms are complex and include proteins, some of which have enzymatic activity. The effects produced by venoms include neurotoxic effects with sensory, motor, cardiac, and respiratory difficulties; cytotoxic effects on red blood cells, blood vessels, heart muscle, kidneys, and lungs; defects in coagulation; and effects from local release of substances by enzymatic actions. Other noticeable effects of venomous snake bites include swelling, edema, and pain around the bite, and the development of ecchymosis (the escape of blood into tissues from ruptured blood vessels).

**Control** - To minimize the threat of snake bites and insect hazards, all personnel walking through vegetated areas must be aware of the potential for encountering snakes, and the need to avoid actions potentiating encounters, such as turning over logs, etc. If a snake bite occurs, an attempt should be made to kill the snake for identification. The victim must be transported to the nearest hospital within 30 minutes; first aid consists of applying a constriction band, and washing the area around the wound to remove any unabsorbed venom.

#### **4.8 Noise**

Exposure to noise over the OSHA action level can cause temporary impairment of hearing; prolonged and repeated exposure can cause permanent damage to hearing. The risk and severity of hearing loss increases with the intensity and duration of exposure to noise. In addition to damaging hearing, noise can impair voice communication, thereby increasing the risk of accidents on site.

**Control** - All personnel must wear hearing protection with a Noise Reduction Rating (NRR) of at least 20 when noise levels exceed 85 dBA. When it is difficult to hear a co-worker at normal conversation distance, the noise level is approaching or exceeding 85 dBA, and hearing protection is necessary.

Whenever possible, equipment that does not generate excessive noise levels will be selected for this project. If the use of noisy equipment is unavoidable, barriers or increased distance will be used to minimize worker exposure to noise, if feasible.

#### **4.9 Sanitation**

Site sanitation will be maintained according to OSHA and Department of Health requirements.

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#### 4.10 Break Area

Breaks will only be taken in designated areas. There will be no eating, drinking, or chewing gum in any areas where employees may be exposed to hazardous materials or air contaminants.

#### 4.11 Electrical Hazards

Electricity may pose a particular hazard to site workers due to the use of portable electrical equipment. If wiring or other electrical work (lockout/tagout) is needed, it must be performed by a qualified electrician and comply with all applicable codes and regulations.

General electrical safety requirements include:

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

#### 4.12 Lifting Hazards

Using proper lifting techniques may prevent back strain or injury. The fundamentals of proper lifting include:

- Consider the size, shape, and weight of the object to be lifted. A mechanical lifting device or additional persons must be used to lift an object if it cannot be lifted safely alone.
- The hands and the object should be free of dirt or grease that could prevent a firm grip.
- Gloves must be used, and the object inspected for metal slivers, jagged edges, burrs, or rough or slippery surfaces.
- Fingers must be kept away from points which could crush or pinch them, especially when putting an object down.
- Feet must be placed far enough apart for balance. The footing should be solid and the intended pathway should be clear.
- The load should be kept as low as possible, close to the body with the knees bent.
- To lift the load, grip firmly and lift with the legs, keeping the back as straight as possible.
- A worker should not carry a load that he or she cannot see around or over.

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- When putting an object down, the stance and position are identical to that for lifting; the legs are bent at the knees, and the back is straight as the object is lowered.

#### **4.13 Elevated Work Safety**

During the course of this project personnel may be exposed to the hazards of working at heights (ladders, scaffolding, roofing work, etc.). The following sections of 29 CFR 1926 are applicable to the elevated work on this project:

- Subpart L, Scaffolds;
- Subpart M, Fall Protection; and
- Subpart X Stairways and Ladders.

All elevated work will be performed in a safe manner and in compliance with all regulations governing such work, the requirements of this HASP. All personnel exposed to fall hazards shall be trained regarding the nature of the hazards of elevated work prior to assignment.

##### **4.13.1 General Safety Requirements for Elevated Work**

- All personnel exposed to fall hazards greater than 6 feet shall be protected from the hazard by a fall-protection system.
- Fall protection systems shall comply with the guidelines established in 29 CFR 1926 Subpart M, Fall Protection.
- All personnel exposed to fall hazards shall be trained by a competent person in the following areas:
  - The nature of fall hazards in the work area;
  - The correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems to be used and the employees roles and responsibilities associated with the systems;
  - The use and operation of the fall protection systems to be used;
  - The correct procedures for the handling and storage of materials and equipment and the erection of overhead protection; and
  - The fall protection standards contained in 29 CFR 1926 Subpart M, Fall Protection.
- Written certification of fall protection training for personnel exposed to fall hazards shall be maintained by each contractor, and must be made available to the SS upon request.
- Only trained and authorized personnel shall operate aerial lifts.
- Aerial lifts shall be inspected at least daily prior to operation.
- Personnel working from boom type lifts shall be protected from falling by the use of a safety harness and lanyard properly attached to a manufacturer-approved tie-off point.
- Scaffolds shall only be erected, moved, or dismantled under the direction and supervision of a competent person who is experienced in scaffold erection, dismantling, or moving. Only trained and experienced personnel selected by the competent person shall perform such work.
- Scaffolds shall be inspected prior to use each day and frequently throughout the work shift by a competent person.
- Guard rails and toeboards shall be installed on all open sides and ends of scaffold platforms which are greater than 6 feet in height.
- Footing for scaffolding shall be sound and capable of withstanding the load imposed.
- All frame-type scaffolds shall rest on base plates and mudsills.
- Blocks, barrels, buckets, boxes and other unstable items shall not be used to support scaffolds.
- Scaffold platforms shall be fully planked, and the planks shall overlap a minimum of 12 inches or be secured to prevent movement.
- An access ladder is required for all scaffolds. Climbing of crossbraces is prohibited.
- Personnel working on scaffolds shall be trained in the following subject areas at a minimum:
  - The nature of fall hazards, electrical hazards, and falling object hazards in the work area;

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- The correct procedures for dealing with electrical hazards, and for erecting, dismantling, and maintaining the fall protection and overhead protection systems to be used;
  - The proper use of the scaffold and the handling of material and equipment on the scaffold;
  - The load capacities of the scaffold; and
  - Applicable sections of 29 CFR 1926 Subpart L, Scaffolds.
- In addition to the above training, all personnel involved in the erection, moving, and dismantling of scaffolds must be trained by a competent person in the following areas:
    - The correct procedures for erecting, dismantling, moving, operating, inspecting, and maintaining the scaffold being used; and
    - The design criteria, maximum load carrying capacity, and intended use of the scaffold.
  - Ladders and stairways shall comply with 29 CFR 1926 Subpart X.
  - Ladders shall be used for only the purpose for which they were designed.
  - Straight and extension ladders shall be set up properly, secured to prevent movement, and extended 3 feet above the landing surface.
  - Stepladders shall be used only in the open position with the spreaders locked.
  - Personnel shall not stand on the top step or the top of a stepladder.
  - Stepladders shall not be moved while in use (walked).
  - Personnel shall not overreach while using ladders.
  - Users shall inspect ladders prior to use.
  - Ladders shall be inspected frequently by a competent person. Ladders found to be damaged or defective shall be removed from service immediately and tagged "DO NOT USE".
  - The areas around the top and bottom of a ladder shall be kept clear.
  - Ladders shall be free from any defects.
  - Ladders shall be kept free from oil, solvents, or other materials that present a slipping hazard.
  - Personnel shall face the ladder when ascending and descending, and maintain at least three-point contact.
  - Personnel shall not carry loads up ladders that may cause them to lose their balance or maintain less than three-point contact with the ladder.

#### **4.14 Heavy Equipment Materials Handling**

To protect on-site personnel against hazards associated with materials handling, and to prevent injury due to unsafe heavy equipment operation, only properly trained and authorized personnel will be allowed to operate heavy equipment. All materials handling equipment will be maintained in a safe operating condition and inspected daily prior to use.

##### **4.14.1 Equipment Inspection and Maintenance**

All vehicles in use shall be checked at the beginning of each shift to assure that the following parts, equipment, and accessories are in safe operating condition and free of apparent damage: brakes, parking brake, tires, horn, steering, coupling devices, seat belts, operating controls, back up alarm, and safety devices. All defects affecting safe operation shall be corrected before the vehicle is placed into service. These requirements also apply to equipment such as lights, reflectors, windshield and windshield wipers, fire extinguishers, etc, where such equipment is necessary.

Vehicle engines shall not be allowed to run in enclosed places unless vents are provided which effectively remove the exhaust gases from the building.

Except for emergency repairs, a safety tire rack, cage, or equivalent protection shall be used when inflating truck or equipment tires after mounting on the rim, if such tires depend upon a locking ring or similar device to hold them on the rim.

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No repairs shall be attempted on heavy equipment until arraignments are made to eliminate possibility of injury caused by sudden movements or operation of the equipment or its parts.

All controls shall be in a neutral position, with the engine stopped and brakes set, unless work being performed requires otherwise. Trucks with dump bodies shall be equipped with positive means of support, permanently attached, and capable of being locked in position to prevent accidental lowering of the body while maintenance or inspection work is being performed. In all cases where the body is raised for any work, a locking device shall be used.

#### **4.14.2 Equipment Parking and Loading**

Whenever equipment is parked, the parking brake shall be set. Equipment parked on inclines shall have the wheels chocked and the parking brake set.

Scissor points on all front-end loaders which constitute a hazard to the operator shall be guarded. A loader shall not travel without adequate visibility for the driver and stability of the equipment. No loading device shall be left unattended until the load or bucket is lowered to the ground.

#### **4.14.3 Equipment Fueling**

No equipment shall be refueled while the engine is running. Fueling will be done in such a manner that the likelihood of spillage is minimal. If a spill occurs, it shall be contained and cleaned before restarting the engine.

A good metal-to-metal contact shall be kept between the fuel supply tank or nozzle of the supply hose and the equipment fuel tank. No open lights, welding, or spark-producing equipment or operations shall be allowed near the equipment being refueled or near the fuel storage area. No smoking shall be permitted at or near the fuel storage area or equipment being fueled. A conspicuous sign shall be posted in the area of equipment refueling that states "NO SMOKING WITHIN 50 FEET." No repairs shall be made on equipment while it is being refueled.

All fuel storage tanks, drums or safety cans shall be properly marked and of the proper type.

### **4.15 Hot Work Safety Program**

To effectively comply with the provisions of the OSHA standards governing fire prevention and hot work activities, the Welding Safety Program establishes procedures to ensure that physical and chemical fire hazards present in the workplace are isolated from hot work activities. The Welding Safety Program is applicable to all welding, cutting, burning, grinding, and other spark producing work activities. Contractors may utilize their own hot work safety procedures as long as the requirements of this section are met.

#### **4.15.1 Designated Hot Work Areas**

Contractors may establish designated hot work areas at the project site. Hot work conducted within a designated hot work area does not require a work permit. Designated hot work areas must be delineated, and all project site personnel informed of their location.

All project site personnel are responsible for keeping flammable and combustible materials out of designated hot work areas. **All hot work conducted outside of designated hot work areas requires a hot work permit.**

##### **4.15.1.1 Conditions Prohibiting Hot Work**

Hot work activities are prohibited in any area of the project site where the following conditions exist:

- If the requirements of the hot work permit cannot be met, then the hot work is prohibited and alternative methods shall be employed;

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- If areas potentially containing explosive atmospheres due to the presence of flammable gases, vapors, liquids, or dusts; and
  - Within 50 feet of an area where flammable or combustible liquids or gases are used or stored.

Hot work activities shall not be conducted within the areas outlined above. All on-site personnel are responsible for preventing hot work activities within prohibited areas.

#### 4.15.2 Hot Work Permits

A hot work permit is required for welding, cutting, burning, grinding, or spark producing work conducted outside of designated hot work areas. This section outlines the preparation, issuance, use, and tracking of hot work permits. Contractors may utilize their own hot work permits if they meet the requirements of this section. This procedure has been developed to ensure basic precautions for fire prevention and employee safety are implemented prior to and during hot work activities outside of designated hot work areas. The hot work permit contains a checklist to be completed by the authorized personnel conducting the hot work activities. The hot work permit must be reviewed by the SS and the HSS prior to the start of hot work activities. The attached checklist is designed to ensure the following measures are addressed.

- If possible, the object or equipment on which the hot work is to be conducted shall be moved to a designated hot work area.
- If an object or equipment on which hot work is to be conducted cannot be moved, all moveable fire hazards shall be moved at least 50 feet from the hot work operation.
- If an object or equipment on which hot work is to be conducted cannot be moved, or all fire hazards cannot be removed, then guards, barriers, or screens shall be used to confine any heat, sparks, and slag, and to protect the immovable fire hazards.
- All floor, wall, and window openings or cracks within a 35-foot radius shall be protected to prevent exposure of combustible material to heat, sparks, or slag.
- Suitable fire fighting equipment shall be on-hand for immediate use.
- If hot work takes place in an area where flying sparks and slag may injure personnel working near, above, or below the hot work operation, then additional precautions shall be implemented to prevent injury to the personnel (i.e. screens, barriers, caution tape, PPE, etc.).
- A fire watch will begin before hot work is initiated and will continue during and for a minimum of 30 minutes after the hot work concludes to ensure that there are no smoldering fires. A fire watch is required whenever hot work is performed outside of designated hot work areas.
- Verify that flammable and combustible materials adjacent to the opposite side of metal partitions, walls, ceilings, or roofs and which are likely to be ignited by conduction or radiation are protected by guards, barriers, screens, or are moved 50 feet away from the metal partitions, walls, ceilings, or roofs.
- If hot work is to be conducted in a confined space, the requirements for the confined space entry must be reviewed and followed.
- Hot work will not be performed in areas where other workers may be affected unless adequate engineering or administrative controls are used to prevent personnel exposure.
- Welding, cutting, and other hot work will not be undertaken unless adequate ventilation, PPE, and well maintained equipment are used by trained and authorized personnel.
- After welding and cutting has been completed, the area will be thoroughly cleaned, and equipment returned to its proper location.
- All personnel involved in hot work activities shall use appropriate PPE.

If any of the basic requirements for fire prevention cannot be implemented prior to or during hot work which is conducted outside a designated hot work area, then the hot work activities will not be conducted. At the conclusion of the hot work activities the hot work permit will be provided to the contractor's HSS for record keeping.

### 4.15.3 Fire Watch Procedures

A fire watch is required whenever hot work is performed outside designated hot work areas. Fire watch personnel are required to meet the following requirements.

- Fire watch personnel must have fire-extinguishing equipment readily available and ready for immediate use.
- Fire watch personnel must be trained in the use of the fire fighting equipment provided.
- Fire watch personnel must be familiar with the procedure to sound the fire alarm in the event of a fire and know the location of the nearest telephone.
- All fire watch personnel shall use appropriate PPE.
- Fire watch personnel must watch for fires, try to extinguish them if safe to do so, or otherwise activate the fire alarm system.
- If a fire cannot be extinguished with one fire extinguisher, the area shall be evacuated, the fire alarm system shall be activated and the appropriate professional firefighting organization contacted.
- Fire watch personnel must maintain a fire watch for at least 30 minutes after the hot work operations are completed.

If any of the above requirements cannot be met, hot work shall not be conducted.

### 4.16 Traffic Safety

The site may be located adjacent to a public roadway where exposure to vehicular traffic is likely. Traffic may also be encountered as vehicles enter and exit the property. See Attachment N for Traffic Control Procedures.

To minimize the likelihood of on-site personnel and activities being affected by traffic, the following precautionary measures/controls will be implemented:

- A reflective vest and bright clothing must be worn by personnel exposed to potential traffic hazards;
- Personnel must remain behind all protective barricades, a minimum of two protective barricades will be used when working in active roadways;
- Personnel must remain alert, pay attention, and listen for cars;
- Personnel should stay upright and face traffic as much as possible;
- The buddy system will be used in high risk areas;
- Traffic assessment information should be obtained from the client contact;
- Floodlights will be used when working in darkness;
- Lane closure according to appropriate regulatory standards (e.g. DOT/OSHA, National Highway Safety Uniform Traffic Control), local standards; and
- Police assistance must be obtained as required by local regulations.

In addition to the above precautionary measures/controls, at least two traffic control devices shall be used at all sites where personnel may be exposed to vehicular traffic. Examples of traffic control devices include:

- Traffic cones and flags;
- Barrels/Barricades;
- Vehicle (or drill rig) parked to block traffic and provide protection to personnel;
- Portable gates;
- Light bars; and
- Caution and work zone signs.

Cones, flags, and barricades must be placed, as required by appropriate regulations, along the roadway to alert passing motorists to the presence of personnel and equipment. A "Men Working" sign must also be placed in advance of the

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work area as required by the appropriate regulations. For work in roadways, lane closure procedures, signals, and devices must comply with Department of Transportation (DOT), OSHA, and local regulations, and the Manual on Uniform Traffic Control Devices.

# **5. Personal Protective Equipment**

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## **5.1 Levels of Protection**

Personal protective equipment (PPE) is required to safeguard site personnel from various hazards. Varying levels of protection may be required depending on the degree of physical hazard and level of COCs. This section presents the various minimum levels of protection. Contractors are required to continually evaluate and update the required PPE for each one of their job tasks. The required PPE Matrix is listed Table 5.1.

### **5.1.1 Level D Protection**

The minimum level of protection that will be required of personnel at the site will be Level D, which will be worn when site conditions or air monitoring indicates no inhalation hazard exists. The following equipment will be used:

- Work clothing as prescribed by weather and task;
- Safety toe work boots, meeting ANSI Z41;
- Safety glasses or goggles, meeting ANSI Z87;
- Hard hat, meeting ANSI Z89;
- Hearing protection (if noise levels exceed 85 dBA, then hearing protection with a US EPA NRR of at least 20 dBA must be used); and
- High visibility clothing if working in a traffic hazard area.

### **5.1.2 Modified Level D Protection**

Modified Level D will be used when airborne constituents are not present at levels of concern, but site activities present an increased potential for skin contact with contaminated materials. Modified Level D consists of:

- Polyethylene coated Tyvek<sup>®</sup> coveralls (if body contact is anticipated);
- Safety toe work boots, meeting ANSI Z41;
- Vinyl or latex booties, or PVC overboots when contact with contaminated media is anticipated;
- Safety glasses or goggles, meeting ANSI Z87;
- Hard hat, meeting ANSI Z89; and
- Face shield in addition to safety glasses or goggles when projectiles pose a hazard;
- Protective gloves based on the COC;
- Hearing protection (if noise levels exceed 85 dBA, then hearing protection with a US EPA NRR of at least 20 dBA must be used); and
- High visibility clothing if working in a traffic hazard area.

### **5.1.3 Level C Protection**

Level C protection will be required when the airborne concentration of COCs reaches site action levels. The following equipment will be used for Level C protection:

- Air-purifying respirator with appropriate cartridges;
- Polyethylene coated Tyvek<sup>□</sup> suit, ankles and cuffs taped to boots and gloves;
- Protective gloves based on the COC;
- Safety toe work boots, meeting ANSI Z41;
- Chemical resistant Neoprene boots with steel toes; or latex/PVC booties over steel toe work boots;
- Hard hat, meeting ANSI Z89;
- Hearing protection (if noise levels exceed 85 dBA, then hearing protection with a US EPA NRR of at least 20 dBA must be used); and
- High visibility clothing if working in a traffic hazard area.

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## 5.2 Selection of PPE

Equipment for personal protection will be selected based on the potential for contact, site conditions, physical hazards, ambient air quality, and the judgment of supervising site personnel and health and safety professionals. The PPE used will be chosen to be effective against the COC present on the site.

