

BRC HEALTH AND SAFETY PLAN

BMI COMMON AREAS CLARK COUNTY, NEVADA

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| B | Material Safety Data Sheets |

LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|-------------------|---|
| ACGIH | American Conference of Governmental Industrial Hygienists |
| AIDS | Acquired Immunodeficiency Syndrome |
| ANSI | American National Standards Institute |
| APR | Air Purifying Respirator |
| BMI | Basic Management Incorporated |
| BRC | Basic Remediation Company |
| CFR | Code of Federal Regulations |
| CIH | Certified Industrial Hygienist |
| CMS | Chip Measurement System |
| CPR | Cardiopulmonary Resuscitation |
| CRZ | Contamination Reduction Zone |
| dB | Decibels |
| dBA | Decibels on the 'A' Weighted Scale |
| DCE | Dichlorethene |
| DDT | Dichlorodiphenyltrichloroethane |
| DEET | N,N-Dimethyl-m-toluamide |
| eV | Electron Volt |
| F | Degrees Fahrenheit |
| FID | Flame Ionization Detector |
| HAZMAT | Hazardous Material |
| HAZWOPER | Hazardous Waste Operations and Emergency Response |
| HEPA | High Efficiency Particulate Air |
| HIV | Human Immunodeficiency Virus |
| HSP | Health and Safety Plan |
| IATA | International Air Transport Association |
| IDLH | Immediately Dangerous to Life and Health |
| kV | Kilovolt |
| LEL | Lower Explosive Limit |
| mg/m ³ | Milligrams per Cubic Meter |
| MSDS | Material Safety Data Sheet |
| NAC | Nevada Administrative Code |
| NDEP | Nevada Department of Environmental Protection |
| NIOSH | National Institute for Occupational Safety and Health |
| OSHA | Occupational Safety and Health Administration |

LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|-------|---|
| OSO | On-Site Safety Officer |
| PCB | Polychlorinated Biphenyl |
| PEL | Permissible Exposure Limit |
| PID | Photoionization Detector |
| PPE | Personal Protective Equipment |
| Ppm | Parts Per Million |
| PSO | Project Safety Officer |
| PVC | Polyvinyl Chloride |
| REL | Recommended Exposure Limit |
| SOP | Standard Operating Procedure |
| SVOC | Semi Volatile Organic Compound |
| TLV | Threshold Limit Value |
| TWA | Time Weighted Average |
| USCG | United States Coast Guard |
| USEPA | United States Environmental Protection Agency |
| VOC | Volatile Organic Compound |

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SECTION 1

1 INTRODUCTION

This Health and Safety Plan (HSP) applies to the implementation of field investigation, soil sampling, groundwater monitoring well installation and development, hydraulic testing, groundwater monitoring, and other field activities at the Basic Management Incorporated (BMI) Site (Site), located in Clark County, Nevada. A copy of this plan must be on site at all times while work is being conducted. Basic Remediation Company (BRC) is responsible for the implementation of this HSP.

1.1 PURPOSE OF THE HEALTH AND SAFETY PLAN

The purpose of the HSP is to provide information to site workers so that they can complete the project objectives in a safe and healthful manner. The evaluation of hazards, levels of protection and procedures specified in this HSP are based on the best information available during the writing of this plan. It is recognized that every feasible safety or health hazard faced on site may not be contained in this document and that site conditions change. Therefore, it is part of every employee's job to continuously assess site conditions in relation to his/her own knowledge of how to do a task safely. If at any time an employee lacks clarity in how to do a job safely or is unsure of the potential for adverse exposure to a contaminant, that employee shall bring this to the attention of the On-Site Safety Officer (OSO) or his/her direct supervisor. No employee is expected to do work that he/she does not know how to do properly and safely.

All project activities will be performed in accordance with applicable sections of the Code of Federal Regulations (CFRs), including the Occupational Safety and Health Administration (OSHA) Standards 29 Code of Federal Regulations (CFR) 1910 and 29 CFR 1926. All BRC employees, contractors, and visitors must comply with the requirements of this HSP.

1.2 MODIFYING THE HEALTH AND SAFETY PLAN

This HSP must be modified if, new hazards are identified, the scope of work is revised, or the provisions specified in the HSP are not adequate to protect the health and safety of all personnel. Modifications will be accomplished by consultation with all project Health and Safety personnel, who in turn shall recommend appropriate modifications after approval by the BRC Project Manager or his designee. All HSP modifications shall be documented on the form included in

Appendix A (HSP Change Form). The form must have referenced verbal concurrence, or the signature from the Project Safety Officer (PSO) or a Certified Industrial Hygienist (CIH).

All changes to the HSP shall be documented with the appropriate revision number. The Project Manager must approve the changes to this document. This process is to be documented in the HSP and the project files. The Project Manager will be responsible for informing staff and contractors of all changes.

1.3 SITE LOCATION AND DESCRIPTION

The Site is located in close proximity to the BMI Industrial Complex in the City of Henderson, Clark County, Nevada. The BMI Industrial Complex consists of several operational plants located along Lake Mead Drive on the east side of Boulder Highway (Figure 1).

The BMI eastside site consists primarily of former wastewater effluent evaporation ponds and associated conveyance ditches that were used from the early 1940s through 1976. The pond cells are constructed in native soils (no liners) and are generally well defined by four to six foot tall soil berms. The ditches are unlined, open surface drainage channels excavated into native soils varying from three feet deep in most areas to 15 feet deep in some areas.