## 5.3 Site Respiratory Protection Program

Respiratory protection is an integral part of employee health and safety at the site due to the potential for airborne constituents. If it will be necessary for a contractor's personnel to use respirators, a site respiratory protection program will be incorporated into this HASP including the contractor specific respiratory protection program. The respiratory protection program will consist of the following as a minimum:

- All site personnel who may use respiratory protection will have an assigned respirator.
- All site personnel who may use respiratory protection will have been fit tested and trained in the use of the respirator within the past 12 months.
- All site personnel who may use respiratory protection must be medically certified as being capable of wearing a respirator. Documentation of the medical certification must be provided to the HSS, prior to commencement of site work.
- Only cleaned, maintained, NIOSH-approved respirators are to be used on this site.
- Change-out schedules for respirator cartridges shall be included in the site specific plan, based on the site COC;
- If respirators are used, the respirator cartridge is to be properly disposed of at the end of each work shift, or when load-up or breakthrough occurs.
- Contact lenses are not to be worn on-site in areas where respirators are worn.
- All site personnel who may use respiratory protection must be clean-shaven. Mustaches and sideburns are permitted, but they must not touch the sealing surface of the respirator.
- Respirators will be inspected, and a negative pressure test performed prior to each use.
- After each use, the respirator will be wiped with a disinfectant, cleansing wipe. When used, the respirator will be thoroughly cleaned at the end of the work shift. The respirator will be stored in a clean plastic bag, away from direct sunlight in a clean, dry location, in a manner that will not distort the face piece.

## 5.4 PPE Procedures for Hazardous Waste Operations

For hazardous waste operations, depending upon the level of protection selected, specific donning and doffing procedures may be required. The procedures presented in this section are mandatory when Modified Level D or Level C PPE is used.

All people entering the exclusion zone must put on the required PPE in accordance with the requirements of this plan and the contractor's site specific HASP. When leaving the exclusion zone, PPE will be removed in accordance with the minimum procedures listed to minimize the spread of contamination.

### 5.4.1 Donning Procedures

These procedures are mandatory when Modified Level D or higher PPE is used on the project:

- Remove bulky outerwear. Remove street clothes and store in clean location;
- Put on work clothes or coveralls;
- Put on the required chemical protective coveralls or rain gear;
- Put on the required chemical protective boots or boot covers;
- Tape the legs of the coveralls to the boots with duct tape;
- Put on the required chemical protective gloves;
- Tape the wrists of the protective coveralls to the gloves;

- Don the required respirator (Level C or higher) and perform appropriate fit check;
- Put hood or head covering over head and respirator straps (Level C or higher) and tape hood to facepiece; and
- Don remaining PPE, such as safety glasses or goggles and hard hat.

When these procedures are instituted, one person must remain outside the exclusion zone to ensure that each person entering has the proper protective equipment.

#### 5.4.2 Doffing Procedures

The following procedures are mandatory when Modified Level D or higher PPE is required for this project. Whenever a person leaves a Modified Level D or higher work site, the following decontamination sequence will be followed:

- Upon entering the contaminant reduction zone, rinse contaminated materials from the boots or remove contaminated boot covers;
- Clean reusable protective equipment;
- Remove protective garments, equipment, and respirator (Level C or higher). All disposable clothing should be placed in plastic bags, which are labeled with contaminated waste labels;
- Wash hands, face and neck or shower (if necessary);
- Proceed to clean area and dress in clean clothing; and
- Clean and disinfect respirator (Level C or higher) for next use.

All disposable equipment, garments, and PPE must be bagged in plastic bags, labeled for disposal.

#### 5.5 PPE Selection Matrix

The level of personal protection selected will be based upon observations, task to be performed, air monitoring of the work environment and an assessment by the SS of the potential for skin contact with impacted materials. Contractors shall continually evaluate the minimum levels of protection for each of the tasks they will be conducting to ensure they are adequate. A minimum level of PPE for each general task is listed below.

TABLE 5-1  
PPE SELECTION MATRIX

Task	Anticipated Level of Protection
Mobilization	Level D
Drilling and Boring	Level D/Modified Level D
Sampling and Monitoring	Level D/Modified Level D
Construction Activities	Level D
Asbestos Removal/Abatement	Level C or as dictated by regulatory requirements
Decontamination	Level D/Modified Level D
Demobilization	Level D

## **6. Site Control**

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### **6.1 Authorization to Enter**

Only authorized personnel will be allowed on the site.

All personnel who are potentially exposed to hazardous substances must have completed hazardous waste operations initial training as defined under OSHA Regulation 29 CFR 1910.120, have completed their training or refresher training within the past 12 months, and have been certified by a physician as fit for hazardous waste operations in order to enter a site area designated as an exclusion zone or contamination reduction zone.

Personnel without such training or medical certification may enter the designated support zone only.

### **6.2 Site Orientation and Hazard Briefing**

No person will be allowed in the general work area during site operations without first being given a site orientation and hazard briefing. This orientation will be presented by the contractor's HSS and will consist of a review of this HASP. This review must cover the chemical, physical, and biological hazards, protective equipment, safe work procedures, and emergency procedures for the project. In addition to this meeting, Daily Safety Meetings will be held each day before work begins.

All people on the site, including visitors, must document their attendance to this briefing as well as the Daily Safety Meetings on the forms included with this plan.

### **6.3 Certification Documents**

A training and medical file may be established for the project and kept on site during all site operations. The 24 or 40-hour training, update, and specialty training [first-aid/cardio-pulmonary resuscitation (CPR), confined space, etc.] certificates, as well as current medical clearance for all project field personnel will be maintained within that file. All contractor personnel must provide their training and medical documentation to the HSS prior to the start of fieldwork.

### **6.4 Entry Requirements**

In addition to authorization, hazard briefing, orientation, and certification requirements listed above, no person will be allowed on the site unless he or she is wearing the minimum PPE as described in Section 6, Personal Protective Equipment. Personnel entering hazardous waste work areas must wear the required PPE for those locations.

### **6.5 Emergency Entry and Exit**

The contractors SS will brief people who must enter the site on an emergency basis of the hazards. All hazardous activities will cease in the event of an emergency and any sources of emissions will be controlled, if possible.

People exiting the site because of an emergency will gather in a safe area for a head count. Each contractor's SS is responsible for ensuring that all people who entered the work area have exited in the event of an emergency. The General Contractor will post a diagram of the facility identifying all emergency exits. This information will be reviewed with all on-site personnel during the site safety orientation.

### **6.6 Contamination Control Zones**

Contamination control zones are maintained to prevent the spread of contamination and to prevent unauthorized people from entering hazardous areas. Contractor's work plans shall identify work areas and the methods to be used to demarcate these areas.

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### **6.6.1 Exclusion Zone**

The exclusion zone (EZ) consists of the specific work area, or may be the entire area of suspected contamination. All employees entering the EZ must use the required PPE, and must have the appropriate training and medical clearance for hazardous waste work. The EZ is the defined area where there is a possible respiratory and/or contact health hazard. Cones, caution tape, or other appropriate means will identify the location of each exclusion zone.

### **6.6.2 Contamination Reduction Zone**

The contamination reduction zone (CRZ) or transition area will be established, if necessary, to perform decontamination of personnel and equipment. All personnel entering or leaving the EZ will pass through this area to prevent any cross-contamination. Tools, equipment, and machinery will be decontaminated in a specific location. The decontamination of all personnel will be performed on site adjacent to the EZ. Personal protective outer garments and respiratory protection will be removed in the CRZ and prepared for cleaning or disposal. This zone is the only appropriate corridor between the EZ and the Support Zone (SZ).

### **6.6.3 Support Zone**

The SZ is a clean area outside the CRZ located to prevent employee exposure to hazardous substances. Eating and drinking will be permitted in the support area only after proper decontamination.

### **6.6.4 Posting**

The EZ, CRZ, and SZ will be prominently marked and delineated using cones, caution tape, or other suitable means.

### **6.7 Site Inspections**

The contractors SS will conduct a daily inspection of site activities, equipment, and zone set up to verify that the required elements are in place.

# **7. Decontamination**

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## **7.1 Personnel Decontamination**

All contractors conducting hazardous waste operations shall outline their decontamination procedures for personnel and equipment in their scope of work. All personnel wearing Modified Level D or Level C protective equipment in the CZ must undergo personal decontamination prior to entering the SZ. Personnel decontamination will consist of the following stations at a minimum:

- Station 1:* Personnel leaving the CZ will remove the gross contamination from their outer clothing and boots.
- Station 2:* Personnel will remove their outer garment and gloves and deposit them in the lined waste receptacles. Personnel will then decontaminate their hard hats, and boots with an aqueous solution of detergent or other appropriate cleaning solution. These items are then hand carried to the next station.
- Station 3:* Personnel will thoroughly wash their hands and face before leaving the decontamination zone. Respirators will be sanitized and then placed in a clean plastic ziplock bag.

## **7.2 Equipment Decontamination**

All vehicles that have entered the contaminated zone will be decontaminated at the decontamination pad prior to leaving the zone. If the level of vehicle contamination is low, decontamination may be limited to rinsing of tires and wheel wells with water. If the vehicle is significantly contaminated, steam cleaning or pressure washing of vehicles and equipment may be required.

## **7.3 Personal Protective Equipment Decontamination**

Where and whenever possible, single use, external protective clothing must be used for work within the EZ or CRZ. This protective clothing must be disposed of in properly labeled containers.

Reusable protective clothing will be rinsed at the site with detergent and water. The rinsate will be collected for disposal.

When removed from the CRZ, the respirator will be thoroughly cleaned with soap and water. The respirator face piece, straps, valves and covers must be thoroughly cleaned at the end of each work shift, and ready for use prior to the next shift. Respirator parts may be disinfected with a solution of bleach and water, or by using a spray disinfectant.

## **8. Site Monitoring**

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### **8.1 Air Monitoring**

Contractors engaged in activities that may expose personnel to elevated levels of COCs are required to conduct air monitoring. Air monitoring will be conducted to determine employee exposure to airborne constituents. Personal exposure monitoring may be necessary to evaluate employee exposures if direct-reading instruments indicate general readings in excess of site action levels. The monitoring results will dictate work procedures and the selection of PPE. At a minimum, a MiniRAM portable dust monitor (or equivalent) will be used during drilling, demolition, and any activities that generate airborne particulate. A PID will be used if the presence of organic COCs is suspected. A combustible gas/oxygen/hydrogen sulfide/carbon monoxide meter will be used during intrusive activities if flammable or explosive vapors may be present; the combustible gas/oxygen/hydrogen sulfide/carbon monoxide meter will also be used during confined space or excavation entry.

Air monitoring will be conducted continuously with the LEL/O<sub>2</sub> meter if flammable/explosive vapors are suspected, during confined space, or during excavation entry. Prior to any activities where organic COCs may be present, air monitoring will be conducted to establish background levels for total organic vapors (using a PID) and for dust particulate (using a mini-RAM). PID and mini-RAM measurements will be taken at the upwind and downwind property boundaries. During operations which may cause airborne particulate (demolition activities, drilling) an MIE MiniRAM (or equivalent) portable dust monitor will be used to measure airborne concentrations of total particulate material. At a minimum, all readings will be manually recorded on an hourly basis on air monitoring logs or field notebooks.

All work activity must stop where tests indicate the concentration of flammable vapors exceeds 10% of the Lower Explosive Limit (LEL) at a location with a potential ignition source. Such an area must be ventilated to reduce the concentration to an acceptable level.

Action levels for atmospheric contaminants are shown in Table 8-1.

### **8.2 Noise Monitoring**

Noise monitoring may be conducted as required. Hearing protection is mandatory for all employees in noise hazard areas, such as around heavy equipment. As a general rule, sound levels that cause speech interference at normal conversation distance should require the use of hearing protection.

### **8.3 Monitoring Equipment Maintenance and Calibration**

All direct-reading instrumentation calibrations should be conducted under the approximate environmental conditions the instrument will be used. Instruments must be calibrated before and after use, noting the reading(s) and any adjustments that are necessary. All air monitoring equipment calibrations, including the standard used for calibration, must be documented. All completed documentation/forms must be reviewed by the HSS and maintained by the SS.

All air monitoring equipment will be maintained and calibrated in accordance with the specific manufacturers' procedures. Preventive maintenance and repairs will be conducted in accordance with the respective manufacturers' procedures. When applicable, only manufacturer-trained and/or authorized personnel will be allowed to perform instrument repairs or preventive maintenance.

If an instrument is found to be inoperative or suspected of giving erroneous readings, the HSS must be responsible for immediately removing the instrument from service and obtaining a replacement unit. If the instrument is essential for safe operation during a specific activity, that activity must cease until an appropriate replacement unit is obtained. The HSS will be responsible for ensuring a replacement unit is obtained and/or repairs are initiated on the defective equipment.

**Table 8-1  
Atmospheric Contaminant Action Levels**

Atmospheric Contaminant Action Levels		
Parameter	Reading	Action/Level of Protection
Airborne Particulates	0 to 1 mg/m <sup>3</sup>	Normal operations
	> 1 mg/m <sup>3</sup>	Begin soil wetting procedure. Upgrade to Level C if particulate levels do not drop below 1 mg/m <sup>3</sup>
Total Organic Vapors	< 5 parts per million (ppm)	Acceptable Normal operations;
	≥ 5 ppm	Stop work; evacuate confined space and investigate cause of reading
Flammable Vapors (LEL)	< 10% LEL	Normal operations, acceptable entry condition
	≥ 10% LEL	Stop work; evacuate confined space; ventilate area; investigate source of vapors
Hydrogen Sulfide	< 5 ppm	Normal operations, acceptable entry condition
	≥ 5 ppm	Stop work; evacuate confined space; ventilate area; investigate source of vapors
Carbon Monoxide	< 25 ppm	Normal operations, acceptable entry condition
	≥ 25 ppm	Stop work; evacuate confined space; ventilate area; investigate source of vapors
Oxygen	> 19.5%, < 23.5%	Acceptable Entry Condition, Normal Operations
	< 19.5%, > 23.5%	Stop work; evacuate confined space; ventilate; re-sample

# **9. Employee Training**

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## **9.1 General**

All on-site project personnel will receive safety training necessary to perform their work activities. Personnel will not be assigned duties for which they have not received training.

## **9.2 Site-Specific Training**

Site-specific training of personnel will be accomplished through a site briefing by the PM, SS, or HSS on the contents of this HASP, and the site safety requirements. The review must include a discussion of the chemical, physical, and biological hazards, the protective equipment and safety procedures, and emergency procedures. This training must be conducted before work begins.

## **9.3 Daily Safety Meetings**

Daily Safety Meetings will be held to cover the work to be accomplished, the hazards anticipated, the protective clothing and procedures required to control site hazards, and emergency procedures. The SS or HSS shall present these meetings prior to beginning the days fieldwork. No work will be performed before the Daily Safety Meeting has been held. The Daily Safety Meeting must also be held prior to new tasks, and repeated if new hazards are encountered.

## **9.4 First Aid and CPR**

At least one employee current in first aid/CPR will be assigned to each of the contractors work crews and will be on the site during operations. Refresher training in first aid and CPR is required to keep the certificate current. These individuals must also receive training regarding the precautions and protective equipment necessary to protect against exposure to blood-borne pathogens.

## **9.5 HAZWOPER Training**

All on-site project personnel who work in areas where they may be exposed to site constituents must be trained as required by OSHA Regulation 29 CFR 1910.120. Such field employees also receive a minimum of three days of actual field experience under the direct supervision of a trained, experienced supervisor. Personnel who completed their training more than 12 months prior to the start of the project must have completed an 8-hour refresher course within the past 12 months. Supervisory personnel must complete an additional 8 hours of supervisor training.

### **9.5.1 Basic 40-Hour Course**

The following is a list of the topics typically covered in a 40-hour training course:

- general safety procedures;
- physical hazards (fall protection, noise, heat stress, cold stress);
- names and job descriptions of key personnel responsible for site HS;
- safety, health, and other hazards typically present at hazardous waste sites;
- use, application and limitations of PPE;
- work practices by which employees can minimize risks from hazards;
- safe use of engineering controls and equipment on site;
- medical surveillance requirements;
- recognition of symptoms and signs which might indicate overexposure to hazards;
- worker right-to-know (Hazard Communication OSHA 1910.1200);
- routes of exposure to constituents;
- engineering controls and safe work practices;
- components of a site HS program and HASP;
- decontamination practices for personnel and equipment;

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- confined-space entry procedures; and
  - general emergency response procedures.

# **10. Medical Surveillance**

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## **10.1 Medical Examination**

All personnel who are potentially exposed to site constituents must participate in a medical surveillance program provided by their employer that meets the requirements of 29 CFR 1910.120 (f).

### **10.1.1 Preplacement Medical Examination**

All potentially-exposed personnel must have completed a comprehensive medical examination prior to assignment, and periodically thereafter as defined by applicable OSHA Regulations. The preplacement and periodic medical examinations typically include the following elements:

- medical and occupational history questionnaire;
- physical examination;
- complete blood count, with differential;
- liver enzyme profile;
- chest X-ray, at a frequency determined by the physician;
- pulmonary function test;
- audiogram;
- electrocardiogram for persons older than 45 years of age, or if indicated during the physical examination;
- drug and alcohol screening, as required by job assignment;
- visual acuity; and
- follow-up examinations, at the discretion of the examining physician or the corporate medical director.

The examining physician provides the employee with a letter summarizing his findings and recommendations, confirming the worker's fitness for work and ability to wear a respirator. Documentation of medical clearance will be available for each employee during all project site work.

Subcontractors will certify that all their employees have successfully completed a physical examination by a qualified physician. The physical examinations must meet the requirements of 29 CFR 1910.120 and 29 CFR 1910.134. Subcontractors will supply copies of the medical examination certificate for each on-site employee.

### **10.1.2 Other Medical Examination**

In addition to pre-employment, annual, and exit physicals, personnel may be examined:

- at employee request after known or suspected exposure to toxic or hazardous materials;
- at the discretion of the client, HS professional, or occupational physician in anticipation of, or after known or suspected exposure to toxic or hazardous materials; and
- at the discretion of the occupational physician.

### **10.1.3 Periodic Exam**

Following the placement examination, all employees must undergo a periodic examination, similar in scope to the placement examination. For employees potentially exposed over 30 days per year, the frequency of periodic examinations will be annual. For employees potentially exposed less than 30 days per year, the frequency for periodic examinations will be 18 months.

## **10.2 Medical Restriction**

When the examining physician identifies a need to restrict work activity, the employee's supervisor must communicate the restriction to the employee and the HSS. The terms of the restriction will be discussed with the employee and the supervisor.

# **11. Emergency Procedures**

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## **11.1 General**

Prior to the start of operations, each contractor's work area will be evaluated for the potential for fire, constituent release, or other catastrophic event. Unusual conditions or events, activities, chemicals, and conditions will be reported to the General contractor's SS/HSS immediately.

The General contractor's SS/HSS will establish evacuation routes and assembly areas for the site. All personnel entering the site will be informed of this route and the assembly area. The emergency alarm system to be used at the site will be established by the General Contractor. On-site personnel will be made aware of the system to be used and the procedures to be followed during the site safety orientation.

## **11.2 Emergency Response**

If an incident occurs, the following steps will be taken:

- the SS/HSS will evaluate the incident and assess the need for assistance and/or evacuation;
- the SS/HSS will call for outside assistance as needed;
- the SS/HSS will ensure the PM is notified promptly of the incident; and
- the SS/HSS will take appropriate measures to stabilize the incident scene.