The site has a typical desert climate and is sparsely vegetated with small shrubs throughout most of the site, with the exception of the Lower Ponds, which have increased vegetation. Native soils at the site consist of unconsolidated, poorly sorted, non-plastic, light brown to red silty sands with varying amounts of gravel and cobbles.

The primary source of chemical contamination at the BMI eastside site is the result of transport and disposal of industrial and sewage effluent in the pond and ditch areas. Reported solid wastes include: asbestos sludge, sodium chlorate filter cake wastes, ammonium perchlorate filter cake wastes, potassium perchlorate process wastes, and sodium dichromate. Reported liquid waste includes: effluent containing organics, caustics, and cell liquor, sulfuric acid, hydrochloric acid, sulfonated metabolites of dichlorodiphenyltrichloroethane (DDT), aqueous boron solution, industrial wastes from cooling and dust control operations, ore processing waste, leach liquor, caustic waste, other process waste effluents (mixed metal chlorides), borox, soda ash, phosphate chemicals, cyanide, rinse and wash water containing small amounts of chloride, and municipal sewage effluent.

The CAMU site (westside), which represents a portion of the greater BMI Complex, is comprised of existing and closed landfills, slit trenches, and vacant land. The many production processes that have operated at the BMI complex since 1942 have resulted in the generation of a variety of waste by-products. A majority of these wastes were disposed in the BMI landfill, and in numerous ponds located on the north side of the BMI complex. Waste materials that were reportedly disposed of in the landfill include: refinery slag cake, chlorinator cleanings, concrete cell parts, graphite anodes, asbestos shavings and sludge, miscellaneous operating refuse (paper, wood, etc.), miscellaneous metallic equipment and scrap, empty DDT bags, housekeeping wastes, chlorate filter cake wastes, elemental carbon powder, dried residue from perchlorate salts, boron operations waste, hydrated lime, dolomitic stone, kiln dust, acid effluent and waste caustic liquor, chlorine sludge, carbon tetrachloride waste, high paraffin fuel oil, polychlorinated benzene still bottom waste, sludge dryer residue, titanium fines, metallic dust and byproducts, and solidified waste paints.

Reportedly, the BMI landfill received wastes from 1942 until 1980, at which time the landfill was closed and capped. Periodically, during 1970 to 1980, process waste was also reportedly disposed of in the Slit Trenches, an area located immediately south of the landfill.

Besides land disposal, historical manufacturing operations and work management practices in the production areas upgradient of the landfill, have been known to have significantly impacted groundwater quality in the vicinity of the landfill area. In 1979, Stauffer discovered that approximately 30,000 gallons of benzene had leaked from an underground tank in the production area. Since its discovery, the plume migrated northeast passing under the BMI landfill area and towards the town of Pittman and the Las Vegas Wash. In 1983-1984, in response to a consent order from Nevada Department of Environmental Protection (NDEP), Stauffer and Montrose installed a Groundwater Treatment System (GWTS) to provide capture and treatment of groundwater contaminated with volatile organic compounds (VOCs) from the industrial complex before it migrates off-site (HLA 1999). The GWTS is located about 1000 feet downgradient of the BMI landfill area.

1.4 CHEMICALS OF CONCERN

This section provides site hazard characterization information so that initial levels of personal protective equipment (PPE) can be selected, as well as appropriate monitoring for chemical and physical hazards. Section 7 describes initial and up-grade PPE ensembles and describes the monitoring program with action levels for up- or down-grading PPE or evacuating a site.

1.4.1 Site-Related Chemicals

The primary chemicals identified in site soil include metals, perchlorate, pesticides, semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), asbestos, radionuclides, and dioxins/furans. The primary chemicals in site groundwater include metals, pesticides, VOCs, SVOCs, perchlorate, and radionuclides. Table 1 was created from the list of chemicals to provide occupational exposure limits, some physical and chemical properties, routes of exposure and signs and symptoms of exposure. The Site-Related Chemicals report provides a full list of chemicals that may potentially be encountered at the site (BRC, 2005a).

1.4.2 Chemicals Brought to Support Work

During the course of fieldwork, BRC contractors will bring certain chemicals to the site. These may include:

- Gasoline fuel for generator
- Alconox
- Isobutylene calibration gas

Material Safety Data Sheets (MSDSs) for these chemicals are included in Appendix B. All containers must be labeled with the identity of the contents as well as a hazard warning and emergency notices.

SECTION 2

2 PROJECT ROLES AND RESPONSIBILITIES

2.1 ROLES AND RESPONSIBILITIES

BRC is responsible for verifying that the project activities are carried out in accordance with the agreed upon scope of work and related contract documents. Along with this responsibility, BRC will verify that project activities are carried out in a manner consistent with applicable health and safety regulations, and this HSP.

2.2 HEALTH AND SAFETY RESPONSIBILITIES

Safety, loss prevention and strict adherence to this HSP are a direct responsibility of all levels of management under all projects. The efforts of multiple organizations are necessary for completing investigations and remedial objectives associated with hazardous waste site work. Each individual assigned to oversee or conduct field work will be responsible for conducting his/her job in a safe and healthful manner. The Quality Assurance Project Plan (QAPP) contains the project-specific organization structure (BRC, 2005b).