### **11.2.1 Fire**

In the case of a fire on the site, the SS/HSS will assess the situation and direct fire-fighting activities. The SS/HSS will ensure that the client site representative is immediately notified of any fires. Site personnel will attempt to extinguish the fire with available extinguishers, if safe to do so. In the event of a fire that site personnel are unable to safely extinguish, the local fire department will be summoned.

### **11.2.2 Constituent Release**

In the event of a constituent release, the following steps will be taken:

- notify SS/HSS immediately;
- evacuate immediate area of release;
- conduct air monitoring to determine needed level of PPE; and
- don required level of PPE and prepare to implement control procedures.

The SS/HSS has the authority to commit resources as needed to contain and control released material and to prevent its spread to off-site areas.

### **11.2.3 Medical Emergency**

All employee injuries must be promptly reported to the HSS/SS, who will:

- ensure that the injured employee receives prompt first aid and medical attention; and
- in emergency situations, the worker is to be transported by appropriate means to the nearest urgent care facility (normally a hospital emergency room).

### **11.2.4 First Aid - General**

All persons must report any near-miss incident, injury, or illness to their immediate supervisor or the SS. Trained personnel will provide first aid. Injuries and illnesses requiring medical treatment must be documented. The SS must conduct an accident investigation as soon as emergency conditions no longer exist and first aid and/or medical

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treatment has been ensured. These two reports must be completed and submitted to the PM within 24 hours after the incident.

If first-aid treatment is required, first aid kits are kept at the CRZ. If treatment beyond first aid is required, the injured should be transported to the medical facility. If the injured is not ambulatory, or shows any sign of not being in a comfortable and stable condition for transport, then an ambulance-/paramedics should be summoned. If there is any doubt as to the injured worker's condition, it is best to let the local paramedic or ambulance service examine and transport the worker.

- **Survey the scene.** Determine if it is safe to proceed. Try to determine if the conditions, which caused the incident, are still a threat. Protect yourself from exposure before attempting to rescue the victim.
- **Do a primary survey of the victim.** Check for *airway* obstruction, *breathing*-, and *pulse*. Assess likely routes of chemical exposure by examining the eyes, mouth, nose, and skin of the victim for symptoms.
- **Phone Emergency Medical Services (EMS).** Give the location, telephone number used, caller's name, what happened, number of victims, victims' condition, and help being given.
- **Maintain airway and perform rescue breathing** as necessary.
- **Perform cardiopulmonary resuscitation (CPR)** as necessary.
- **Do a secondary survey of the victim.** Check *vital signs* and do a *head-to-toe exam*.
- **Treat other conditions as necessary.** If the victim can be moved, take him to a location away from the work area where EMS can gain access.

#### **11.2.4.1 First Aid - Inhalation**

Any employee complaining of symptoms of chemical overexposure as described in Section 5 will be removed from the work area and transported to the designated medical facility for examination and treatment.

#### **11.2.4.2 First Aid - Ingestion**

Call EMS and consult a poison control center for advice. If available, refer to the MSDS for treatment information, if recommended. If the victim is unconscious keep them on their side and clear the airway if vomiting occurs.

#### **11.2.4.3 First Aid - Skin Contact**

Project personnel who have had skin contact with constituents will, unless the contact is severe, proceed through the decontamination zone, to the wash-up area. Personnel will remove any contaminated clothing, and then flush the affected area with water for at least 15 minutes. The worker should be transported to the medical facility if he shows any sign of skin reddening, irritation, or if he requests a medical examination.

#### **11.2.4.4 First Aid - Eye Contact**

Project personnel who have had constituents splashed in their eyes or who have experienced eye irritation while in the contaminated zone, must immediately proceed to the eyewash station, set up in the decontamination zone. Do not decontaminate prior to using the eyewash. Remove whatever protective clothing is necessary to use the eyewash. Flush the eye with clean running water for at least 15 minutes. Arrange prompt transport to the designated medical facility.

### **11.3 Reporting Injuries and Illnesses**

All injuries and illnesses, however minor, will be reported to the SS immediately. The SS will complete an injury report and submit it to the PM within 24 hours.

#### 11.4 Emergency Information

The means to summon local public response agencies such as police, fire, and ambulance will be reviewed in the Daily Safety Meeting.

**Table 11-1  
EMERGENCY CONTACTS**

<u>Local Emergency Contacts</u>	<u>Telephone No.</u>
Fire	(704) 694-2167 or 911
Police	911
Sheriff	(704) 694-4188 or 911
Ambulance	(704) 694-4090 or 911
Hospital	(704) 694-5131
Local Health Department	(704) 694-5188
State Health Department	(919) 733-4534
<u>Project Emergency Contacts</u>	<u>Telephone No.</u>
State Environmental Agency - NCDENR	(919) 733-2801
USEPA – Regional Office	(404) 562-9900
BBL Project Manager	(919) 469-1952 ext. 22

***Attachments***

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***Attachment A***

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**Material Safety Data Sheets**



Section 1 - Chemical Product and Company Identification

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Product/Chemical Name: Arsenic      Chemical Formula: As      CAS Number: 7440-38-2  
Structural Chemical Formula: As<sub>4</sub>      EINECS Number: 231-148-6

Synonyms: arsenia; arsenic black; arsenic - 75; arsenicals; colloidal arsenic; grey arsenic; metallic arsenic  
Derivation: Reduction with carbon (sugar charcoal) and sublimation in a nitrogen current yields very pure arsenic; by roasting the sulfide to form the oxide and then reducing the oxide with carbon; by the direct smelting of arsenopyrite and loellingite; or by the reduction of arsenic trioxide with charcoal. General Use: Arsenic is used to make gallium arsenide for dipoles and other electronic devices; in metallurgy for hardening copper, lead and alloys; in the manufacture of certain types of glass; in pigment production; in insecticides, fungicides, and rodenticides; as a radioactive tracer in toxicology; as a dopant material in semiconductor manufacture; and as a catalyst. Vendors: Consult the latest *Chemical Week Buyers' Guide*. (73)

Section 2 - Composition / Information on Ingredients

Arsenic, ca 99% wt (refined); 90 - 95% (crude)  
Trace Impurities: Arsenic oxides

<b>OSHA PELs</b> 8-hr TWA: 0.5 mg/m <sup>3</sup> *; 0.01 mg/m <sup>3</sup> ** Action level: 0.005 mg/m <sup>3</sup>	<b>NIOSH REL</b> Ceiling: 15 min: 0.002 mg/m <sup>3</sup> **  <b>IDLH Level</b> 5 mg/m <sup>3</sup>	<b>DFG (Germany) MAK</b> None established  <b>ACGIH TLV</b> TWA: 0.01 mg/m <sup>3</sup>	<b>AIHA WEEL</b> None established
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\* Organic compounds

\*\* Inorganic compounds

Section 3 - Hazards Identification

ANSI Signal Word: Warning!

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

Arsenic is a gray odorless solid. It is harmful by ingestion and a severe irritant by inhalation. It is irritating to the skin, eyes, and respiratory tract, and can be absorbed through the skin. Avoid all contact with arsenic. It is noncombustible but the dust may burn when heated. Arsenic is a human carcinogen that causes mutagenic and reproductive effects, damage to the gastrointestinal tract, and degeneration of the liver and kidneys.

Potential Health Effects

Primary Entry Routes: Inhalation, ingestion, skin/eye contact, skin absorption

Target Organs: Liver; kidneys; skin; lungs; eyes; respiratory, lymphatic, immune (sensitizer) and central nervous systems; gastrointestinal tract; blood/bone marrow; heart

Acute Effects

**Inhalation:** Causes irritation and dryness of the nose and throat, bluish skin, digestive disorders, lung congestion, chest pain, difficulty breathing, headache, altered mental status, seizures, toxic delirium, encephalopathy, gross tremors, incoordination, shuffling gait, and delayed peripheral neuropathy and upon severe poisoning, pulmonary edema and respiratory failure. Convulsions, coma, and death may follow within 24 hours of severe acute exposure. **Eye:** Contact causes irritation, redness, watery eyes, and burns. **Skin:** Contact causes irritation, burning, itching, dermatitis, thickening and color changes, white lines on the nails, and hair loss. Arsenic compounds are contact allergens. Arsenic may also be absorbed through the skin to cause systemic effects. **Ingestion:** Causes garlic-like odor of breath and feces; burning lips; throat constriction; decreased white blood cell count; irritation of the gastrointestinal tract; poor appetite, dehydration, intense thirst, fluid-electrolyte disturbances, nausea, abdominal pain, vomiting, muscle cramps, diarrhea which can progress to shock and death; hypotension; ventricular fibrillation or tachycardia; hypovolemic or hemorrhagic shock; and T-wave changes. Symptoms may be delayed several hours if ingested with food. Multi-organ failure with primary target organs of gastrointestinal tract, heart, brain, and kidneys may occur after absorption. Eventually the skin, bone marrow, and peripheral nervous system may be significantly damaged. Convulsion, coma, and death may follow within 24 hours.

**Carcinogenicity:** IARC, NTP, OSHA, EPA, NIOSH, and ACGIH list arsenic as a carcinogen. MAK states arsenic is capable of producing malignant tumors as shown by experience with humans.

**Medical Conditions Aggravated by Long-Term Exposure:** Emphysema and other respiratory problems; diabetes; heart, cardiovascular, immune system, kidney, liver, nervous system, and skin disorders or allergies. **Chronic Effects:** Arsenic is a carcinogen with reported reproductive effects. Chronic poisoning can result in significant damage to the skin, bone marrow, and peripheral nervous system; skin exfoliation; herpes; polyneuritis; altered hematopoiesis; myocarditis; degeneration of the liver and kidneys; nerve damage with "pins and needles", burning, numbness, and weakness of the arms and legs; thickened skin

Wilson  
Risk  
Scale

R 0  
I 4  
S 2\*  
K 0

\*Skin  
absorption

HMIS  
H 2\*  
F 1  
R 1

PPE†  
\*Chronic  
effects  
†Sec. 8

and/or patchy areas of darkening and loss of pigment, eczematoid and allergic dermatitis, and possible white lines on the nails; anorexia; jaundice; stomach problems; nose ulcers; sore eyes; and hoarseness.

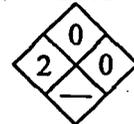
### Section 4 - First Aid Measures

**Inhalation:** Remove exposed person to fresh air and support breathing as needed. Keep affected person warm and at rest. Get medical attention immediately. **Eye Contact:** Do not allow victim to rub or keep eyes tightly shut. Gently lift eyelids and flush immediately and continuously with flooding amounts of water for at least 15 min. Consult a physician or ophthalmologist immediately. **Skin Contact:** Quickly remove contaminated clothing. Rinse with flooding amounts of water. Wash exposed area with soap and water. Consult a physician immediately. **Ingestion:** Never give anything by mouth to an unconscious or convulsing person. Contact a poison control center. Unless the poison control center advises otherwise, have the *conscious and alert* person drink 1 to 2 glasses of water. Do not induce vomiting due to potential onset of rapid CNS depression or seizures. Get medical attention immediately. *After first aid, get appropriate in-plant, paramedic, or community medical support.* Note to Physicians: After suspected overexposure examine the nose, skin, eyes, nails and nervous system; determine CBC, electrolytes, urinalysis, spot urine arsenic, a 24 hour urinary arsenic collection, liver and renal function tests, and a blood arsenic in all symptomatic patients. A chelated or nonchelated 24 hour urinary arsenic collection exceeding 100 µg is usually abnormal. Obtain an abdominal radiograph in patients acutely ingesting arsenic. Symptoms of exposure to arsenic may be delayed. For severe poisoning, BAL has been used, For milder poisoning, Penicillamine (not penicillin) has been used, with mixed success. It can only be done under strict medical care. Consider whole bowel irrigation if x-ray demonstrates arsenic in the lower GI tract. Arsenic is antagonistic to thyroid hormones. **Regulatory Requirements:** Consult 29 CFR 1910.1018(n) and Appendix C.

### Section 5 - Fire-Fighting Measures

**Flash Point:** Noncombustible; however, arsenic dust can be flammable when exposed to heat or flame. **Autoignition Temperature:** Noncombustible **LEL:** Noncombustible **UEL:** Noncombustible  
**OSHA Flammability Classification:** Noncombustible solid. **Extinguishing Media:** Extinguish with carbon dioxide, water spray, dry chemical powder or appropriate foam. **Unusual Fire or Explosion Hazards:** Arsenic is a noncombustible solid but can be heated to burn in air. Containers may explode when heated. **Hazardous Combustion Products:** Arsenic burns to produce dense white fumes of highly toxic arsenic trioxide and other forms of arsenic. **Fire-Fighting Instructions:** Do not breathe dust. Prevent contact with skin and eyes. Use water spray to "knock down" dust. Stop discharge if possible. Do not release runoff from fire control methods to sewers or waterways. Because fire may produce toxic thermal decomposition products, wear an SCBA with full facepiece/pressure-demand or positive-pressure.

NFPA



### Section 6 - Accidental Release Measures

**Spill/Leak Procedures:** Notify safety personnel, evacuate all unnecessary personnel, remove heat and ignition sources. Isolate and ventilate area, deny entry, stay upwind. Cleanup personnel should protect against exposure (Sec. 8). **Small Spills:** Avoid raising dust. If in solid form, do not sweep! Cover with dry lime or soda ash, carefully scoop up or vacuum (with a HEPA filter) and keep in a closed container. Absorb liquid spill with an inert, noncombustible absorbent such as sand or vermiculite. **Large Spills:** For large spills, dike far ahead of liquid spill for later disposal. Do not release into sewers or waterways. **Regulatory Requirements:** Consult 29 CFR 1910.120.

### Section 7 - Handling and Storage

**Handling Precautions:** Use only in a fume hood. Wear personal protective clothing and equipment to prevent vapor inhalation and contact with skin or eyes (Sec. 8). **Storage Requirements:** Arsine may be accidentally formed by the reaction of arsenic impurities in commercial acids stored in metal tanks, so a test should be made for arsine before entry is made into such vessels. Store in tightly closed containers in a cool, well-ventilated area away from air, heat, light, ignition sources, and incompatibles. **Regulatory Requirements:** Consult CFR Title 29 Part 1910.1018(f).

### Section 8 - Exposure Controls/Personal Protection

**Engineering Controls:** Establish regulated work areas per OSHA regulations 1910.1018(f) and (g). Where feasible, enclose operations to avoid vapor dispersion into the work area. Where possible, automatically transfer arsenic from drums or other storage containers to process containers. In plants with arsenic hazard, floors should be impermeable to prevent absorption and flushed down frequently with water. Work rooms must be well ventilated. Condense poisonous fumes and remove dust content. Equip exhaust hoods and worktables with down draft ventilation. **Ventilation:** Provide general or local exhaust ventilation systems to maintain airborne concentrations below exposure limits (Sec. 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source. Air from the exhaust ventilation system shall not be recirculated into work areas, and necessary measures shall be taken to ensure that the discharge outdoors will not produce a health hazard to humans or animals. **Administrative Controls:** Due to potential skin irritation associated with respirator use and arsenic dust exposure, workers shall be permitted to leave the work area every 2 hours to wash their face and obtain a clean respirator. Routinely evaluate exposure to arsenic. This may include collecting personal and area air samples. Establish a regulated, marked area where arsenic is handled, used, or stored. Educate workers about the health and safety hazards associated

with this material. Train in work practices which minimize exposure. Before first exposure and every 6 to 12 month thereafter perform a medical exam including an exam of the nose, skin, eyes, nails, and nervous system; test for urine arsenic (may not be accurate within 2 days of eating shellfish or fish; most accurate at the end of a workday) should not be greater than 100 µg per gram creatinine in the urine. Also, examine the skin periodically for abnormal growths. **Respiratory Protection:** Seek professional advice prior to respirator selection and use. Refer to OSHA respirator regulations (29 CFR 1910.134 and 1910.1018(h) Table 1 [Resp. Protection for Inorganic Arsenic]) and, if necessary, wear a NIOSH-approved respirator. For exposures >0.002 mg/m<sup>3</sup>, use a NIOSH approved supplied-air respirator with a full facepiece operated in the positive-pressure mode or with a full facepiece, hood, or helmet in the continuous flow mode, or use a NIOSH approved self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive-pressure mode. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. **Warning!** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres. If respirators are used, OSHA requires a written respiratory protection program that includes at least: medical certification, training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas. **Protective Clothing/Equipment:** Wear an appropriate NIOSH-approved respirator, chemically resistant gloves, boots, aprons, and gauntlets to prevent prolonged or repeated skin contact. Wear disposable coveralls and discard them after use. Wear dust-proof protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133 and 1910.1018(j)) and face shield when working with arsenic. Contact lenses are not protective eye devices. Appropriate eye protection must be worn instead of contact lenses. *Do not* wear contact lenses when working with arsenic. **Safety Stations:** Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work area. **Contaminated Equipment:** Separate contaminated work clothes from street clothes. Do not take contaminated work clothes home. Launder before reuse by individuals who have been informed of the hazards of working with arsenic. Remove this material from your shoes and clean personal protective equipment. Follow OSHA housekeeping regulation 29 CFR 1910.1018(k) and (m). **Comments:** Never eat, drink, or smoke in work areas. Wash any areas of the body that may have been exposed to arsenic whether or not known skin contact has occurred. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

### Section 9 - Physical and Chemical Properties

**Physical State:** Solid; crystalline

**Color:** Silver-gray or tin-white, metallic-looking; darkens to black in moist air

**Odor:** Odorless

**Vapor Pressure:** 1 mm Hg at 702 °F (372 °C)

**Formula Weight:** 74.9216

**Density:** 5.72 g/cm<sup>3</sup>

**Specific Gravity:** 5.727 at 57 °F (14 °C)

**Water Solubility:** Insoluble

**Other Solubilities:** Soluble in nitric acid; insoluble in caustic and nonoxidizing acids

**Boiling Point:** 1135 °F (613 °C); sublimes at 760 mm Hg (1 atm)

**Melting Point:** 1503 °F (817 °C) at 36 atm

**Critical Pressure:** 342 atm

**Critical Temperature:** 1477.4 °F (803 °C)

**Ionization Potential:** 9.8152 eV

**Bioconcentration Factor (BCF):** bioaccumulated by aquatic organisms

### Section 10 - Stability and Reactivity

**Stability:** Arsenic is stable at room temperature in closed containers under normal storage and handling conditions. Hydrogen gas can react with inorganic arsenic to form highly toxic arsine gas. Arsenic gas is produced upon contact with an acid or acid fumes. Arsenic darkens to black in moist air. **Polymerization:** Hazardous polymerization cannot occur. **Chemical**

**Incompatibilities:** Include air; acids; active metals (such as iron, lithium, aluminum, or zinc); hydrogen gas; oxidizers (such as bromates, chlorates, iodates, nitrates, perchlorates, peroxides, and permanganates); KNO<sub>3</sub>; K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>; AgNO<sub>3</sub>; NOCl; IF<sub>5</sub>; CrO<sub>3</sub>; ClF<sub>3</sub>; ClO; Cl<sub>2</sub>O; BrF<sub>3</sub>; BrF<sub>5</sub>; BrN<sub>3</sub>; RbC<sub>3</sub>BCH; CsC<sub>3</sub>BCH; NCl<sub>3</sub>; halogens or interhalogens; bromine azide; dirubidium acetylide; palladium; platinum; AgNO<sub>3</sub>; Na<sub>2</sub>O<sub>2</sub>; FNO; KO<sub>2</sub>; and hexafluoroisopropylideneamino lithium. **Conditions to**

**Avoid:** Avoid contact with chemical incompatibles, heat, air, food, and sources of ignition. **Hazardous Decomposition Products:** Thermal oxidative decomposition of arsenic can produce highly toxic arsenic trioxide and other forms of arsenic.

### Section 11 - Toxicological Information

#### Toxicity Data:\*

#### Acute Oral Effects:

Rat, oral, LD<sub>50</sub>: 763 mg/kg produced toxic effects: ataxia; hypermotility, diarrhea.

Man, oral, TD<sub>Lo</sub>: 7857 mg/kg for 55 years produced: changes in structure or function of esophagus; hemorrhage; skin and appendages - dermatitis, other.

#### Acute Dermal Effects:

Rabbit, subcutaneous, LD<sub>Lo</sub>: 300 mg/kg

#### Tumorigenic Effects:

Man, oral, 76 mg/kg for 12 years intermittently produced toxic effects: carcinogenic by RTECS criteria; liver - tumors; hemorrhage.

#### Genetic Effects:

Human, unreported route, 4286 µg/kg induced cytogenetic analysis.  
Mouse, oral, 280 mg/kg, 8 weeks, induced cytogenetic analysis.

#### Reproductive Effects:

Rat, female, oral, 605 µg/kg administered 35 weeks prior to mating produced toxic effects: pre-implantation; post-implantation mortality.

**Section 11- Toxicological Information, continued****Multiple Dose Toxicity Data:**

Rat, oral, 1360 mg/kg administered for 17 days intermittently produced toxic effects: gastrointestinal changes; interstitial nephritis; changes in cell count (unspecified).

\* See NIOSH, RTECS (CG0525000), for additional toxicity data.

**Section 12 - Ecological Information**

**Ecotoxicity:** 9900 µg/L/96hr/LC<sub>50</sub> (mortality)/Fathead minnow (*Pimephales promelas*); 2319 µg/L/96hr/LC<sub>50</sub> (mortality)/Opposum shrimp (*Mysidopsis bahia*). **Environmental Fate:** Arsenic as a free element is rarely encountered in natural waters. Soluble inorganic arsenate (+5 oxidation state) predominates under normal conditions since it is thermodynamically more stable in water than arsenite (+3 state). Arsenic released to air exists mainly in the form of particulate matter. These particles are dispersed by the wind and are then returned to the earth by wet or dry deposition. Due to its immobility, arsenic tends to concentrate and remain in upper soil layers indefinitely. Photolysis is not considered an important fate process for arsenic compounds. Bioconcentration of arsenic occurs in aquatic organisms, primarily in algae and lower invertebrates. **Soil Adsorption/Mobility:** Most arsenic in the environment exists in soil or rock. Poorly soluble forms tend to adsorb to organic material in soils while the soluble species tend to move with water. This material may be transported by wind or water erosion of small particles or may be transported by leaching into rainfall or snowmelt. Many arsenic compounds tend to adsorb to soils or sediments under oxidizing conditions so leaching usually results in transportation over short distances in soil. Arsenic is mainly immobile in agricultural soils. Its mobility may be further reduced by acidification.

**Section 13 - Disposal Considerations**

**Disposal:** Recover material in the elemental state for reuse or recycling. Dissolve in minimum concentrated hydrochloric acid. Dilute with water until white precipitates form. Add just enough 6M HCl to redissolve. Saturate with H<sub>2</sub>S. Filter, wash, dry and ship to supplier. Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable federal, state, and local regulations. **Container Cleaning and Disposal:** Handle empty containers carefully as hazardous residues may still remain. Triple rinse containers and dispose of wash wastewater appropriately.

**Section 14 - Transport Information****DOT Transportation Data (49 CFR 172.101):**

<b>Shipping Name:</b> Arsenic	<b>Packaging Authorizations</b>	<b>Quantity Limitations</b>
<b>Shipping Symbols:</b> --	a) Exceptions: None	a) Passenger Aircraft/Rail: 25 kg
<b>Hazard Class:</b> 6.1	b) Non-bulk Packaging: 173.212	b) Cargo Aircraft Only: 100 kg
<b>ID No.:</b> UN1558	c) Bulk Packaging: 173.242	
<b>Packing Group:</b> II		<b>Vessel Stowage Requirements</b>
<b>Label:</b> Poison		a) Vessel Stowage: A
<b>Special Provisions (172.102):</b> --		b) Other: --

**Section 15 - Regulatory Information****EPA Regulations:**

RCRA Hazardous Waste (40 CFR 261.33); RCRA Hazardous Waste Number: D004  
 Listed as a CERCLA Hazardous Substance (40 CFR 302.4) specific per CWA, Sec. 307(a); CAA, Sec. 112  
 CERCLA Final Reportable Quantity (RQ): 1 lb (0.454 kg)  
 Listed as a SARA Toxic Chemical (40 CFR 372.65)  
 SARA EHS (Extremely Hazardous Substance) (40 CFR 355): Not listed  
 Toxic Substances Control Act (TSCA): Listed

**OSHA Regulations:**

Air Contaminant (29 CFR 1910.1000, Table Z-1, 29 CFR 10190.1018): Listed

**Section 16 - Other Information**

**References:** 1, 99, 124, 136, 149, 161, 176, 184, 190, 198, 209, 216, 222, 225, 227, 229, 230, 233, 234

**Prepared By** ..... R Reals, MS/M Adams, PhD

**Research Date:** ..... 1999-03

**Review Date:** ..... 2000-01

**Industrial Hygiene Review** ..... DJ Wilson, CIH

**Medical Review** ..... G Kelafant, MD

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MATERIAL SAFETY DATA SHEET  
MOTIVA MSDS: 840076M-04 09/10/95

ASBESTOS

TELEPHONE NUMBER:

24 HOUR EMERGENCY ASSISTANCE

EQUIVA SERVICES: 877-276-7283

CHEMTREC: 800-424-9300

GENERAL MSDS ASSISTANCE

877-276-7285

NAME AND ADDRESS

MOTIVA ENTERPRISES LLC

PRODUCT STEWARDSHIP

P.O. BOX 674414

HOUSTON, TX 77267-4414

SECTION I NAME

PRODUCT: ASBESTOS  
CHEM NAME: AMOSITE, CHRYSOTILE, CROCIDOLITE AND  
OTHER FORMS COVERED BY THE OSHA HEALTH  
STANDARD  
CHEM FAMILY: WASTE  
SHELL CODE: WWWW  
HEALTH HAZARD: 1 FIRE HAZARD: 0 REACTIVITY: 0

SECTION II-A PRODUCT/INGREDIENT

NO.	COMPOSITION	CAS NO.	PERCENT
P	ASBESTOS	1332-21-4	100

SECTION II-B ACUTE TOXICITY DATA

NO.	ACUTE ORAL LD50	ACUTE DERMAL LD50	ACUTE INHALATION LC50
P	NONE		

SECTION III HEALTH INFORMATION

THE HEALTH EFFECTS NOTED BELOW ARE CONSISTENT WITH REQUIREMENTS UNDER THE OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200).

EYE CONTACT: DUST MAY CAUSE MECHANICAL IRRITATION TO THE EYES.

SKIN CONTACT: HIGH CONCENTRATIONS OF DUST ARE IRRITATING TO THE SKIN AND MAY CAUSE "ASBESTOS CORNS," BENIGN, WART-LIKE GROWTHS.

INHALATION: INHALATION OF ASBESTOS FIBERS MAY CAUSE ASBESTOSIS (FIBROSIS OF THE LUNGS). LUNG CANCER OR MESOTHELIOMA (SEE OTHER HEALTH EFFECTS).

INGESTION: ASBESTOS HAS A LOW LEVEL OF ACUTE TOXICITY UPON INGESTION.

SIGNS AND SYMPTOMS: IRRITATION AS NOTED ABOVE. LUNG DAMAGE (SCARRING, AND TUMORS) MAY BE EVIDENCED BY SHORTNESS OF BREATH, COUGH, CHEST PAIN, CYANOSIS (BLuish DISCOLORATION OF THE SKIN), CLUBBING OF THE FINGERS, FATIGUE AND WEIGHT LOSS.

AGGRAVATED MEDICAL CONDITIONS:

PREEXISTING SKIN AND RESPIRATORY DISORDERS MAY BE AGGRAVATED BY EXPOSURE TO THIS MATERIAL. IMPAIRED LUNG FUNCTION FROM PREEXISTING DISORDERS MAY BE AGGRAVATED BY EXPOSURE TO THIS MATERIAL.

OTHER HEALTH EFFECTS:

THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, THE NATIONAL TOXICOLOGY PROGRAM AND THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER HAVE DETERMINED THERE IS SUFFICIENT EVIDENCE FOR THE CARCINOGENICITY OF ASBESTOS IN BOTH HUMANS AND EXPERIMENTAL ANIMALS. THEREFORE, THE HANDLING PROCEDURES AND SAFETY PRECAUTIONS IN THIS MSDS SHOULD BE FOLLOWED TO MINIMIZE EMPLOYEE'S EXPOSURE.

SEE SECTION VI FOR ADDITIONAL HEALTH INFORMATION.

## SECTION IV

## OCCUPATIONAL EXPOSURE LIMITS

COMP NO.	OSHA PEL/TWA	OSHA PEL/CEILING	TLV/TWA	ACGIH TLV/STEL	OTHER
P	0.1 F/CC	1 F/CC*	2 F/CC,A1		
P1			0.5 F/CC,A1		
P2			2 F/CC,A1		
P3			0.2 F/CC,A1		
P4			2 F/CC,A1		

F/CC= FIBERS/CUBIC CENTIMETER; \*30-MINUTE EXCURSION LIMIT. P1= AMOSITE; P2= CHRYSOTILE; P3= CROCIDOLITE; P4= OTHER FORMS.

## SECTION V

## EMERGENCY AND FIRST AID PROCEDURES

**EYE CONTACT:** FLUSH EYES WITH PLENTY OF WATER FOR 15 MINUTES WHILE HOLDING EYELIDS OPEN. GET MEDICAL ATTENTION.

**SKIN CONTACT:** FLUSH SKIN WITH WATER WHILE REMOVING CONTAMINATED CLOTHING AND SHOES. IF IRRITATION OCCURS, GET MEDICAL ATTENTION. DO NOT REUSE CLOTHING OR SHOES UNTIL CLEANED.

**INHALATION:** REMOVE VICTIM TO FRESH AIR AND PROVIDE OXYGEN IF BREATHING IS DIFFICULT. GIVE ARTIFICIAL RESPIRATION IF NOT BREATHING. GET MEDICAL ATTENTION.

**INGESTION:** DO NOT INDUCE VOMITING. IN GENERAL, NO TREATMENT IS NECESSARY UNLESS LARGE QUANTITIES OF MATERIAL ARE INGESTED. HOWEVER, GET MEDICAL ADVICE.

**NOTE TO PHYSICIAN:** IN GENERAL, EMESIS INDUCTION IS UNNECESSARY IN HIGH VISCOSITY, LOW VOLATILITY PRODUCTS, I.E., MOST OILS AND GREASES.

## SECTION VI

## SUPPLEMENTAL HEALTH INFORMATION

ASBESTOS CAUSED NO DOSE-RELATED INCREASE IN SISTER-CHROMATID EXCHANGE LEVELS IN CHO-K1 CELLS, HUMAN FIBROBLASTS OR HUMAN LYMPHOBLASTOID CELLS. HOWEVER, MITOTIC DELAY WAS INDUCED IN CHO-K1 CELLS AND HUMAN FIBROBLASTS. CHINESE HAMSTER OVARIAN FIBROBLASTS SHOWED AN INCREASE IN THE SISTER CHROMATID EXCHANGE RATE UPON EXPOSURE TO ASBESTOS. ESCHERICHIA COLI AND SALMONELLA TYPHIMURIUM SHOWED ASBESTOS NOT TO BE MUTAGENIC. CYTOGENETICS IN VITRO ASSAY FINDINGS WERE POSITIVE; ASBESTOS WAS NOT METABOLICALLY ACTIVATED.

MARKED TO EXTREME HYPERPLASIA OF THE BONE MARROW AND ABERRATIONS OF HUMORAL AND CELLULAR IMMUNITY HAVE BEEN REPORTED IN INDIVIDUALS EXPOSED TO ASBESTOS.

THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER HAS CONCLUDED THE FOLLOWING: "CIGARETTE SMOKING AND OCCUPATIONAL EXPOSURE TO ASBESTOS FIBERS INCREASES LUNG CANCER INCIDENCE INDEPENDENTLY; WHEN THEY OCCUR TOGETHER; THEY ACT MULTIPLICATIVELY." THE HANDLING PROCEDURES AND SAFETY PRECAUTIONS IN THIS MSDS SHOULD BE FOLLOWED TO MINIMIZE EMPLOYEE EXPOSURE.

## SECTION VII

## PHYSICAL DATA

**BOILING POINT (DEG F):** NOT APPLICABLE

**SPECIFIC GRAVITY (H<sub>2</sub>O = 1):** >1

**VAPOR PRESSURE (MM HG):** NOT APPLICABLE

**MELTING POINT (DEG F):** NOT APPLICABLE

**SOLUBILITY IN WATER:** NEGLIGIBLE

**VAPOR DENSITY (AIR = 1):** NOT APPLICABLE

**EVAPORATION RATE (NORMAL BUTYL ACETATE = 1):** NOT APPLICABLE

**APPEARANCE AND ODOR:** FIBROUS SOLID, NO ODOR.

**PHYS/CHEM PROPERTIES:** SEE ABOVE FOR DETAILS

## SECTION VIII

## FIRE AND EXPLOSION HAZARDS

**FLASH POINT AND METHOD:** NONE

**FLAMMABLE LIMITS/PERCENT VOLUME IN AIR:** LOWER: - HIGHER: -

**EXTINGUISHING MEDIA:**

USE WATER FOG, FOAM, DRY CHEMICAL OR CO2.

SPECIAL FIRE FIGHTING PROCEDURES AND PRECAUTIONS:

MATERIAL WILL NOT BURN. DO NOT ENTER CONFINED FIRE SPACE WITHOUT FULL BUNKER GEAR (HELMET WITH FACE SHIELD, BUNKER COATS, GLOVES AND RUBBER BOOTS), INCLUDING A POSITIVE PRESSURE NIOSH APPROVED SELF-CONTAINED BREATHING APPARATUS. COOL FIRE EXPOSED CONTAINERS WITH WATER.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

NONE IDENTIFIED

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SECTION IX

REACTIVITY

---

STABILITY: STABLE HAZARDOUS POLYMERIZATION WILL NOT OCCUR  
CONDITIONS AND MATERIALS TO AVOID:

NONE IDENTIFIED

HAZARDOUS DECOMPOSITION PRODUCTS:

THERMAL DECOMPOSITION PRODUCTS ARE HIGHLY DEPENDENT ON THE COMBUSTION CONDITIONS. A COMPLEX MIXTURE OF AIRBORNE PARTICULATES AND GASES WILL EVOLVE WHEN THIS MATERIAL UNDERGOES PYROLYSIS OR COMBUSTION.

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SECTION X

EMPLOYEE PROTECTION

---

RESPIRATORY PROTECTION:

DO NOT BREATHE DUST. IF EXPOSURE MAY OR DOES EXCEED OCCUPATIONAL EXPOSURE LIMITS (SEC. IV) USE A NIOSH-APPROVED RESPIRATOR TO PREVENT OVEREXPOSURE. IN ACCORD WITH 29 CFR 1910.1001 OR 1926.58 USE EITHER AN ATMOSPHERE-SUPPLYING RESPIRATOR OR AN AIR-PURIFYING RESPIRATOR EQUIPPED WITH HIGH-EFFICIENCY PARTICULATE CARTRIDGES. FOR ADDITIONAL REQUIREMENTS, REFER TO 29 CFR 1926.58(H).

PROTECTIVE CLOTHING

AVOID CONTACT WITH EYES. WEAR SAFETY GLASSES OR GOGGLES AS APPROPRIATE. AVOID CONTACT WITH SKIN AND CLOTHING. WEAR CHEMICAL-RESISTANT GLOVES AND PROTECTIVE CLOTHING. FOR ADDITIONAL REQUIREMENTS, REFER TO 29 CFR 1926.58(I).

ADDITIONAL PROTECTIVE MEASURES:

FOR ADDITIONAL REQUIREMENTS, REFER TO 29 CFR 1926.58(G).

---

SECTION XI

ENVIRONMENTAL PROTECTION

---

SPILL OR LEAK PROCEDURES:

PREVENT BODILY CONTACT WITH SPILLED MATERIAL. WEAR PROTECTIVE CLOTHING AND APPROPRIATE RESPIRATOR. VACUUM THE AREA WITH VACUUM CLEANER EQUIPPED WITH HIGH-EFFICIENCY PARTICULATE AEROSOL (HEPA) FILTERS. FOR ADDITIONAL REQUIREMENTS ON CLEANUP AND DISPOSAL, REFER TO 29 CFR 1926.58(L) AND 40 CFR 61.150. AVOID GENERATING DUST. PUT INTO CONTAINERS FOR DISPOSAL.

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SECTION XII

SPECIAL PRECAUTIONS

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FOR ADDITIONAL REQUIREMENTS, REFER TO 29 CFR 1926.58, 29 CFR 1910.1001, 40 CFR 61.145, AND 40 CFR 61.150.

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SECTION XIII

TRANSPORTATION REQUIREMENTS

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DEPARTMENT OF TRANSPORTATION CLASSIFICATION:

CLASS 9 (MISCELLANEOUS HAZARDOUS MATERIAL), III

DOT PROPER SHIPPING NAME: ASBESTOS

OTHER REQUIREMENTS: NA2212, GUIDE 171. NONFRIABLE ASBESTOS AND FRIABLE ASBESTOS IN QUANTITIES OF LESS THAN 1 POUND PER CONTAINER ARE NOT REGULATED BY D.O.T.

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SECTION XIV

OTHER REGULATORY CONTROLS

---

THIS MATERIAL IS LISTED ON THE EPA/TSCA INVENTORY OF CHEMICAL SUBSTANCES. IN ACCORDANCE WITH SARA TITLE III, SECTION 313, THE ATTACHED ENVIRONMENTAL DATA

SHEET (EDS) SHOULD ALWAYS BE COPIED AND SENT WITH THE MSDS.

SECTION XV

STATE REGULATORY INFORMATION

THE FOLLOWING CHEMICALS ARE SPECIFICALLY LISTED BY INDIVIDUAL STATES; OTHER PRODUCT SPECIFIC HEALTH AND SAFETY DATA IN OTHER SECTIONS OF THE MSDS MAY ALSO BE APPLICABLE FOR STATE REQUIREMENTS. FOR DETAILS ON YOUR REGULATORY REQUIREMENTS YOU SHOULD CONTACT THE APPROPRIATE AGENCY IN YOUR STATE.