2.2.1 Project Manager

The BRC Project Manager, Dr. Ranajit Sahu, C.E.M., has overall responsibility and authority for the project and therefore the safety of BRC's employees and contractors working on this project.

2.2.2 Health and Safety Representative

Each investigation consultant will name an individual to serve as the H&S Representative for their role on this project, and will be responsible for implementing this HSP. The H&S Representative has the authority to stop work activities and to remove employees (or contractors) from the site when their actions are considered dangerous. His/her duties include, but are not limited to:

- Serve as the project lead for all issues related to health and safety.
- Conduct a daily safety meeting
- Maintain necessary project health and safety documentation and records.

- Verify that employees wear the prescribed level of personal protective equipment.
- Verify that the project bulletin board, where applicable, contains the necessary health and safety postings and that the information is current.
- Prepare incident reports for near miss accidents and actual work-related injuries, illnesses or losses involving the environment or property.

2.2.3 Field Team Leader/Field Manager

Specific actions of the Field Team Leader/Field Manager include:

- Knowing how to safely implement the project objectives, including familiarization with the site background and equipment operation.
- Leading by example the safe way to complete the job.
- Coordinating with the OSO to ensure that the site safety program is being implemented effectively and taking corrective action when it is not.
- Putting a stop to any unsafe acts or activity.
- Ensuring lines of communication and points of contact are known to all team members.
- Notifying the Project Manager of any site evacuation, injury or site-related illness, property damage or near miss.

2.2.4 On-Site Safety Officer

Specific actions of the OSO include:

- Ensuring general implementation of the HSP, including necessary coordination and integration of subcontractors into the site safety program.
- Conducting regular inspections of the work areas, whether formally documented or visually observed, to ensure implementation of the safety plan and safe and healthful work conditions.
- Maintaining documentation file that includes: Personal Acknowledgement Forms (as well as any BRC specific briefings), Visitor Log, Tailgate Safety Meetings, Medical Surveillance

Health Status Reports, Training Documentation, Incident Reports, Monitoring Equipment Calibration and Recording, etc. (see Appendix A).

- Maintaining current certification in cardiopulmonary resuscitation (CPR) and first aid by an authorized training organization such as The American Red Cross, or equivalent. Ensuring adequate first aid supplies and fire extinguishers, etc. are available at the site and that access (phone number if not 911, route map) to an ambulance or emergency services provider is known and posted for all team members to see.
- Halting or modifying any working conditions, or removing personnel from the site, if OSO considers conditions to be unsafe.
- Leading during any on-site emergency situation.
- Seeking guidance from the PSO when unanticipated conditions develop, or completing an HSP Change Form (Appendix A).
- Overseeing the air monitoring program (i.e., calibration documentation, monitoring documentation, equipment maintenance), and ensuring proper PPE is available and used.
- Coordinating site control that includes work zones, decontamination station and the buddy system.

2.2.5 Contractor Safety Personnel

Each contractor shall designate a competent person (capable of recognizing hazards, with the authority to immediately correct) in a supervisory position, to administer its HSP. Should the contractor's safety effort be considered inadequate, BRC has the option to request replacement of the designated safety representative. This person shall be named and on site whenever the subcontractor is performing work. Specific actions of the subcontractor's competent person shall include:

- Knowing how to safely implement the project objectives, including familiarization with the site background and equipment operation.
- Leading by example the safe way to complete the job.
- Putting a stop to any unsafe acts or activity.

- Actively participating in Tailgate Safety Meetings and providing relevant safety information about the subcontractor's means and methods to the Field Team Leader or Field Manager.

2.2.6 Field Personnel

Specific actions of field personnel include:

- Understanding and complying with the HSP.
- Bringing all perceived unsafe site conditions to the attention of the OSO. This includes situations when the person does not know how to do a job safely.
- Having stop-work authority if imminent danger exists.

2.2.7 Site Visitors

Personnel visiting the site whom are invitees (visitors), employees, or subcontractors will be permitted to enter work areas only with prior approval by the Project Manager or designee. The Project Manager or site H&S Representative must adequately inform the visitors of the current hazards and controls including the protective equipment required.

Visitors wishing to enter the site exclusion or contamination reduction zone must provide verification to the OSO that he/she has been medically approved and trained per the Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard. Unless prior arrangements are made, PPE other than hard hat, safety glasses and high visibility vests will not be provided to visitors. In no case will field staff provide respiratory protection to site visitors. Prior to entry, this HSP must reviewed and an Personal Acknowledgement form signed.

SECTION 3

3 STANDARD OPERATING GUIDELINES

All site operations will be performed in accordance with applicable Nevada Administrative Code (NAC) 618, 29 CFR 1910 and 1926, and other applicable federal and state requirements. All BRC employees, contractors, and visitors must comply with the requirements of this HSP.

3.1 GENERAL

The following practices are expressly forbidden during on-site work:

- Smoking, eating, drinking, chewing tobacco, or applying cosmetics while in the exclusion zone, contamination reduction zone (CRZ), or any potentially contaminated area.
- Ignition of flammable materials in the work zone (equipment needed to work around flammable materials will be bonded and grounded, spark proof and explosion resistant, as appropriate).
- Contact with potentially contaminated substances, this includes walking through puddles or pools of liquid; kneeling on the ground; or leaning, sitting, or placing equipment on contaminated soil.
- Performance of tasks in the exclusion zone without a “buddy” or specified system accounting for a buddy.

Personnel must keep the following guidelines in mind when on site conducting field activities:

- Hazard assessment is a continual process; personnel must be aware of their surroundings and constantly be aware of the chemical/physical hazards that are present.
- The number of personnel in the exclusion zone will be the minimum number necessary to perform work tasks in a safe and efficient manner.
- Team members will be familiar with the physical characteristics of each site including wind direction, site access, and location of communication devices and safety equipment.
- The location of overhead power lines and underground utilities must be established.

- Where economically and practically feasible, engineering controls will be selected to reduce exposure of site personnel to health or safety hazards. Engineering controls that may be feasible include use of pressurized cabs or control booths on equipment, use of remotely operated material handling equipment, dust suppression techniques (such as wetting down a surface with a water spray), noise insulation barriers, and use of shoring devices for trench or excavation entry.

When engineering controls are not feasible, administrative controls in the form of work practices will be implemented to minimize risk to personnel from site hazards. Work practices that may be instituted include removing all non-essential personnel from the exclusion zone and locating employees upwind of the hot zone. Work rotation will be used to control exposures to extreme thermal stresses; however, work rotation for the purpose of limiting exposure to site personnel from airborne chemical hazards is unacceptable.

3.2 RECORDKEEPING

Documentation is one of the methods of ensuring that the site safety program is implemented properly. The Project shall establish reporting and recordkeeping requirements in accordance with Federal and/or State law. Some, but likely not all, of the recordkeeping forms needed for projects are provided in Appendix A. It is the OSO's responsibility to maintain and update these documents. Appropriate regulatory agency and BRC personnel shall be granted ready access to these records. Listed below is the minimum project health and safety compliance documentation requirements:

- A copy of this HSP must be on site.
- OSHA Job Safety and Health Protection poster, posted at the site
- OSHA Injury and Illness Recordkeeping Form 300 (required for remedial and clean construction job sites only).
- Calibration records for health hazard assessment monitoring equipment.
- Record of health hazard assessment monitoring results (a field log book or daily report sheet is acceptable).
- Incident reports, including near misses, for the project.

- Inspections (daily visual inspections recorded in a field log book or daily report sheet).
- Personal acknowledgement forms signed by all site workers.
- Daily tailgate safety meeting forms.
- Visitor sign-in sheet.
- Respirator fit test and equipment inspection documentation for Level C or B jobs.
- Permits, if required, for the job:
 - Permit Required Confined Space
 - Hot Work
 - Lockout / Tagout
 - Excavation entry
- Training and medical surveillance certifications:
 - Initial 40-hour, or 24-hour, HAZWOPER training
 - 8-hour refresher HAZWOPER training
 - OSO's 8-hour supervisory HAZWOPER training
 - On-the-job training, 3-day or 1-day
 - First Aid / CPR
 - Medical clearance for working on hazardous waste sites and wearing respiratory protection

3.3 GUIDELINES FOR OBSERVED OR IDENTIFIED HAZARDS

3.3.1 Hazards Created By or Identified During Work Controlled By BRC or Contractors

When apparent non-compliance to the HSP or unsafe conditions or practices are observed, the BRC Project Manager, and/or H&S Representative will be notified and corrective actions

completed. For BRC contractors, the contractor's H&S Representative or Project Manager will be notified and corrective actions will be required. For work activities performed by the contractor, the contractor is responsible for determining and implementing necessary controls and corrective actions.

When BRC employees or contractors may be exposed to an apparent imminent danger, immediately stop work and alert all affected individuals. Remove all affected BRC and contractor employees from the danger and notify the Project Manager, and/or H&S Representative, and the contractor's H&S Representative or Project Manager where appropriate. Do not allow work to resume until adequate corrective measures are implemented and documented and accepted by the H&S Representative or his/her designee.

3.3.2 Hazards Identified with Other Third Party Work Activities

In carrying out BRC's responsibilities of assuring safety compliance for BRC and contractor employees, the following guidelines are implemented when employees identify hazardous conditions created by the BRC or Contractors (third party) within or adjacent to their work area:

- If a condition is identified that could immediately result in an accident causing severe injury or death:
 - Take appropriate measures to ensure your own safety and all other BRC and contractor employees by immediately removing yourself from the immediate danger of the hazard zone.
 - Advise others in the area of your potential concern. This would include notifying the client representative. Do not advise how to correct the immediate hazard, only that one appears to exist.
 - If the potential concern is not addressed, the BRC employee should notify the project Manager or his/her designee, who then may notify the Owner of the potential concern. It is the Owner's responsibility to determine, and implement if appropriate, the issuance of a stop work order or to suspend the affected activity. Additionally, only the Owner can authorize a restart of the suspended work activity following mitigation of the immediate hazard.

- If a condition is identified that may not be an immediate danger, but could result in an accident involving less serious or minor injury, damage to equipment, or environmental release:
 - Take appropriate measures to ensure your own safety and the safety of all other BRC and/or contractor employees in immediately removing yourself/them from the immediate hazard zone.
 - Advise others in the area of your concern. This would include notifying the client representative. Do not advise how to correct the deficiency; only that it appears that one exist.

In either case, notify the Project Manager and/or H&S Representative. The situation will be evaluated and protective actions taken to ensure the safety of BRC and contractor employees during the performance of their work activities.