STATE LISTED COMPONENT	CAS NO	PERCENT	STATE CODE
------------------------	--------	---------	------------

ASBESTOS	1332-21-4	100	CA, FL, IL, MA, ME, MN, PA, RI, CA65C
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CA = CALIFORNIA HAZ. SUBST. LIST; CA65C, CA65R, CA65C/R = CALIFORNIA SAFE DRINKING WATER AND TOXICS ENFORCEMENT ACT OF 1986 OR PROPOSITION 65 LIST; CT = CONNECTICUT TOXIC. SUBST. LIST; FL = FLORIDA SUBST. LIST; IL = ILLINOIS TOX. SUBST. LIST; LA = LOUISIANA HAZ. SUBST. LIST; MA = MASSACHUSETTS SUBST. LIST; ME = MAINE HAZ. SUBST. LIST; MN = MINNESOTA HAZ. SUBST. LIST; NJ = NEW JERSEY HAZ. SUBST. LIST; PA = PENNSYLVANIA HAZ. SUBST. LIST; RI = RHODE ISLAND HAZ. SUBST. LIST.

CALIFORNIA PROPOSITION 65 FOOTNOTE: CA65C = THE CHEMICAL IDENTIFIED WITH THIS CODE IS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER. CA65R = THE CHEMICAL IDENTIFIED WITH THIS CODE IS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM. CA65C/R = THE CHEMICAL IDENTIFIED WITH THIS CODE IS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE BOTH CANCER AND BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

SECTION XVI

SPECIAL NOTES

THIS MSDS REVISION HAS CHANGES IN SECTION XV - STATE REGULATORY INFORMATION

THE INFORMATION CONTAINED IN THIS DATA SHEET IS BASED ON THE DATA AVAILABLE TO US AT THIS TIME, AND IS BELIEVED TO BE ACCURATE BASED UPON THAT DATA. IT IS PROVIDED INDEPENDENTLY OF ANY SALE OF THE PRODUCT, FOR PURPOSE OF HAZARD COMMUNICATION. IT IS NOT INTENDED TO CONSTITUTE PRODUCT PERFORMANCE INFORMATION, AND NO EXPRESS OR IMPLIED WARRANTY OF ANY KIND IS MADE WITH RESPECT TO THE PRODUCT, UNDERLYING DATA OR THE INFORMATION CONTAINED HEREIN. YOU ARE URGED TO OBTAIN DATA SHEETS FOR ALL PRODUCTS YOU BUY, PROCESS USE OR DISTRIBUTE, AND ARE ENCOURAGED TO ADVISE THOSE WHO MAY COME IN CONTACT WITH SUCH PRODUCTS OF THE INFORMATION CONTAINED HEREIN.

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ENVIRONMENTAL DATA SHEET  
MOTIVA EDS: 840076M

ASBESTOS

TELEPHONE NUMBER:

24 HOUR EMERGENCY ASSISTANCE

EQUIVA SERVICES: 877-276-7283

CHEMTREC: 800-424-9300

GENERAL MSDS ASSISTANCE

877-276-7285

NAME AND ADDRESS

MOTIVA ENTERPRISES

PRODUCT STEWARDSHIP

P.O. BOX 674414

HOUSTON, TX 77267-4414

PRODUCT CODE: WWWW

## SECTION I

## PRODUCT COMPOSITION

NO. COMPOSITION	CAS	PERCENT
P ASBESTOS	1332-21-4	100

## SECTION II SARA TITLE III INFORMATION

NO.	EHS RQ (*1)	EHS TPQ (*2)	SEC-313 (*3)	313 CATEGORY (*4)	311/312 CATEGORY (*5)
P			YES		H-1, H-2

- \*1 = REPORTABLE QUANTITY OF EXTREMELY HAZARDOUS SUBSTANCE, SEC 302  
 \*2 = THRESHOLD PLANNING QUANTITY, EXTREMELY HAZARDOUS SUBSTANCE, SEC 302  
 \*3 = TOXIC CHEMICAL, SEC 313  
 \*4 = CATEGORY AS REQUIRED BY SEC 313 (40 CFR 372.65 C), MUST BE USED ON TOXIC RELEASE INVENTORY FORM  
 \*5 = CATEGORY (FOR AGGREGATE REPORTING REQUIREMENTS UNDER SARA 311, 312)  
 HEALTH: H-1 = IMMEDIATE (ACUTE) HEALTH HAZARD  
 H-2 = DELAYED (CHRONIC) HEALTH HAZARD  
 PHYSICAL: P-3 = FIRE HAZARD  
 P-4 = SUDDEN RELEASE OF PRESSURE HAZARD  
 P-5 = REACTIVE HAZARD

## SECTION III ENVIRONMENTAL RELEASE INFORMATION

EPA - COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT. UNDER EPA-CERCLA ("SUPERFUND") RELEASES TO AIR, LAND OR WATER WHICH EXCEED THE REPORTABLE QUANTITY MUST BE REPORTED TO THE NATIONAL RESPONSE CENTER, 800-424-8802.  
 THE REPORTABLE QUANTITY (RQ) FOR A RELEASE OF THIS MATERIAL IS 1 LB.

## SECTION IV RCRA INFORMATION

IF THIS MATERIAL BECOMES A WASTE, IT WOULD NOT BE A HAZARDOUS WASTE BY RCRA CRITERIA (40 CFR 261). FOR DISPOSAL REQUIREMENTS, SEE 40 CFR 61.150.

THE INFORMATION CONTAINED IN THIS DATA SHEET IS BASED ON THE DATA AVAILABLE TO US AT THIS TIME, AND IS BELIEVED TO BE ACCURATE BASED UPON THAT DATA. IT IS PROVIDED INDEPENDENTLY OF ANY SALE OF THE PRODUCT, FOR PURPOSE OF HAZARD COMMUNICATION. IT IS NOT INTENDED TO CONSTITUTE PRODUCT PERFORMANCE INFORMATION, AND NO EXPRESS OR IMPLIED WARRANTY OF ANY KIND IS MADE WITH RESPECT TO THE PRODUCT, UNDERLYING DATA OR THE INFORMATION CONTAINED HEREIN. YOU ARE URGED TO OBTAIN DATA SHEETS FOR ALL PRODUCTS YOU BUY, PROCESS USE OR DISTRIBUTE, AND ARE ENCOURAGED TO ADVISE THOSE WHO MAY COME IN CONTACT WITH SUCH PRODUCTS OF THE INFORMATION CONTAINED HEREIN.

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KAREN G. HAYNES

-----  
 EQUIVA SERVICES LLC  
 P.O. BOX 674414

HOUSTON, TX 77267-4414

FOR ADDITIONAL INFORMATION ON THIS ENVIRONMENTAL DATA PLEASE CALL  
(877) 276-7285

FOR EMERGENCY ASSISTANCE PLEASE CALL  
EQUIVA SERVICES LLC: (877) 276-7283  
CHEMTREC: (800) 424-9300  
}

**Ashland** Material Safety Data Sheet

Ashland Chemical Co.

Date Prepared: 01/26/98

Date Printed: 06/22/99

MSDS No: 999.0053741-004.006I

ISOPROPANOL 99% USP GRADE

---

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Material Identity

Product Name: ISOPROPANOL 99% USP GRADE

General or Generic ID: ALCOHOL

Company

Ashland Chemical Co.

P.O. Box 2219

Columbus, OH 43216

614-790-3333

Emergency Telephone Number:

1-800-ASHLAND (1-800-274-5263)

24 hours everyday

Regulatory Information Number:

1-800-325-3751

---

2. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient(s)	CAS Number	% (by weight)
ISOPROPANOL	67-63-0	100.0

---

3. HAZARDS IDENTIFICATION

Potential Health Effects

Eye

Can cause eye irritation. Symptoms include stinging, tearing, redness, and swelling of eyes.

Skin

May cause mild skin irritation. Prolonged or repeated contact may dry the skin. Symptoms may include redness, burning, drying and cracking of skin, and skin burns. Passage of this material into the body through the skin is possible, but it is unlikely that this would result in harmful effects during safe handling and use.

Swallowing

Swallowing small amounts of this material during normal handling is not likely to cause harmful effects. Swallowing large amounts may be harmful.

Inhalation

Breathing of vapor or mist is possible. Breathing small amounts of this material during normal handling is not likely to cause harmful effects. Breathing large amounts may be harmful. Symptoms usually occur at air concentrations higher than the

recommended exposure limits (See Section 8).

#### Symptoms of Exposure

Signs and symptoms of exposure to this material through breathing, swallowing, and/or passage of the material through the skin may include: stomach or intestinal upset (nausea, vomiting, diarrhea) irritation (nose, throat, airways), central nervous system depression (dizziness, drowsiness, weakness, fatigue, nausea, headache, unconsciousness), low blood pressure, mild, temporary changes in the liver, effects on heart rate, respiratory depression (slowing of the breathing rate), loss of coordination, confusion, lung edema (fluid buildup in the lung tissue), kidney damage, coma.

#### Target Organ Effects

Overexposure to this material (or its components) has been suggested as a cause of the following effects in laboratory animals: mild, reversible liver effects.

#### Developmental Information

This material (or a component) has been shown to cause harm to the fetus in laboratory animal studies. Harm to the fetus occurs only at exposure levels that harm the pregnant animal. The relevance of these findings to humans is uncertain.

#### Cancer Information

No data

#### Other Health Effects

No data

#### Primary Route(s) of Entry

Inhalation, Skin absorption, Skin contact, Eye contact.

---

#### 4. FIRST AID MEASURES

##### Eyes

If symptoms develop, immediately move individual away from exposure and into fresh air. Flush eyes gently with water for at least 15 minutes while holding eyelids apart; seek immediate medical attention.

##### Skin

Remove contaminated clothing. Wash exposed area with soap and water. If symptoms persist, seek medical attention. Launder clothing before reuse.

##### Swallowing

Seek medical attention. If individual is drowsy or unconscious, do not give anything by mouth; place individual on the left side with the head down. Contact a physician, medical facility, or poison control center for advice about whether to induce vomiting. If possible, do not leave individual unattended.

##### Inhalation

If symptoms develop, immediately move individual away from exposure and into fresh air. Seek immediate medical attention; keep person warm and quiet. If person is not breathing, begin artificial respiration. If breathing is difficult, administer oxygen.

Note to Physicians

Preexisting disorders of the following organs (or organ systems) may be aggravated by exposure to this material: skin, lung (for example, asthma-like conditions), kidney.

---

5. FIRE FIGHTING MEASURES

Flash Point

53.0 F (11.6 C)

Explosive Limit

(for product) Lower 2.5 Upper .0 %

Autoignition Temperature

No data

Hazardous Products of Combustion

May form: carbon dioxide and carbon monoxide.

Fire and Explosion Hazards

Vapors are heavier than air and may travel along the ground or may be moved by ventilation and ignited by pilot lights, other flames, sparks, heaters, smoking, electric motors, static discharge, or other ignition sources at locations distant from material handling point. Never use welding or cutting torch on or near drum (even empty) because product (even just residue) can ignite explosively.

Extinguishing Media

alcohol foam, carbon dioxide, dry chemical.

Fire Fighting Instructions

Water may be ineffective. Water may be used to keep fire-exposed containers cool until fire is out. Wear a self-contained breathing apparatus with a full facepiece operated in the positive pressure demand mode with appropriate turn-out gear and chemical resistant personal protective equipment. Refer to the personal protective equipment section of this MSDS.

NFPA Rating

Health - 1, Flammability - 3, Reactivity - 0

---

6. ACCIDENTAL RELEASE MEASURES

Small Spill

Absorb liquid on vermiculite, floor absorbent or other absorbent material.

Large Spill

Eliminate all ignition sources (flares, flames including pilot lights, electrical sparks). Persons not wearing protective equipment should be excluded from area of spill until clean-up has been completed. Stop spill at source. Prevent from entering drains, sewers, streams or other bodies of water. Prevent from spreading. If runoff occurs, notify authorities as required. Pump or vacuum transfer spilled product to clean containers for recovery. Absorb unrecoverable product. Transfer contaminated absorbent, soil and other materials to containers for disposal. Per good environmental management practices, prevent run-off to sewers, streams and other bodies of water. Stop spill at the

source. Cover sewer grates and dike the spill. Absorb spilled material on to absorbents. Shovel materials into container. Close container tightly and dispose of properly.

---

## 7. HANDLING AND STORAGE

### Handling

Containers of this material may be hazardous when emptied. Since emptied containers retain product residues (vapor, liquid, and/or solid), all hazard precautions given in the data sheet must be observed. All five-gallon pails and larger metal containers, including tank cars and tank trucks, should be grounded and/or bonded when material is transferred. Warning. Sudden release of hot organic chemical vapors or mists from process equipment operating at elevated temperature and pressure, or sudden ingress of air into vacuum equipment, may result in ignitions without the presence of obvious ignition sources. Published "autoignition" or "ignition" temperature values cannot be treated as safe operating temperatures in chemical processes without analysis of the actual process conditions. Any use of this product in elevated temperature processes should be thoroughly evaluated to establish and maintain safe operating conditions.

---

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### Eye Protection

Not applicable

### Skin Protection

Wear resistant gloves (consult your safety equipment supplier).. To prevent repeated or prolonged skin contact, wear impervious clothing and boots..

### Respiratory Protections

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

### Engineering Controls

Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below TLV(s).

### Exposure Guidelines

Component

-----

ISOPROPANOL (67-63-0)

OSHA VPEL 400.000 ppm - TWA

OSHA VPEL 500.000 ppm - STEL

ACGIH TLV 400.000 ppm - TWA

ACGIH TLV 500.000 ppm - STEL

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point

(for product) 180.0 F (82.2 C) @ 760 mmHg

Vapor Pressure

(for product) 33.000 mmHg @ 68.00 F

Specific Vapor Density

2.070 @ AIR=1

Specific Gravity

.789 @ 60.00 F

Liquid Density

6.580 lbs/gal @ 60.00 F

.789 kg/l @ 15.60 C

Percent Volatiles

100.0 %

Evaporation Rate

7.70 (ETHYL ETHER)

Appearance

No data

State

LIQUID

Physical Form

HOMOGENEOUS SOLUTION

Color

CLEAR & COLORLESS

Odor

No data

pH

Not applicable

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10. STABILITY AND REACTIVITY

Hazardous Polymerization

Product will not undergo hazardous polymerization.

Hazardous Decomposition

May form: carbon dioxide and carbon monoxide.

Chemical Stability

Stable.

Incompatibility

Avoid contact with: acetaldehyde, acids, chlorine, ethylene oxide isocyanates, strong oxidizing agents, Do not use with aluminum equipment at temperatures above 120 degrees F..

---

11. TOXICOLOGICAL INFORMATION

No data

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12. ECOLOGICAL INFORMATION

No data

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13. DISPOSAL CONSIDERATION

Waste Management Information

Dispose of in accordance with all applicable local, state and federal regulations.

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14. TRANSPORT INFORMATION

DOT Information - 49 CFR 172.101

DOT Description:

ISOPROPYL ALCOHOL, 3, UN1219, II

Container/Mode:

55 GAL DRUM/TRUCK PACKAGE

NOS Component:

None

RQ (Reportable Quantity) - 49 CFR 172.101

Not applicable

---

15. REGULATORY INFORMATION

US Federal Regulations

TSCA (Toxic Substances Control Act) Status

TSCA (UNITED STATES) The intentional ingredients of this product are listed.

CERCLA RQ - 40 CFR 302.4(a)

None listed

SARA 302 Components - 40 CFR 355 Appendix A

None

Section 311/312 Hazard Class - 40 CFR 370.2

Immediate(X) Delayed(X) Fire(X) Reactive( ) Sudden  
Release of Pressure( )

SARA 313 Components - 40 CFR 372.65

None

International Regulations

Inventory Status

DSL (CANADA) The intentional ingredients of this product are listed.

State and Local Regulations

California Proposition 65

None

New Jersey RTK Label Information  
ISOPROPYL ALCOHOL

67-63-0

Pennsylvania RTK Label Information  
2-PROPANOL

67-63-0

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16. OTHER INFORMATION

The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances.

Last page



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**Section 1 - Chemical Product and Company Identification**

**53**

**Product/Chemical Name:** Lead **CAS Number:** 7439-92-1 **Chemical Formula:** Pb **EINECS Number:** 231-100-4  
**Synonyms:** C.I. Pigment Metal 4; C.I. 77575; Glover; KS-4; lead flake; lead inorganic; lead metal; metallic lead; Olow; Omaha; Omaha & Grant; plumbum; SI; SO. **Derivation:** Lead is derived by the roasting and reduction of galena (lead sulfide), anglesite (lead sulfate), and cerussite (lead carbonate). It is also recovered from scrap and from ore with purification. **General Use:** Lead is used in storage batteries, radiation shielding, cable covering, ammunition, chemical reaction equipment (piping, tank linings, etc), solder and fusible alloys, type metal, vibration damping in heavy construction, foil, Babbitt and other bearing alloys, x-ray protection, paint pigment, in the manufacture of lead alloys, ceramics, plastics, and electronic devices. **Vendors:** Consult the latest *Chemical Week Buyers' Guide*. (73)

**Section 2 - Composition/Information on Ingredients**

Lead, ca 99+% wt

**Trace Impurities:** silver, copper, arsenic, antimony, tin, zinc, iron, and/or bismuth

OSHA PEL	NIOSH REL	DFG (Germany) MAK	AIHA WEEL
8-hr TWA: 0.05 mg/m <sup>3</sup>	10-hr TWA: <0.1 mg/m <sup>3</sup>	TWA: 0.1 mg/m <sup>3</sup>	None established
OSHA Blood Lead Level: <40 µg/dL	(Blood Pb <0.06 mg/100 g whole blood)	Category III: Substances with systemic effects, onset of effect > 2 hr	
ACGIH TLV 0.05 mg/m <sup>3</sup>	IDLH Level 100 mg/m <sup>3</sup> (as Pb)	Peak Exposure Limit: 1 mg/m <sup>3</sup> , 30 min, average value, 1 per shift	

**Section 3 - Hazards Identification**

☆☆☆☆ Emergency Overview ☆☆☆☆

Lead is a bluish-white, silvery, gray metal that is very soft. It is a cumulative poison by all routes. Lead is stable but may explode when heated to high temperatures. Rubber gloves containing lead may ignite in nitric acid. Lead is a suspected carcinogen and an experimental teratogen.

Wilson Risk Scale
R 1
I 4
S 1
K 1

**Potential Health Effects**

**Primary Entry Routes:** Ingestion and inhalation of dust. **Target Organs:** Central nervous system; gastrointestinal, cardiovascular, and reproductive systems; blood; gingival tissue; and kidneys

**Acute Effects**

**Inhalation:** Causes mucous membrane and respiratory system irritation; myalgia or paresthesia, mild fatigue, irritability, lethargy, occasional abdominal discomfort, arthralgia, difficulty concentrating, muscular exhaustibility, tremor, headache, pica, anorexia, vomiting, malaise, convulsions; central nervous system disturbances, colic, lead-line, proteinuria, glucosuria, aminoaciduria, insomnia, muscle and joint pains, and hallucinations. **Eye:** Contact causes irritation. **Skin:** Contact causes skin irritation. **Ingestion:** Exposure may cause permanent brain damage and reversible renal injury. Lead encephalopathy is accompanied by severe cerebral edema, increase in cerebral spinal fluid pressure, proliferation and swelling of endothelial cells in capillaries and arterioles, proliferation of glial cells, neuronal degeneration and areas of focal cortical necrosis in fatal cases. In young children developmental defects include learning disabilities, lowered IQ, and behavioral abnormalities.

**Carcinogenicity:** ACGIH lists lead as Group A3 (Confirmed Animal Carcinogen with Unknown Relevance to Humans), EPA as Group B2 (Probable Human Carcinogen), IARC as Group 2B (Possibly Carcinogenic to Humans), NTP as Group 2B (Reasonably anticipated to be a carcinogen), and MAK as Group B (Justifiably suspected of having carcinogenic potential).