3.4 ENFORCEMENT OF SAFE WORK PRACTICES IN A MULTI-EMPLOYER JOB SETTING

Enforcement of safe work practices starts with a disciplinary action program. All persons assigned to the field are expected to conduct themselves in a manner that promotes the health and safety of themselves and their fellow workers. Employees not able to conform to the safety and health protocols contained in this document will be subject to disciplinary action, up to and including termination. Personnel who knowingly disobey safe operating procedures will be disciplined. Depending on the nature of the infraction, the disciplinary action will progress from a verbal warning, to a written warning, to a suspension from site activities, to dismissal from the site.

Enforcing safe work practices at a multiple employer job setting presents many challenges. BRC recognizes its responsibility as prime contractor to create and enforce a work environment that is safe and healthful. According to OSHA, each employer is required to provide a safe and healthful working environment for its employees. Most hazardous waste site activities require that more than one contractor work simultaneously on a given work site. In this situation, activities of one company could potentially cause a hazard to employees of another company, and so forth. It is not possible to present every subtle hazard associated with a particular piece of equipment or process or site condition in an HSP; therefore, it is necessary for each company to inform site workers of the particular safety and health issues associated with the means and

methods of accomplishing site tasks. The forum for disseminating this information is through safety meetings and Activity Hazard Analyses.

When conducting site activities, it is possible for personnel to forget or ignore certain provisions of the HSP. Project staff noticing deviations from accepted safe work practices will remind personnel of the proper procedures. Should this fail to correct the deviation, the Field Team Leader or Field Manager (and Subcontractor designated competent person[s], as appropriate) will be informed of the circumstances. Under no conditions are deviations from safe work practices to be tolerated by anyone on site. Unsafe behavior or unsafe conditions at the site shall be corrected in accordance with this HSP. Should this attempt fail, BRC will halt site activities. Non-cooperative subcontractors may be terminated.

3.5 HAZMAT PROGRAM

When shipping a hazardous material, according to the Department of Transportation, staff must follow appropriate protocols. This includes proper identification of the hazardous material (HAZMAT), containerizing, labeling, marking and completing necessary shipping papers. If sending a HAZMAT via an airborne carrier (e.g., Federal Express) the shipping rules provided in the International Air Transport Association (IATA) Dangerous Goods Regulations apply. If you are in doubt about the proper way to send a HAZMAT or need verification as to whether something is a HAZMAT contact the Project Manager. The Project Manager will obtain the necessary information for you. For example, MWH maintains the services of INFOTRAC to act as their emergency 24-hour hotline. The phone number should appear on any HAZMAT shipping paper and is: 800-535-5053. Notify INFOTRAC via this number of the shipment and supply an MSDS or other hazard information if they need it.

3.6 SPILL CONTAINMENT PROGRAM

In most cases BRC and contractors are on site to investigate or remove already spilled hazardous materials. There are, however, hazardous materials sometimes brought to the site to accomplish the project objectives. These include decontamination solvents, acid preservatives, and electric generator fuels. Drums or other containers will be on site to store decontamination fluids and waste PPE. All field team members will exercise care when decontaminating equipment and personnel, and will treat any spilled decontamination water or fluid as a hazardous material. If a spill or release (e.g., via fire or explosion) of any hazardous material on site occurs, field team members will:

- Assess the need to don a higher level of PPE. This assessment will depend on the volume of the spill, nature of the spilled material, and measurements from air monitoring equipment.
- Attempt to dike or stop the spread of the spilled material with absorbent pillows or material (e.g., kitty litter); or cover the material if it is volatile with Visqueen, or equivalent. The OSO and Field Manager should assess during the planning stage the need to mobilize this kind of equipment.
- Obtain an appropriate drum or container to package the spilled material.
- Pump or scoop up the spilled material and any additional contaminated soil or articles, and place the material in a drum or other suitable container.
- In the event that the spill is too large to be handled safely by the field team, the area around the spill will be secured and the OSO will initiate clean-up activities by notifying the appropriate emergency or spill response organization (e.g., BRC, fire department, contracted response company, etc.).
- Once efforts to mitigate the spill are underway, the Project Manager and appropriate BRC representatives shall be notified.
- If any agency notifications are necessary, such as when State or Federal reportable quantities are exceeded, BRC will notify the appropriate entities to report the spill, unless otherwise agreed to in writing between BRC and contractors.

3.7 FIRE PROTECTION PLAN

Field activities associated with hazardous waste operations potentially could result in a fire at a site. Cigarette smoking is expressly forbidden in the exclusion zone. Air monitoring equipment used to monitor for flammable mixtures will be intrinsically safe if required and measurements collected at a frequency which will allow for a reliable assessment of the fire hazards at a site. At least one Class ABC dry chemical fire extinguisher, 10-pound minimum, will be available for use at each site.

All electrical wiring will be free from frayed ends and sections, and all hook-ups will be checked for loose fittings. Portable power tools will be connected to a ground fault circuit interrupter and care will be taken to ensure that electrical connections do not exceed the maximum load capacity for any one circuit.

Wildfires

Areas (particularly the southwestern United States) with wide open spaces of natural brush present the danger of wildfires when dry grasses and brush catch fire. Many project sites have structures that can provide enough of a fire break to prevent wildfires from endangering site personnel, but, it is not an absolute protective measure. As warranted, the OSO will check regularly with the local fire department during the most common wildfire months (July through November). Should a wildfire threaten a work site, the OSO will watch for changing conditions and evacuate and secure each active site, in accordance with local fire department instructions.