**Medical Conditions Aggravated by Long-Term Exposure:** Lead may aggravate nervous system disorders, kidney diseases, high blood pressure, infertility, and anemia. Lead-induced anemia and its effect on blood pressure can aggravate cardiovascular disease. Persons with blood disorders, children, and pregnant women are at increased risk.

**Chronic Effects:** May cause weight loss, weakness, lassitude, insomnia, hypotension, anemia, and neurobehavioral deficits in children. Adults manifest vague gastrointestinal complaints, which include constipation, anorexia, and abdominal discomfort, or actual colic. Physical signs usually are facial pallor, malnutrition, muscle and joint pain, lead lines, abdominal tenderness, and pallor of the eye grounds. Symptoms also include CNS complaints and reproductive disorders; irreversible vascular sclerosis, tubular cell atrophy, azotemia, gout, interstitial fibrosis, and glomerular sclerosis; wristdrop and colic rarely occur. Lead ions cross the placenta and cause minor congenital anomalies.

HMIS
H 3*
F 1
R 0
PPE†
*Chronic effects
†Sec. 8

**Section 4 - First Aid Measures**

**Inhalation:** Remove exposed person to fresh air and support breathing as needed. Get medical attention as soon as possible.

**Eye Contact:** *Do not* allow victim to rub or keep eyes tightly shut. Gently lift eyelids and flush immediately and continuously with flooding amounts of water for at least 15 min. Consult a physician or ophthalmologist immediately.

**Skin Contact:** Quickly remove contaminated clothing. Rinse with flooding amounts of water. Wash exposed area with soap and water. For irritated, reddened, or blistered skin, consult a physician.

**Ingestion:** Never give anything by mouth to an unconscious or convulsing person. Contact a poison control center. Unless the poison control center advises otherwise, have the *conscious and alert* person drink 1 to 2 glasses of water, then induce vomiting. *After first aid, get appropriate in-plant, paramedic, or community medical support.*

**Note to Physicians:** There may be no unique signs or symptoms to suggest lead poisoning as the diagnosis. Serious injury can occur without signs or symptoms. Elevation of blood lead level is essential to the diagnosis of childhood and industrial cases. Institute chelation therapy in all patients with a blood lead level of 45  $\mu\text{g}/\text{dL}$  or greater, and in patients with a positive calcium EDTA provocation test. Patients treated as outpatients must be discharged to a lead-free environment.

### Section 5 - Fire-Fighting Measures

**Flash Point:** Data not found.      **Autoignition Temperature:** Data not found.      **Genium**

**LEL:** Data not found.      **UEL:** Data not found.      

**Extinguishing Media:** Extinguish with dry chemical or carbon dioxide.      **Unusual Fire or Explosion Hazards:** Lead is flammable and moderately explosive as a dust when exposed to heat or flame. It is reactive at high temperature and pressure. Containers may explode when heated.      **Hazardous Combustion Products:** When heated to decomposition it emits highly toxic fumes of lead.      **Fire-Fighting Instructions:** *Do not* use scatter the material. *Do not* use straight streams. *Do not* get water inside of containers. *Do not* release runoff from fire control methods to sewers or waterways. Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode.

### Section 6 - Accidental Release Measures

**Spill/Leak Procedures:** Notify safety personnel, evacuate all unnecessary personnel, remove heat and ignition sources. Isolate and ventilate area, deny entry, stay upwind. Cleanup personnel should protect against exposure (Sec. 8).      **Small Spills:** If in solid form, *do not sweep!* Carefully scoop up or vacuum (with a HEPA filter). Add lime to precipitate basic lead carbonate or add complexing agent (EDTA) and adsorb on carbon.      **Large Spills:** For large spills, dike far ahead of spill for later disposal. *Do not* release into sewers or waterways.      **Regulatory Requirements:** Follow applicable OSHA regulations (29 CFR 1910.120).

### Section 7 - Handling and Storage

**Handling Precautions:** Wear full body personal protective clothing and equipment to prevent dust inhalation and contact with skin or eyes (Sec. 8). Avoid wearing rubber as rubber gloves may ignite in nitric acid.      **Storage Requirements:** Store in tightly closed containers in a cool, well-ventilated area away from heat, light, ignition sources, and incompatibles. Periodically inspect and monitor the storage area.

### Section 8 - Exposure Controls/Personal Protection

**Engineering Controls:** Where feasible, enclose operations to avoid dust dispersion into the work area. Specific engineering controls are required for this substance by OSHA. Refer to the OSHA Standards 1910.1025 and 1926.62. Vigorously clean all work surfaces periodically.      **Ventilation:** Provide general or local exhaust ventilation systems to maintain airborne concentrations below exposure limits (Sec. 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.      **Administrative Controls:** Educate workers about the health and safety hazards associated with this material. Train in work practices which minimize exposure. Medical examinations shall include a detailed work and medical history, with particular attention to any past exposure to lead, personal habits, and past gastrointestinal, hematologic, renal, cardiovascular, reproductive, and neurological problems; thorough physical examination, with particular attention to teeth, gums, hematologic, gastrointestinal, renal, cardiovascular, and neurological systems; a ZPP test; pulmonary status be evaluated if respiratory equipment is to be used; measurement of blood pressure; and an analysis of blood sample for blood lead level, hemoglobin and hemacrit, red cell indices, and peripheral smear morphology, zinc protoporphyrin, blood urea nitrogen, and serum creatinine. Obtain a 24 hour quantitative urine lead output, with and without DMSA, D-penicillamine or EDTA mobilization. Blood levels of employees exposed to lead above the action level of 30  $\mu\text{g}/\text{m}^3$  must be maintained at levels at or below 40  $\mu\text{g}/\text{dL}$ , determined by monitoring every 6 months. For those (both male and female) who intend to have children, maintain blood lead levels at or below 30  $\mu\text{g}/\text{dL}$ . If an employee's blood lead level exceeds 40  $\mu\text{g}/\text{dL}$ , monitoring frequency must be increased to at least every 2 months until two consecutive blood lead levels are below 40  $\mu\text{g}/\text{dL}$ . Employees whose blood lead level is equal to or greater than 50  $\mu\text{g}/\text{dL}$  shall be temporarily removed from exposure until their blood lead level is at or below 40  $\mu\text{g}/\text{dL}$ . Employees may also be removed from exposure for medical reasons even if their blood lead levels are within 40  $\mu\text{g}/\text{dL}$ .      **Respiratory Protection:** Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a NIOSH-approved respirator. For exposures > 0.05 to 0.5  $\text{mg}/\text{m}^3$  wear an air-purifying respirator operating in the negative-pressure mode with a half mask; > 0.5 to 2.5  $\text{mg}/\text{m}^3$ , any air-purifying respirator operated in the - mode with a full face mask; > 2.5 to 50  $\text{mg}/\text{m}^3$ , a powered air-purifying respirator with a half or full facepiece or hood; > 50 to 100  $\text{mg}/\text{m}^3$ , wear a supplied-air respirator with a full facepiece with a hood, helmet, or

suit, operated in a positive-pressure mode; > 100 to unlimited mg/m<sup>3</sup>, wear a SCBA operated in pressure-demand mode with a full facepiece (cartridge color: magenta (P 100)). Note: 29CFR 1910.1025 for general industry. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. **Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.** If respirators are used, OSHA requires a written respiratory protection program that includes at least: medical certification, training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas. **Protective Clothing/Equipment:** Wear chemically protective gloves, boots, and full body clothing and headgear to prevent any skin contact. Try to avoid cotton fabrics and overalls with turn ups, pleats and pockets in which lead dust may be collect. Wear dust-proof goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Contact lenses are not protective eye devices. *Do not* wear contact lenses when working with lead. **Safety Stations:** Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work area. **Contaminated Equipment:** HEPA vacuum work clothing before removal. *Do not* blow dust off with compressed air. Separate contaminated work clothes from street clothes. *Do not* take contaminated work clothes home. Launder before reuse. Remove this material from your shoes and clean personal protective equipment. **Comments:** Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

### Section 9 - Physical and Chemical Properties

<b>Physical State:</b> Solid; ductile, soft	<b>Boiling Point:</b> 3164 °F (1740 °C)
<b>Color:</b> Bluish – white; silvery, gray; tarnishes upon exposure to air	<b>Melting Point:</b> 621.32 °F (327.4 °C)
<b>Vapor Pressure:</b> 1.77 mm Hg at 1832 °F (1000 °C)	<b>Viscosity:</b> 3.2 cP at 621.32 °F (327.4 °C) (molten lead)
<b>Vapor Density (Air=1):</b> 11.0 (calculated)	<b>Refractive Index:</b> 2.01
<b>Formula Weight:</b> 207.20	<b>Water Solubility:</b> Insoluble
<b>Specific Gravity (H<sub>2</sub>O=1, at 4 °C):</b> 11.34	<b>Other Solubilities:</b> Dissolves in dilute HNO <sub>3</sub> , acetic acid, and slowly in HCl; soluble in alkali solutions.

### Section 10 - Stability and Reactivity

**Stability:** Lead is stable at room temperature in closed containers under normal storage and handling conditions. Avoid heating above 900 °F (538 °C). Lead is attacked at room temperature by F<sub>2</sub> and Cl<sub>2</sub>.

**Polymerization:** Hazardous polymerization cannot occur.

**Chemical Incompatibilities:** Include hot concentrated nitric acid, boiling concentrated hydrochloric acid, sulfuric acid, pure water, weak organic acids in the presence of oxygen, ammonium nitrate, hydrogen peroxide and trioxane, concentrated hydrogen peroxide, sodium azide, zirconium, sodium acetylde, disodium acetylde, chlorine trifluoride, oxidizing materials.

**Conditions to Avoid:** Avoid contact with chemical incompatibles, heat, and sources of ignition. Avoid formation of dust.

**Hazardous Decomposition Products:** Thermal oxidative decomposition of lead can produce toxic fumes of lead.

### Section 11 - Toxicological Information

#### Toxicity Data:\*

#### Acute Oral Effects:

Woman, oral, TD<sub>Lo</sub>: 450 mg/kg for 6 years produced toxic effects: flaccid paralysis without anesthesia (usually neuromuscular blockage); hallucinations, distorted perceptions.

#### Genetic Effects:

Rat, inhalation, 23 µg/m<sup>3</sup> for 16 weeks induced cytogenetic analysis.

#### Multiple Dose Toxicity Data:

Rat, oral, 1050 µg/kg administered for 30 weeks intermittently produced toxic effects: brain and coverings – other degenerative changes; alteration of classical conditioning; nutritional and gross metabolic – other metals.

Rat, oral 6879 mg/kg administered for 5 weeks continuously produced toxic effects: pigmented or nucleated red blood cells, other changes, changes in other cell count (unspecified).

#### Reproductive Effects:

Rat, female, inhalation, 10 mg/m<sup>3</sup> for 24 hours administered on gestational days 1-21 produced toxic effects: fetotoxicity; specific developmental abnormalities – blood and lymphatic system (including spleen and marrow).

Rat, oral, 1140 mg/kg administered 14 days prior to mating to 21 days after birth produced toxic effects: effects on newborn – behavioral.

\* See NIOSH, RTECS (OF7525000), for additional toxicity data.

### Section 12 - Ecological Information

**Ecotoxicity:** Japanese Quail (*Coturnix japonica*), LC<sub>50</sub>: >5000 ppm/males or females/14 days old/oral (5-day ad libitum in diet).

**Environmental Fate:** Lead is expected to slowly undergo speciation to the more insoluble sulfate, sulfide, oxide, and phosphate salts. Lead does not appear to bioconcentrate significantly in fish but does in some shellfish such as mussels. When released to the atmosphere, lead will generally be in dust or adsorbed to particulate matter and subject to gravitational settling and be transformed to the oxide and carbonate. If released or deposited on soil, lead will be retained in the upper 2-5 cm of soil, especially soils with at least 5% organic matter of a pH 5 or above. Leaching is not important under normal conditions. If released into water, metallic lead will simply sink into the sediment. In the dissolved state, it will form ligands, the dominant ones varying with pH.

**Soil Adsorption/Mobility:** Lead is effectively removed from the water column to the sediment by adsorption to organic matter and clay minerals, precipitation as insoluble salt (the carbonate or sulfate, sulfide), and reaction with hydrous iron and manganese oxide. Under most circumstances, adsorption predominates. Generally, the uptake of lead from soil into plants is not significant.

### Section 13 - Disposal Considerations

**Disposal:** Route to a metal salvage facility. Precipitation is the preferred treatment process for removing toxic heavy metals from electroplating waters. Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable federal, state, and local regulations.

**Container Cleaning and Disposal:** Handle empty containers carefully as hazardous residues may still remain. Triple rinse containers and dispose of wash wastewater appropriately.

### Section 14 - Transport Information

#### DOT Transportation Data (49 CFR 172.101):

**Shipping Name:** Lead compounds, soluble,  
n.o.s.

**Shipping Symbols:** --

**Hazard Class:** 6.1

**ID No.:** UN2291

**Packing Group:** III

**Label:** POISON

**Special Provisions (172.102):** --

#### Packaging Authorizations

a) Exceptions: 173.153

b) Non-bulk Packaging: 173.213

c) Bulk Packaging: 173.240

#### Quantity Limitations

a) Passenger Aircraft/Rail: 100 kg

b) Cargo Aircraft Only: 200 kg

#### Vessel Stowage Requirements

a) Vessel Stowage: A

b) Other: --

### Section 15 - Regulatory Information

#### EPA Regulations:

Listed as a RCRA Hazardous Waste (40 CFR 261.33); RCRA Hazardous Waste Number: D008, Included in waste streams: F039, K002, K003, K005, K046, K048, K049, K052, K061, K064, K065, K066, K069, K086, K100

Listed as a CERCLA Hazardous Substance (40 CFR 302.4) specific per CWA, Sec. 307(a)

CERCLA Final Reportable Quantity (RQ): 10 lb (4.54 kg)

Listed as a SARA Toxic Chemical (40 CFR 372.65)

SARA EHS (Extremely Hazardous Substance) (40 CFR 355): Not listed

Toxic Substances Control Act (TSCA): Listed

#### OSHA Regulations:

Listed as an Air Contaminant (29 CFR 1910.1000, Table Z-1, Z-1-A)

OSHA Specifically Regulated Substance (29 CFR 1910.1025)

### Section 16 - Other Information

**References:** 1, 99, 124, 136, 149, 161, 176, 184, 190, 208, 209, 216, 222, 227, 229, 230, 233, 234

**Prepared By** ..... R Reals, MS/M Adams, Ph.D

**Research Date:** ..... 1999-03

**Review Date:** ..... 2000-01

**Industrial Hygiene Review** ..... RE Langford, CIH

**Medical Review** ..... G Kelafant, MD

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LIQUI-NOX MSDS · LIQUI-NOX MSDS · LIQUI-NOX MSDS · LIQUI-NOX MSDS

**Liqui-Nox®****MATERIAL SAFETY DATA SHEET**

Alconox, Inc.  
9 East 40th Street, Suite 200  
New York, NY 10016

**I. IDENTIFICATION**

Product Name (as appears on label)	LIQUI-NOX
CAS Registry Number:	Not Applicable
Effective Date:	January 1, 1998
Chemical Family:	Anionic Liquid Detergent

**II. HAZARDOUS INGREDIENTS/IDENTITY INFORMATION**

There are no hazardous ingredients in LIQUI-NOX™ as defined by the OSHA Standard and Hazardous Substance List 29 CFR 1910 Subpart Z.

**III. PHYSICAL/CHEMICAL CHARACTERISTICS**

Boiling Point (F):	214°F
Vapor Pressure (mm Hg):	No Data
Vapor Density (AIR=1):	No Data
Specific Gravity (Water=1):	1.075
Melting Point:	Not Applicable
Evaporation Rate (Butyl Acetate=1):	Slower
Solubility in Water:	Completely soluble in all proportions.
Appearance:	Yellow liquid, nearly odorless

**IV. FIRE AND EXPLOSION DATA**

Flash Point:	None (Cleveland Open Cup)
Flammable Limits:	LEL: No Data UEL: No Data
Extinguishing Media:	Water, dry chemical, CO <sub>2</sub> , foam
Special Firefighting Procedures:	Self-contained positive pressure breathing apparatus and protective clothing should be worn when fighting fires involving chemicals.
Unusual Fire and Explosion Hazards:	None

**V. REACTIVITY DATA**

Stability:	Stable
Conditions To Avoid:	None
Incompatibility (Materials To Avoid):	Oxidizing agents.
Hazardous Decomposition or Byproducts:	May release SO <sub>2</sub> on burning

**VI. HEALTH HAZARD DATA**

Route(s) of Entry:	Inhalation? No Skin? Yes Ingestion? Yes
Health Hazards (Acute and Chronic):	Skin contact may prove locally irritating, causing drying and/or chapping. Ingestion may cause discomfort and/or diarrhea.
Carcinogenicity:	NTP? No IARC Monographs? No OSHA Regulated? No
Signs and Symptoms of Exposure:	Prolonged skin contact may cause drying and/or chapping.
Medical Conditions Generally Aggravated by Exposure:	Not established. Unnecessary exposure to this product or any industrial chemical should be avoided.
Emergency and First Aid Procedures:	Eyes: Immediately flush eyes with water for at least 15 minutes. Call a physician. Skin: Flush with plenty of water. Ingestion: Drink large quantities of water or milk. Do not induce vomiting. If vomiting occurs readminister fluids. See a physician for discomfort.

**VII. PRECAUTIONS FOR SAFE HANDLING AND USE**

Steps to be Taken if Material is Released or Spilled:	Material foams profusely. For small spills recover as much as possible with absorbent material and flush remainder to sewer. Material is biodegradable.
Waste Disposal Method:	Small quantities may be disposed of in sewer. Large quantities should be disposed of in accordance with local ordinances for detergent products.
Precautions to be Taken in Storing and Handling:	No special precautions in storing. Use protective equipment when handling undilute material.
Other Precautions:	No special requirements other than the good industrial hygiene and safety practices employed with any industrial chemical.

**VIII. CONTROL MEASURES**

Respiratory Protection (Specify Type):	Not Required
Ventilation:	Local Exhaust-Normal Special-Not Required Mechanical-Not Required Other-Not Required
Protective Gloves:	Impervious gloves are recommended.
Eye Protection:	Goggles and/or splash shields are recommended.
Other Protective Clothing or Equipment:	Not required
Work/Hygienic Practices:	No special practices required

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THE INFORMATION HEREIN IS GIVEN IN GOOD FAITH BUT NO WARRANTY IS EXPRESSED OR IMPLIED.

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**Material Safety Data Sheet**  
**J. R. Simplot Company**  
**AgriBusiness**

Trade Name: Nitric Acid 98%  
Registration No: None

M16045

**SECTION 1 CHEMICAL PRODUCT AND COMPANY INFORMATION**

Manufacturer or Formulator: J.R. Simplot Company  
P.O. Box 912  
Pocatello, ID 83204  
Emergency Phone - Chemtrec: 1-800-424-9300

Product Name: Nitric Acid 98%  
Common Name: Nitric Acid 98% (not red fuming)  
Chemical Type: Nitric Acid

**SECTION 2 COMPOSITION INFORMATION**

Chemical Name and Synonyms	C.A.S. No.	Chemical Formula	WT% Hazardous	TLV	PEL
Nitric Acid	7697-37-2	HNO <sub>3</sub>	98 Non-Hazardous	5 mg/M <sup>3</sup> (4 ppm STEL)	2 ppm TWA
Water	7732-18-5	H <sub>2</sub> O	2		

**SECTION 3 HAZARDS IDENTIFICATION**

**Ingestion:** Will cause chemical burns to digestive tract.  
**Inhalation:** May cause burning of the eyes, nose and throat. Extreme inhalation may cause difficult breathing, loss of consciousness. Lung damage may appear after a delay of up to 48 hours after exposure.  
**Eye Contact:** Will produce very severe, immediate damage and may result in permanent damage.  
**Skin Absorption:** Will produce immediate, penetrating chemical burns and staining of skin yellow to brown.  
**Skin Contact:** On contact with skin, it can destroy tissues, burn skin and may stain skin, sometimes a yellow color.  
**Effects of Overdose:** May cause acute or chronic pulmonary problems. Causes burning and corrosion of mouth, throat, esophagus/stomach; stomachache, nausea, shock, circulatory collapse, and death.

**SECTION 4 FIRST AID MEASURES**

**Ingestion:** Do not induce vomiting Give three or more glasses of water or milk to drink. Seek immediate medical attention.  
**Inhalation:** Remove from exposure immediately. Restore or support respiration. Seek medical attention.  
**Eyes:** Irrigate with running water for at least 15 minutes. Seek immediate medical attention.  
**Skin:** Flush with running stream of water for at least 15 minutes. Wash with soap. Remove contaminated clothing. Seek medical attention.

**Special Considerations:** If exposure to nitrous vapors occurs, medical observation should continue for 24-48 hours after exposure.

**SECTION 5 FIRE FIGHTING MEASURES**

**Extinguishing Media:** Dry chemical or soda ash.  
**Special Fire Fighting Procedures:** Cool containers with water if exposed to fire. Avoid directing water in the acid. Wear self-contained breathing apparatus and full fire fighting protective gear. No skin surface should be exposed.  
**Unusual Fire and Explosion Hazards:** Will oxidize oxides of nitrogen upon heating. Strong oxidizer. May cause spontaneous combustion when in contact with organic or combustible materials. Reacts violently with acetic acid, acetic anhydride, (acetone + acetic acid), (acetone + H<sub>2</sub>SO<sub>4</sub>), acetylene, acrolein, acronitrile, allyl alcohol, allyl chloride, 2-amino ethanol, NH<sub>3</sub>, NH<sub>4</sub>OH, aniline, anion exchange resins, (dichromate + anion exchange resins), Sb, As, Bi, B, boron decahydride, BP, BrF<sub>3</sub>, n-butylaldehyde, Ca hypophosphite, C, C<sub>2</sub>H<sub>2</sub>, 4-chloro-2-nitroaniline, ClF<sub>3</sub>, chlorosulfonic acid, cresol, cumene, Cu<sub>2</sub>N<sub>2</sub>, Cu<sub>2</sub>N<sub>3</sub>, cyanides, cyclic ketones, cyclohexanol, cyclohexanone, diborane, 2,6-di-tert-butyl phenol, diisopropyl ether, epichlorohydrin, ethanol, m-ethylaniline, ethylene diamine, ethylene imine, 5-ethyl-2-methyl pyridine, 5-ethyl-2-picoline, C<sub>6</sub>H<sub>5</sub>PH<sub>2</sub>, FeO, F<sub>2</sub>, furfuryl alcohol, Ge, glyoxal, hydrazine, H<sub>2</sub>, HI, H<sub>2</sub>O<sub>2</sub>, H<sub>2</sub>Se, H<sub>2</sub>S, H<sub>2</sub>Te, (indane + H<sub>2</sub>SO<sub>4</sub>), isoprene, (ketones + H<sub>2</sub>O<sub>2</sub>), (lactic acid + HF), Li, Li<sub>2</sub>S<sub>2</sub>, Mg, Mg<sub>3</sub>P<sub>2</sub>, Mg-Ti alloy, Mn, mesitylene, mesityl oxide, 2-methyl-5-ethyl pyridine, 4-methyl-cyclohexanone, NdP, nitrobenzene, oleum, organic matter, Pb, PH<sub>3</sub>, P, P<sub>2</sub>I<sub>4</sub>, PCl<sub>3</sub>, phthalic acid, phthalic anhydride, H<sub>2</sub>K<sub>2</sub>PO<sub>2</sub>, beta-propiolactone, phosphide, (Ag + ethanol), Na, Na<sub>2</sub>, NaOH, SbH<sub>3</sub>, sulfamic acid, (H<sub>2</sub>SO<sub>4</sub> + glycerides), terpenes, B<sub>2</sub>H<sub>6</sub>, thiocyanates, thiophene e, Ti, Ti alloy, Ti-Mg alloy, (H<sub>2</sub>SO<sub>4</sub> + C<sub>6</sub>H<sub>5</sub>CH<sub>3</sub>), toluidine, triazine, uns-dimethyl hydrazine, U, U-Nd alloy, U-Nd-Zr alloy, vinylacetate, vinylidene chloride, Zn, Zr-U alloys.

**SECTION 6 ACCIDENTAL RELEASE MEASURES**

**Steps to be taken in case material is released or spilled:**  
Evacuate unnecessary personnel to safe area upwind of spill. Nitric acid vapor is denser than air and will concentrate in low spots. If necessary to enter spill area, wear full protective clothing including boots and proper breathing apparatus. Dike large spills and pump to salvage. If not possible to salvage, neutralize with soda ash or lime. Do not get water in salvage containers since violent reaction may occur. Notify authorities in accordance with emergency response procedures. Only personnel trained in emergency response should respond. Follow Federal, State and local spill reporting procedures.

**SECTION 7 HANDLING AND STORAGE**

**Precautions to be taken in handling and storing:**  
Store in clean, cool, well-ventilated area away from organic chemicals, bases, and metal powders. Avoid hydrocarbon lubricants and packing materials. Aluminum tanks are strongly recommended due to reports of pitting and damage caused to stainless steel tanks if stored for periods of 6-12 hours or greater. Dilution of 98% nitric with water will subject aluminum tanks to excessive corrosion.

Trade Name: Nitric Acid 98%  
Registration No: None

M16045

**SECTION 8**

**EXPOSURE CONTROLS/PERSONAL PROTECTION**

**Ventilation Protection:** Mechanical ventilation and/or local exhaust is recommended where needed to meet the TLV requirement.  
**Respiratory Protection:** Respiratory protection not normally required; however, the user must determine the need for each circumstance. For abnormal condition, such as spills, self-contained breathing apparatus is recommended. Some self-contained breathing apparatus may contain oxidizable materials, such as activated carbon, and therefore should not be used for protection against nitric acid.  
**Protective Clothing:** Neoprene or vinyl gloves. Where spill or splash potential exists, rubberized aprons or chemical resistant suits are recommended.  
**Eye Protection:** Acid proof goggles and face shield are required where acid is transferred, sampled, or where persons are otherwise potentially exposed.  
**Other Precautions:** Provide safety showers and eye wash in immediate area.

**SECTION 9**

**PHYSICAL AND CHEMICAL PROPERTIES**

<b>Boiling Point:</b>	98°C (187°F)	<b>Solubility in Water:</b>	Complete
<b>Specific Gravity:</b>	1.51 at 20°C	<b>% Volatiles (by volume):</b>	100% at 122°C
<b>Flashpoint:</b>	Non-flammable	<b>Vapor Pressure, mm Hg:</b>	38 mm Hg at 20°C
<b>Appearance:</b>	Light yellow-brown fuming liquid. Pungent acrid odor.	<b>pH:</b>	Less than 1.0.
<b>Reaction with Water:</b>	May react violently. Will produce heat and hazardous and corrosive fumes.		
<b>Extinguishing Media:</b>	Use media suitable for extinguishing source of fire.		

**SECTION 10**

**STABILITY AND REACTIVITY**

**Stability (Normal Conditions):** Stable  
**Conditions to Avoid:** Avoid exposure to sunlight which promotes oxide formation.  
**Incompatibility (Material to Avoid):** Organic and combustible materials. Will corrode metals. Beware of containers, pumps, and hoses of inadequate construction and/or contamination by incompatible chemicals.  
**Hazardous Decomposition Products:** Oxides of nitrogen.  
**Hazardous Polymerization:** May not occur  
**Conditions to Avoid:** Not applicable

**SECTION 11**

**TOXICOLOGY INFORMATION**

**Ingestion:** Toxicity oral - human LDLo: 430 mg/kg. Unreported human LDLo: 110 mg/kg.  
**Inhalation:** lhl-rat LC: 49 ppm/4H.  
**Aquatic toxicity rating:** TLm 96: 100-10 ppm.

**SECTION 12**

**ECOLOGICAL INFORMATION**

None listed.

**SECTION 13**

**DISPOSAL CONSIDERATIONS**

**Waste Disposal Procedures:** Disposal must comply with Federal, State, and local regulations. If product becomes a waste, it is potentially regulated as a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR part 261.

**SECTION 14**

**TRANSPORT INFORMATION**

<b>Shipping name:</b>	RQ Nitric Acid (other than red fuming, with more than 70% nitric acid), 8, UN2031, P.G. I		
<b>Hazard Class:</b>	8 - Corrosive	<b>C.A.S. Number:</b>	7697-37-2
<b>Reportable Quantity (RQ):</b>	1000 lbs	<b>D.O.T. Number:</b>	UN2031
<b>Labels Required:</b>	Corrosive	<b>Haz Waste No:</b>	D002
<b>Placard:</b>	Corrosive	<b>EPA Regist No:</b>	None

**SECTION 15**

**REGULATORY INFORMATION**

**Carcinogenicity:** by IARC?: Yes ( ) No (X)      by NTP?: Yes ( ) No (X)

This product contains nitric acid (98%), CAS number 7697-37-2, which is subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

**SECTION 16**

**OTHER INFORMATION**

<b>Flash Point (Test Method):</b>	Not applicable	<b>Flammable Limits</b>	<b>LOWER</b>	<b>UPPER</b>
<b>Autoignition Temperature:</b>	Not applicable	<b>(% BY VOLUME)</b>	N/A	N/A
<b>Hazard Rating:</b>	Health: 3      Fire: 0      Reactivity: 0	<b>Specific: Oxy</b>		

This N.F.P.A. rating is a recommendation by the manufacturer using the guidelines or published evaluations prepared by the National Fire Protection Association (N.F.P.A.).

MSDS Version Number: 3 (revisions to Section 15)

**Disclaimer:** This information relates to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. Such information is to the best of our knowledge and belief, accurate and reliable as of the date compiled. However, no representation, warranty or guarantee is made as to its accuracy, reliability or completeness. **NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, IS MADE CONCERNING THE INFORMATION HEREIN PROVIDED.** It is the user's responsibility to satisfy himself as to the suitability and completeness of such information for his own particular use. We do not accept liability for any loss or damage that may occur from the use of this information nor do we offer warranty against patent infringement.

***Attachment B***

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**Incident/Near Miss Investigation Form**

# Incident/Near-Miss Investigation Report

<input type="checkbox"/> OSHA Recordable	<input type="checkbox"/> First Aid Injury	<input type="checkbox"/> Fire	Date of Incident:
<input type="checkbox"/> Lost Workday Injury	<input type="checkbox"/> Vehicle Accident	<input type="checkbox"/> Spill/Leak	
<input type="checkbox"/> Restricted Duty Injury	<input type="checkbox"/> Equipment Damage	<input type="checkbox"/> Near Miss	Incident Number:

Every employee injury, accident, and near miss must be reported within twenty-four hours of the injury. If the incident results in hospitalization, an immediate report must be made by telephone to the Project Manager and the Health and Safety Officer.

## Project Information

Project Name:	Project #
Location of Incident:	

## EMPLOYEE

Name:	Employee Number:
Employment Status: <input type="checkbox"/> Regular <input type="checkbox"/> Part Time	How long in present job?

## INJURY OR ILLNESS INFO

Where did incident / near miss occur? (number, street, city, state, zip):

Employee's specific activity at the time of the incident / near miss:

Equipment, materials, or chemicals the employee was using when the incident / near miss occurred (e.g., the equipment employee struck against or which struck employee; the vapor inhaled or material swallowed; what the employee was lifting, pulling, etc.):

Describe the specific injury or illness (e.g., cut, strain, fracture, etc.):

Body part(s) affected (e.g., back, left wrist, right eye, etc.):

Name and address of treatment provider (e.g., physician or clinic):	Phone No.:
---	------------

If hospitalized, name and address of hospital:	Phone No.:
--	------------

Date of injury or onset of illness    /    /	Time of event or exposure: <input type="checkbox"/> AM <input type="checkbox"/> PM
--	--

Did employee miss at least one full shift's work?     No     Yes, 1st date absent (MM/DD/YYYY)    /    /

Has employee returned to work?     Regular work     Restricted work     No

Yes, date returned (MM/DD/YYYY)    /    /

To whom reported:	Other workers injured/made ill in this event? <input type="checkbox"/> Yes <input type="checkbox"/> No
-------------------	--

**Description of Incident / Near Miss: (Describe what happened and how it happened.)**

**Motor Vehicle Accident (MVA)**Company Vehicle?  Yes  No

Accident Location (street, city, state)

Vehicle Towed?

 Yes  
 No

Other Vehicle?

 Yes  
 No

# Vehicles Towed

# of Injuries

**Spill**

Material Spilled

Quantity

Source

Agency Notifications

**Cost of Incident \$****Third Party Incidents**

Name of Owner

Address

Telephone

Description of Damage:

Witness Name

Address

Telephone

Witness Name

Address

Telephone

**# Root Cause and Contributing Factors: Conclusion (Describe in Detail Why Incident / Near Miss Occurred)**1  
2  
3  
4  
5**Root Cause(s) Analysis (RCA):**

- |  |  |
|--|--|
| 1. Lack of skill or knowledge  | 5. Correct way takes more time and/or requires more effort                                   |
| 2. Lack of or inadequate operational procedures or work standards                  | 6. Short-cutting standard procedures is positively reinforced or tolerated                   |
| 3. Inadequate communication of expectations regarding procedures or work standards | 7. Person thinks there is no personal benefit to always doing the job according to standards |
| 4. Inadequate tools or equipment   | 8. Uncontrollable  |

#	RCA #	Solution(s): How to Prevent Incident / Near Miss From Reoccurring	Person Responsible	Due Date	Closure Date

**Investigation Team Members**

Name	Job Title	Date

**Results of Solution Verification and Validation**


**Reviewed By**

Name	Job Title	Date
	Project Manager	
	Health and Safety Reviewer	

***Attachment C***

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**Incident Prevention Observation Form**

# Incident Prevention Observation

Observer Name		Observer Title		Contractor Company Name	
Date _____ Time _____ <input type="checkbox"/> AM <input type="checkbox"/> PM		Project Type / Task Observed			
<b>Background Information and Miscellaneous Comments</b>					
<b>Observer's Positive Comments</b>					
Feedback Conducted By		Date		Time <input type="checkbox"/> AM <input type="checkbox"/> PM	
<b>Conclusion (Describe in Detail Why the Questionable Item Occurred). Add Any Employee Comments</b>					
<b>Root Cause(s) Analysis (RCA):</b>					
1. Lack of skill or knowledge 2. Lack of or inadequate operational procedures or work standards 3. Inadequate communication of expectations regarding procedures or work standards 4. Inadequate tools or equipment			5. Correct way takes more time and/or requires more effort 6. Short-cutting standard procedures is positively reinforced or tolerated 7. Person thinks there is no personal benefit to always doing the job according to standards 8. Uncontrollable.		
Questionable Item #	RCA #	Solution(s): How to Prevent Questionable Behavior From Reoccurring	Person Responsible	Due Date	Closure Date
<b>Results of Solution Verification and Validation</b>					
Reviewed by		Date		Reviewed by	

# Environmental Operations

	Correct	Questionable	Comments
<b>PRE-TASK PREPARATION</b>			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
<b>PERFORMING TASK</b>			
17.			
18.			
19.			
20.			
21.			
22.			
23.			
24.			
25.			
26.			
27.			
28.			
29.			
30.			
31.			
32.			
33.			
34.			
35.			
36.			
37.			
38.			
39.			
<b>POST - TASK</b>			
40.			
41.			
42.			
43.			
44.			

Total #

% Safe:

[(Total Correct/(Total Correct + Total Questionable)) \* 100]

***Attachment D***

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**Safety Inspection Form**

# Health and Safety Inspection Form

Project Name/# : \_\_\_\_\_ Date: \_\_\_\_\_  
 Auditor: \_\_\_\_\_  
 HSS on Site \_\_\_\_\_

SEND A COPY OF COMPLETED FORM TO THE HEALTH AND SAFETY MANAGER

	YES	NO	N/A	COMMENTS
<b>GENERAL</b>				
HASP on site?				
HASP finalized and approved?				
OSHA poster displayed?				
Emergency telephone numbers posted?				
Emergency eyewash immediately available?				
Emergency shower immediately available?				
Emergency Notification Means available (radio, telephone)?				
First-Aid kit immediately available?				
First-Aid kit adequately stocked?				
Proper sanitation facility on site?				
<b>DOCUMENTATION AND RECORDKEEPING</b>				
Only personnel listed and approved on HASP site?				
All personnel properly trained? (Check company-issued wallet cards.)				
All personnel in health monitoring program? (Check company-issued wallet cards.)				
Daily field log kept by the Site Manager?				
Levels of PPE recorded?				
Contaminant levels recorded?				
Site surveillance records kept by HSS?				
Copy of current fit test records on site?				
Calibration records maintained for air monitoring equipment?				
Accident/incident forms on site?				
Field team review sheets signed?				
Additional hospital route directions available?				
Visitors logbook being accurately maintained?				
MSDSs available for all chemicals on site?				
HASP revisions recorded?				
First-Aid kit inspected weekly?				
Are daily safety meetings held?				
Emergency procedures discussed during safety meetings?				
<b>EMERGENCY RESPONSES</b>				
Vehicle available on site for transportation to the hospital?				
Fire extinguishers on site and immediately available at designated work areas?				
At least one person trained in CPR and First Aid on site at all times during work activities?				
All personnel know who is trained in CPR/First Aid?				

\*N/A – Not Applicable

# Health and Safety Inspection Form

	YES	NO	N/A	COMMENTS
<b>PERSONAL PROTECTIVE EQUIPMENT (PPE)</b>				
Proper PPE being worn as specified in HASP?				
Level of PPE being worn				
PPE adequate for work conditions?				
In not, give reason				
Upgrade/downgrade to PPE level				
Does any employee have facial hair that would interfere with fit of respirators?				
If yes, willing to shave, as necessary?				
Fit-tested within the last year? (Documentation present)				
If Level B, back-up/emergency person suited up (except for air)?				
HSS periodically inspects PPE and equipment?				
PPE not in use properly stored?				
All equipment required in HASP on site?				
Properly calibrated?				
In good condition?				
Used properly?				
Other equipment needed?				
List				
Monitoring equipment covered with plastic to minimize contamination?				
<b>PERSONNEL AND EQUIPMENT DECONTAMINATION</b>				
Decon area properly designated?				
Appropriate cleaning fluid used for known or suspected contaminants?				
Appropriate decon procedures used?				
Decon personnel wearing proper PPE?				
Equipment decontaminated?				
Sample containers decontaminated?				
Disposable items replaced as required?				
<b>WORK PRACTICES</b>				
Proper collection and disposal of potentially contaminated PPE?				
Proper collection and disposal of decon fluid?				
Water available for decon?				
Buddy system used?				
Equipment kept off drums and ground?				
Kneeling or sitting on drums or ground prohibited?				
Personnel avoid standing or walking through puddles or stained soil?				
Work zones established?				
If night work is conducted, is there adequate illumination?				