Fire or Explosion Response Action

The actions listed below are in a general chronological sequence. Conditions and common sense may dictate changes in the sequence of actions and the addition, elimination, or modification of specific steps.

1. Upon detecting a fire/explosion, employees will notify the OSO and one person will be directed to notify the fire department.
2. A determination will be made as to whether or not the fire is small enough to extinguish readily with immediately available portable extinguishers or water, or if other fire-fighting methods are necessary.
3. Non-essential personnel will be directed away from the area of the fire.
4. Someone will be directed to greet the fire crew and show them the way to the site over non-contaminated ground if possible. Once the fire department arrives, the senior fire official is now in charge of the site.
5. If it is judged that a fire is small enough to fight with available extinguishing media, employees will attempt to extinguish the fire provided that:
 - They are able to approach the fire from the upwind side, or opposite to the direction of the fire's progress.
 - The correct extinguisher is readily available or a water source or heavy equipment operator that can put soil on the fire is available.

- No known complicating factors are present, such as likelihood of rapid spread, imminent risk of explosion, or gross contamination.
6. The OSO or designee will perform a head count for that work area.
 7. The OSO will assist the fire crew in performing any necessary decontamination of the fire equipment.

Fire Extinguisher Information

The four classes of fire, along with their constituents, are as follows:

Class A - Wood, cloth, paper, rubber, many plastics, ordinary combustible materials. Extinguish with water or ABC dry chemical extinguisher or other A-rated extinguishing media.

Class B - Flammable liquids, gases, and greases. Extinguish with ABC dry chemical, Purple K, carbon dioxide or other B-rated media.

Class C - Energized electrical equipment. Extinguish with ABC dry chemical, carbon dioxide or other C-rated media.

Class D - Combustible metals such as magnesium, titanium, sodium, and potassium. Extinguish with Metal-X Dry Chemical.

The OSO shall conduct an initial inspection of the fire extinguisher(s) and on a monthly basis to ensure that the unit is adequately charged with extinguishing media. Do not store a fire extinguisher on its side. To use the extinguisher, follow the acronym PASS for instructions listed below:

1. **P**ull the pin on the top of the unit.
2. **A**im at the base of the fire.
3. **S**queeze the handle on the top of the unit.
4. **S**weep the extinguishing media along the base of the fire until the fire is out. Ensure that the fire is fully cooled before assuming it is completely extinguished.

3.8 EARTHQUAKE AND DISASTER PREPAREDNESS

If an earthquake or other disaster occurs during working hours and the magnitude is such that site personnel may be in danger, the OSO will initiate the site evacuation procedure. This action is to be taken only if in the judgment of project personnel and/or OSO that the earthquake is large enough to have potentially caused damage to any of the structures or equipment being used on the site.

If the earthquake or disaster occurs during non-working hours the OSO will determine whether safe entry into the exclusion zones can be made, or if an inspection is needed first. If at any time, the inspection team feels that they need the assistance of the fire department, the inspection shall cease until the fire department is able to assist. The inspection will be conducted using the buddy system. The team will look at all structures, equipment, and any chemical storage areas for signs of cracks or deterioration. When assessing areas known to contain chemicals, appropriate air monitoring equipment will be used to ensure that leaks are detected quickly and without injury to the inspection team. When inspecting areas where chemical releases could have occurred as a result of a breach of containment, Level B PPE is recommended.

In the event of a catastrophic earthquake or disaster, up to 72 hours could elapse before emergency assistance arrives. Therefore, it is advisable for the project team to maintain enough supplies (food, water, emergency supplies such as first aid kits, personal medication, and any other applicable supplies) for each person scheduled to work on a full-time basis. These supplies should be stored in a place that is not likely to be impacted by an earthquake or other type of disaster.

3.9 SANITATION

Work breaks, eating, drinking, and conducting paperwork tasks will be performed in the field vehicle or other suitable location outside of the exclusion zone and CRZ. Field personnel will wash their hands prior to eating or drinking.

Project site toilet facilities may be available to site workers. If it is determined that an existing toilet facility is not located within a suitable distance (up to 5 minutes vehicle ride) to a particular site, portable toilet facilities will be rented and brought to the project site. One toilet will be rented if the anticipated size of the field crew is less than 20. All rented toilets will be equipped with a door that is lockable from the inside. Rental toilets will include at a minimum, a weekly

cleaning service. A visual search for spiders (particularly black widow spiders) should be conducted prior to using any portable toilet.

Potable water will be available in the support zone for all field team members. The OSO is responsible for ensuring that an adequate supply of water is available at the site. During times of heavy labor and hot temperatures, it is recommended that approximately 1 liter of water per hour be ingested. Electrolyte replacement beverages also may be provided for site personnel. Non-potable water outlets must be clearly identified. When decontamination procedures are prohibitive for the purpose of ingesting water during work, field team members may drink water without prior personnel decontamination under the following stipulations:

- Water is dispensed from a cooler with a pull-lever or top push pouring spout. Push-button pouring spouts are unacceptable as dirty fingers can easily contaminate the pouring spout.
- Disposable drinking cups must be used and discarded after each use.
- Drinking cups must be dispensed out of a plastic or metal dispenser attached to the cooler allowing the bottom of the cup to be grabbed without touching the rim of the top.