\*N/A – Not Applicable



***Attachment E***

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**Daily Safety Meeting Log**

# DAILY SAFETY MEETING LOG

PROJECT: \_\_\_\_\_ LOCATION: \_\_\_\_\_

DATE/TIME: \_\_\_\_\_ ACTIVITY: \_\_\_\_\_

## 1. WORK SUMMARY

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## 2. PHYSICAL/CHEMICAL HAZARDS

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## 3. PROTECTIVE EQUIPMENT/PROCEDURES

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## 4. EMERGENCY PROCEDURES

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## 5. SIGNATURES OF ATTENDEES


***Attachment F***

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**Air Monitoring Log**



***Attachment G***

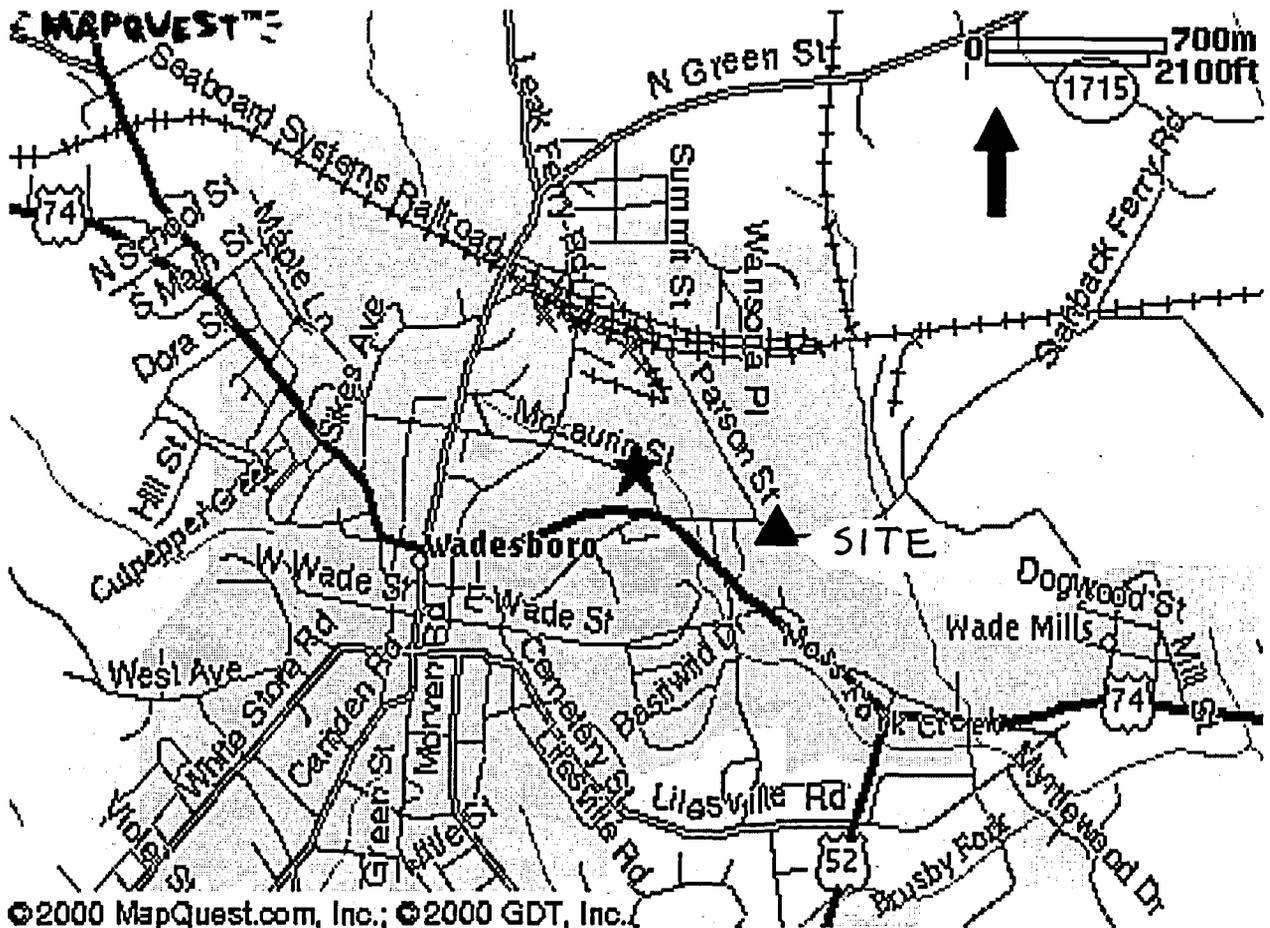
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**Hospital Directions and Map**

**Directions to Anson County Hospital, 605 Mclaurin Street, Wadesboro, NC**

- **From the VCC Site, travel east approximately 0.25 mile on Stanback Ferry Road.**
- **Turn right onto US-74 W.**
- **Travel approximately 0.1 mile on US-74 W.**
- **Exit right onto Mclaurin Street.**
- **Anson County Hospital is approximately 0.2 mile on the left (605 Mclaurin Street)**

## Map and Driving Directions to Anson County Hospital from former VCC Site in Wadesboro, NC



- From the former VCC Site (triangle on map), travel east approximately 0.25 mile on Stanback Ferry Road.
- Turn right onto US-74 W.
- Travel approximately 0.1 mile on US-74 W.
- Exit right onto McLaurin Street.
- Anson County Hospital (star on map) is located at 605 Mclaurin Street, approximately 0.2 mile from US-74.

***Attachment H***

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**Underground/Overhead  
Utilities Checklist**

# UNDERGROUND/OVERHEAD UTILITY CHECKLIST

Project Name \_\_\_\_\_ Date \_\_\_\_\_

Location \_\_\_\_\_

Prepared By \_\_\_\_\_ Project Manager \_\_\_\_\_

This checklist must be completed for any intrusive subsurface work such as excavation or drilling. It documents that overhead and underground utilities in the work are identified and located. The Project Manager shall request utility markouts before that start of field operations to allow the client and utility companies sufficient time to provide them. If complete information is not available, a magnetometer or other survey shall be performed to locate obstacles prior to intrusive subsurface activities.

**Procedure**

A diagram of the work area depicting the proposal location of intrusive subsurface work sites (i.e., boring locations, excavation locations) must be attached to this form. The diagram must clearly indicate the areas checked for underground structures/utilities, and overhead power lines. This form and the diagram must be signed by the Project Manager, the Site Supervisor, and the client representative.

**Checklist**

Type of Structure	Present	Not Present	Method of Markout
Electric Power Line			
Natural Gas Line			
Telephone Line			
Water Line			
Product Line			
Sewer Line			
Steam Line			
Drain Line			
Underground Tank			
Underground Cable			
Overhead Power Line			
Overhead Product Line			
Other (Specify)			

Client Representative \_\_\_\_\_ Date \_\_\_\_\_

Project Manager \_\_\_\_\_ Date \_\_\_\_\_

Site Supervisor \_\_\_\_\_ Date \_\_\_\_\_

***Attachment I***

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**Constituents of Concern**

**Constituents of Concern**

Arsenic  
Isopropanol  
Lead  
Liqui-nox®  
Nitric Acid

***Attachment J***

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**Confined Space Entry Checklist**



***Attachment K***

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**Confined Space Entry Permit**

# CONFINED SPACE ENTRY PERMIT

All Copies of Permit Must Remain at Job Site Until the Entry is Completed

Permit # \_\_\_\_\_

Project \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_

Location and Description of Confined Space: \_\_\_\_\_

Rescue Contact and Phone Number: \_\_\_\_\_

Entry Objectives: \_\_\_\_\_

Equipment/Materials required for Entry : \_\_\_\_\_

Time of Entry: \_\_\_\_\_ Expiration of Entry: \_\_\_\_\_

Required Respirator for Entry: \_\_\_\_\_

Required Protective Clothing for Entry: \_\_\_\_\_

Air Monitoring Requirements			
Monitor For	Monitoring Equipment	Calibrated	
		Date/Time	By
%O <sub>2</sub>			
% of LEL			
H <sub>2</sub> S			
CO			
Other:			
Other:			

Monitoring Frequency:  Continuous  5 min.  10 min.  15 min.  30 min.

Number of Entrants:	Number of Attendants:
Names of Entrants	Names of Attendants

Entry Supervisor Authorizing Confined Space Entry Permit \_\_\_\_\_  
Print

Signature \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_

Entry Supervisor Cancelling Confined Space Entry Permit \_\_\_\_\_  
Print

Signature \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_

***Attachment L***

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**Site Hot Work Permit**

# SITE HOT WORK PERMIT

**ALL COPIES OF PERMIT MUST  
REMAIN AT JOB SITE UNTIL THE  
WORK IS COMPLETE**

Permit # \_\_\_\_\_  
Project \_\_\_\_\_

Location and Description of Hot Work: \_\_\_\_\_  
\_\_\_\_\_

Checklist	YES	NO	NA	COMMENT
Is there any alternate procedure to use instead of hot work?				
Is it possible to move the hot work to a designated hot work area?				
Is it possible to move all fire hazards at least 35 feet away?				
If all fire hazards can not be removed, can guards, barriers or screens be used to confine any heat, sparks, or slag, and to protect the immovable fire hazards?				
Is there any flammable or combustable liquid storage areas within 50 feet?				
Is the area where the work is to be performed free of combustable material to heat, sparks, flying sparks or slag?				
Are combustable materials adjacent to the opposite side of partitions, walls or ceilings protected by guards or moved 35 feet away from the surface?				
Is everything moved or protected that could be damaged by sparks or water?				
Is suitable fire extinguishing equipment on-hand and ready for immediate use?				
Is the sprinkler system in the area operational?				
Are the surrounding employees in an area where flying sparks and slag may injur them?				
Have precautions been implemented to prevent injury to the employees?				
Has the area supervisor been notified?				
Is a fire watch in place?				
Is hot work to be conducted in a confined space?				
Is appropriate personal protective equipment and respiratory protection being used?				

The area where hot work is being conducted must remain attended for at least 30 min. after completion of the work.

Monitoring Frequency     Continuous     Every 30 min     Other \_\_\_\_\_

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

	Hot Work Air Monitoring Parameters		
	% Oxygen >19.5%	% LEL <10%	Other
Time of Reading			

Air Monitor \_\_\_\_\_  
PRINT

Signature \_\_\_\_\_ Time \_\_\_\_\_

***Attachment M***

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**Daily/Periodic Excavation  
Inspection Checklist**

# DAILY/PERIODIC EXCAVATION INSPECTION CHECKLIST

Project Name \_\_\_\_\_ Date \_\_\_\_\_

Location \_\_\_\_\_ Time \_\_\_\_\_

Prepared By \_\_\_\_\_ Project Manager \_\_\_\_\_

**This checklist must be completed for all excavations. It documents that daily and post event/periodic inspections are conducted.**

Soil Classified As:    Stable Rock                     Type A                     Type B                     Type C

Soil Classified On \_\_\_\_\_ By \_\_\_\_\_

Type of Protective System in Use:    Sloping                     Shoring                     Other

Description \_\_\_\_\_

Inspection Item	YES	NO	Comments
Is the underground/overhead utilities checklist completed?			
Are underground installations protected from damage?			
Adequate means of entry/exit available in the excavation?			
If exposed to traffic, are personnel wearing reflective vests?			
Barriers to prevent equipment rolling into excavation?			
Air monitoring conducted prior and during excavation entry?			
Stability of adjacent structures reviewed by registered P.E.?			
Are spoil piles at least 2 feet from the excavation edge?			
Fall protection in use near excavations deeper than 6'.			
Are work tasks completed remotely if feasible?			
Protective system in place and in good repair?			
Emergency rescue (lifeline/body harness) equipment utilized due to potential atmospheric hazard?			
Is excavation exposed to vibration?			
Are employees protected from falling/elevated material?			
Is soil classification adequate for current environmental/weather conditions?			
Portable ladders extend at least 4' above excavation?			
Portable ladders or ramps secured in place?			
All personnel have attended safety meeting on excavation hazards?			
Support systems for adjacent structures are in place?			
Is excavation free from standing water?			
Water control and diversion of surface runoff is adequate?			
Are employees wearing required protective equipment?			

Comments \_\_\_\_\_

\_\_\_\_\_ Excavation Competent Person \_\_\_\_\_ Date/Time

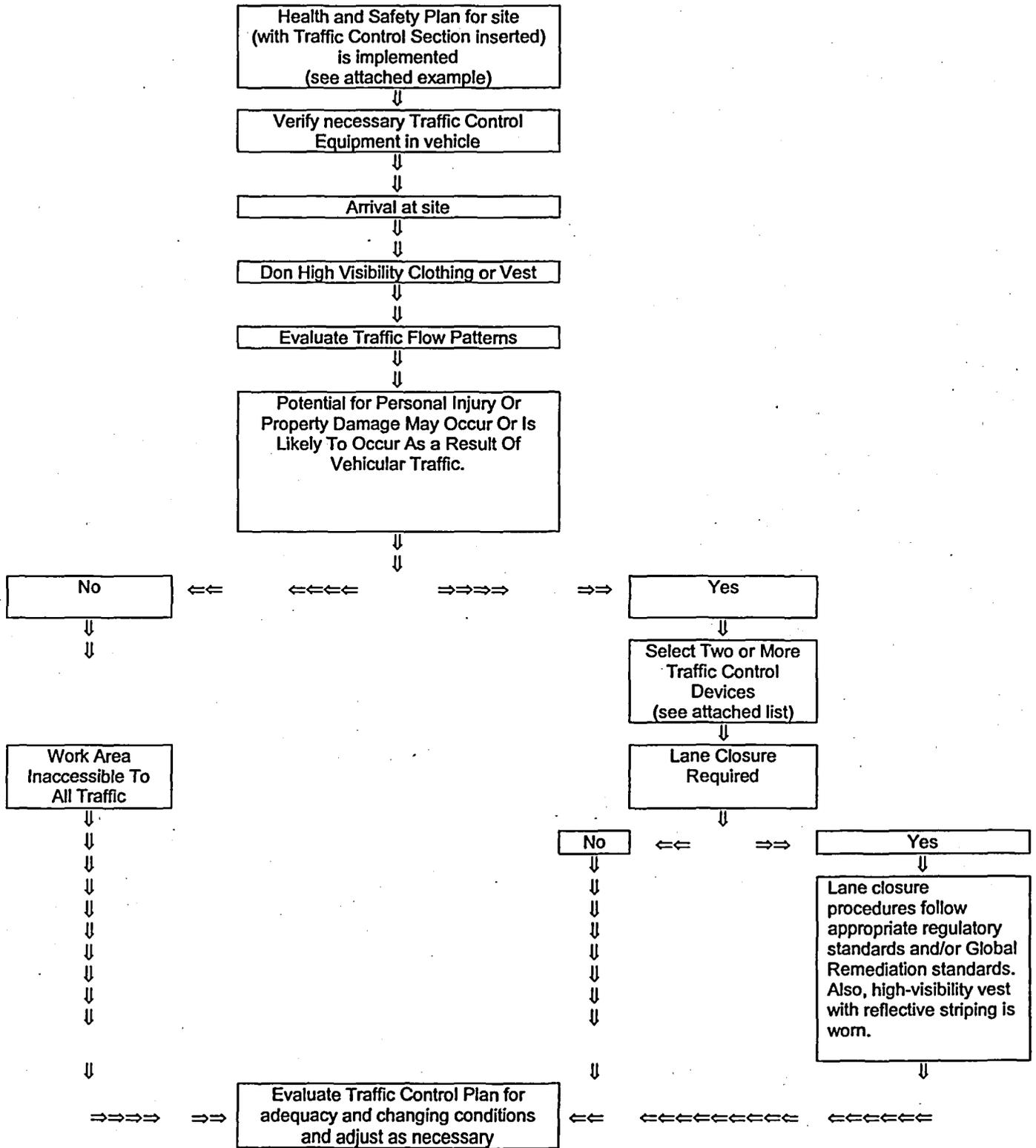
***Attachment N***

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**Traffic Control Procedures**

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**SYSTEM 2 - ATTACHMENT 2.1: TRAFFIC CONTROL PROCEDURES**  
**TRAFFIC CONTROL PROCESS FLOW DIAGRAM**



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## EXAMPLE: HEALTH AND SAFETY PLAN ADDENDUM

### Traffic Control Plan (also see attached flow diagram)

Identify which of the following Traffic Control Procedures applies to the work for this site.

#### A. Performing tasks in roadways:

- All employees are required to wear high-visibility clothing at all times while onsite.
- Review of site specific HASP should identify and require that the buddy system be implemented in areas considered high risk.
- Use of a minimum of 2 additional traffic control measures/devices.
- Lane closure procedures following appropriate regulatory standards (e.g. DOT/OSHA, National Highway Safety Uniform Traffic Control), local standards, or Global Remediation minimum standards.

#### B. Performing tasks in traffic areas (other than roadways) or any area where vehicular accidents could occur: (pump islands, parking lots/garages, up on curbed areas, in grass right of ways, etc.)

- All employees are required to wear high-visibility clothing at all times on site.
- Use of a minimum of 2 additional traffic control measures/devices.
- Review of site specific HASP should identify and require that the buddy system be implemented in areas considered high risk.

#### C. Long duration work: (geoprobe operations, drilling, trenching, etc.)

In addition to standard practices for work in roadway and/or other traffic areas:

- Placement of cones and barricades as needed to protect the work area.
- Placement of flags as needed to protect the work area.
- Placement of "Men Working" sign for advance warning to motorists.

Which set(s) of procedures will be followed for this site?

- A. Performing tasks in roadways
- B. Performing tasks in traffic areas (but not in roadways).
- C. Long duration work
- D. Other

Describe:

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\_\_\_\_\_  
Global Remediation Project Manager

\_\_\_\_\_  
Date

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## EXAMPLES OF PRECAUTIONARY MEASURES / CONTROLS

- Place wells in safe locations
- Be alert, pay attention, watch, and listen for cars
- Wear reflective vest and bright clothing
- Use cones at each point of service
- Place pole mounted warning flags inside of cones
- Park vehicle in order to block traffic
- Use flashing lights on barricades
- Use light bars or reflective lights on trucks
- Consult site manager about traffic – traffic evaluation
- Avoid prolonged time in traffic lanes
- Don't work around corners, make yourself visible
- Stay upright as much as possible
- Give notice to vehicle drivers nearby
- Trust no one, even if they see you
- Use buddy system
- Work during non-peak hours
- Always face traffic
- Use floodlights in darkness
- Obtain police assistance for roadwork and local permits as required
- Place letter on windshields to warn drivers – "CAUTION – Work area behind your vehicle"

## EXAMPLES OF TRAFFIC CONTROL DEVICES

- Traffic Cones in combination with Standard Warning Flag. Total height at least 42in. (1m). 2 cones = Traffic Control Device
- 42in. (1m) Traffic Cone. 2 cones = Traffic Control Device
- Molded Plastic Barricades
- Type I and II Barricades
- Use of Vehicle to block traffic
- Use of light bars or reflective lights on trucks
- Buddy System
- Place letter on windshield to warn drivers-"Caution-Technician Working Behind Your Vehicle"
- Portable Gates
- Use of Floodlights in Darkness
- Placement of "Caution-Work Area" signs
- Plastic Channelizer (Orange Barrel)