Support zone food handling activities must comply with local requirements governing the use of barbecues and vending. Remember to store food at above 140 degrees F or below 40 degrees F to kill or retard food-borne pathogenic microorganisms.

Sleeping quarters will be arranged by BRC management, when personnel must travel away from their home to work on site. Such quarters will be equipped with shower and changing facilities.

3.10 ILLUMINATION

Most site work will be done during daylight hours. When performing work during non-daylight hours, personnel must be furnished with sufficient light. OSHA requires a minimum of 5 foot-candles of light for general work sites. Five foot-candles is likely to be inadequate and additional light may be required. Most equipment rental companies maintain light sources capable of providing enough light for site work. Ensure that all electrical lines are properly grounded (i.e., with a ground-fault circuit interrupter) and that explosion-proof lighting is used in flammable atmospheres.

3.11 HOUSEKEEPING

One of the best ways to keep a safe site is to keep a clean and orderly site. The OSO shall remind all site workers that it is their responsibility to ensure that housekeeping is kept up and that the sites, staging areas and parking areas where BRC and its contractors work are free from trash, debris and cluttered walkways. This includes the following:

- The OSO will designate trash receptacles.
- The OSO will designate appropriate storage for flammable materials (e.g., decontamination solvents). This may include a flammables cabinet or short term use of a BRC's storage facility.
- The OSO will designate "Smoking Areas" that are acceptable to BRC and site conditions (e.g., no smoking near dry grass).
- All materials shall be stored such that it is stacked, braced, racked, blocked, interlocked, or otherwise secured to prevent sliding, rolling, falling or collapse.
- Any protruding materials (e.g., nails) will be kept clear from walkways and positioned such that someone will not accidentally lean on them.
- Dangerous depressions in the ground shall be avoided by setting up work so that people are not required to walk over them. If that cannot be done, the depression should be temporarily covered or otherwise made safe.
- Any combustible scrap (e.g., cardboard boxes) shall be removed at regular intervals.
- Hoses and cords shall be run the minimum distance necessary and if they must pass over walkways, they must be secured or passed overhead.

3.12 COMMON PHYSICAL HAZARDS AND CONTROLS

This section provides information concerning common physical hazards associated with hazardous waste operations and recommended controls to minimize risk to site personnel. Anything unique or different from the standard information provided in this section will be provided as appropriate.

3.12.1 Slip/Trip/Fall

All field team members are to be vigilant in providing clear footing, clearly identifying obstructions, holes, or other tripping hazards and maintaining an Awareness of uneven terrain and slippery surfaces. If necessary shoes providing more elaborate tread will be worn to minimize slip, trip and fall hazards. Care shall be taken to contain liquids so as not to create a muddy or slippery condition. Absorbent or gravel material may be used (with BRC approval) to help prevent slippery conditions during wet and rainy seasons.

Working at heights above 6 feet is not anticipated to be necessary during the course of most projects. If work at such heights is necessary for this project fall protection must be provided. When it is known that access to the top of a storage tank (e.g., Baker tank) or treatment system canister will be required, order the equipment with an attached ladder and guard rail system. Fall protection involves the use of either a personal fall arrest system (five point harness with shock absorbing lanyard), guard rail or safety net. All fall protection systems must be as specified in 29 CFR 1926 Subpart M, Fall Protection.

3.12.2 Heavy Lifting

During manual lifting tasks, all personnel will remember to lift with the force of the load suspended on their legs and not their backs. They are to follow these principles of back safety:

- Get help from a co-worker or mechanical device when possible.
- Maintain the natural 'S' curve.
- Build a bridge when lifting relatively light objects by placing one hand on a leg or other surface.
- Lock the stomach muscles.
- Hold the object close to the body.
- Do not twist and lift.
- Try to plan tasks so that you lift from waist height to waist height.
- Place containers on a table to fill them instead of filling them while on the ground.

3.12.3 Electrical Hazards

Underground Utilities

An underground utility service must be contacted in advance of invasive work. The utility locator service in conjunction with a review with BRC of as-built construction drawings will identify and locate all utilities prior to invasive activities. Additional geophysical surveys may be needed if uncertainties remain. Invasive activities must be at least 5 feet away from marked underground utilities. Hand digging to 5 feet will be required when historical evidence suggests that the other utility locator methods may not be enough to locate all underground services.

Overhead Utilities

In all cases, personnel will be vigilant about the presence of overhead lines before raising the mast of a drill rig, backhoe bucket, or crane arm or other extending device, including ladders. Generally, clearances of 20 feet or more are recommended. Minimum distances from mast to overhead electrical lines, based on voltage, are as follows:

| Nominal Power Line System (kV) | Minimum Required Clearance (feet) |
|---|--|
| 0–50 | 10 |
| 51–200 | 15 |
| 201–300 | 20 |
| 301–500 | 25 |
| 501–750 | 35 |
| 751–1,000 | 45 |

Source: United States Army Corps of Engineers
kV: kilovolt

Electrical Equipment

Only authorized electricians are permitted to perform electrical work.

A minimum of 3 feet clearance is required around all electrical panels, the OSO is to ensure that such clearance is maintained during inspections of the field office, if one is brought to the site. This also applies to working around electrical panels at the Site.

Field personnel are responsible for ensuring that equipment brought to the work site is grounded before use. Additionally, the use of ground-fault circuit interrupters are required for all portable electrical tools and fixed electrical equipment to be used at the site.

Extension cords must be inspected prior to use. Any frays or missing ground prongs shall be cause to take the cord out of service. Extension cords are to be used for temporary purposes only and are not be used to hoist equipment. Extension cords are not permitted to be placed in water or in a walkway (if it must cross a walkway it shall be routed overhead). Work on electrically energized systems requires lockout/tagout.

3.12.4 Motor Vehicle Hazards

Motor vehicle accidents can occur any time people drive. All field staff are required to employ defensive driving techniques, and obey all site speed limits and vehicle safety requirements. Seat belts are required during all conducted business in motor vehicles (cars and trucks). Each occupant must have a seat. All accidents are to be reported to the OSO.

3.12.5 Hot Work Permits

Any welding, torch cutting or other hot work will be performed in accordance with a site-specific hot work permit. Each permit is issued for a specified task and shall not extend from one day to the next. All hot work must be done with the complete knowledge of the OSO and a fire watch nearby with a suitable fire extinguisher. The fire watch may not be dismissed until 30 minutes after the work has been completed. During the hot work process screens may be needed to control sparks.

All compressed gas cylinders used must be kept in an upright and secured position. If not on a cylinder dolly the cylinders shall be strapped to a secured wall or structure. The cylinder must be labeled as to its contents and whether it is “full,” “in-use,” or “empty.” The regulator valve shall be closed and covered when not in use. Oxygen cylinders shall be stored at least 20-feet from acetylene. Flammable cylinder storage areas shall be posted with “No Smoking” signs.

3.12.6 Sharp Objects and Pinch Points

During the course of the field work, it is feasible that personnel will encounter sharp objects and pinch points. Sharp objects include site debris, field tools (e.g., knives, scissors), equipment, or other objects. When danger of cuts to the hands or other body parts is probable, employees will either arrange paths where personnel may walk free of sharp edges, or ensure during the tailgate safety meeting that areas with known sharp edges are brought to the attention of the entire field crew. Heavy work gloves shall be used in conjunction with any chemical resistant gloves when handling sharp objects is required. Listed below are rules when using sharp tools:

- Use the right tool for the job. Do not use a knife when a more appropriate tool can be used. For example, plastic cable ties must be cut with some form of diagonal cutter or scissors, not with a knife (the box nodule can be cut if it is too difficult to get under the tie).
- Examine every tool for damage prior to use. Do not use knives with dull blades or broken handles.
- When using a knife, apply the appropriate safety practices. Do not point the knife toward others. Make sure you have adequate space. Make sure that other workers are clear from the immediate area. Do not pull the knife toward you. Make sure you have an appropriate cutting surface. Make sure that you are properly balanced and have firm footing.
- Consider a protective glove made of Kevlar or similar material. Maintain a pair of protective gloves as standard protective gear in your field bag or tool box.
- Make sure that new employees working with you are properly trained in the proper use of all of the tools that they are likely to use.
- Think you need a knife? Think again.

Pinch points are places where the hands may be caught between objects or moving parts. If you are unfamiliar with a piece of equipment that has moving parts – stop and become familiar with it, including knowing where the guards are meant to be. Do not operate or work around something you are not familiar with. It is unacceptable to work with any tool that has had its guard removed or altered. In general guards are required over blades, drive trains, pulleys, fly wheels, rotating parts, belts, motors, etc.

3.12.7 Noise

Noise levels will vary during the course of field activities at any site. Noise monitoring will be required when noise values are unknown and likely to exceed the OSHA action level of 85 dBA for an 8-hour Time Weighted Average (TWA). If noise levels can be inferred from previous work with similar equipment (e.g., hollow stem auger drilling) than the use of hearing protection will be indicated in Section 7. If noise monitoring is done, ideally it will be done during the initial stages of site work or when it is anticipated that noise levels will need to be characterized. Workers will receive training about hearing loss and the OSHA standard as well as the proper way to don hearing protection devices. The program also includes audiometric testing as part of the medical surveillance examination and hearing protection is provided as part of the standard PPE ensemble.

3.12.8 Heavy Equipment Use

General safety precautions for work around drill rigs, excavating equipment and dump trucks is included herein. All other pieces of equipment must have detailed activity hazard analyses. All equipment may only be operated by personnel that have been trained to use the specific piece of equipment and know the limitations and emergency shut off procedures. All equipment shall be maintained and operated in accordance with the manufacturer's guidelines.

Drilling Operations

Drill rigs and support equipment must be inspected before each day or at the beginning of each shift. The inspection must be done in accordance with the manufacturers' and owners' operating requirements by someone qualified to conduct the inspection. When deficiencies that affect the operation of equipment are found, the equipment will be immediately taken out of service until unsafe conditions are corrected. When corrections are made, the equipment will be re-tested for safe use before being returned to service. The following represent general operating safety considerations:

- Before any drilling begins, a utility survey must be completed that include buried and overhead utilities. The OSO must ensure that this survey takes place in a timely manner and is documented in the project files before drilling begins. Safe clearances are described in Section 3.12.3.

- As applicable the drilling site shall be clear and leveled. The ground must be capable of supporting the impact imposed by the drill rig and associated equipment. The drill rig must be leveled and stabilized with leveling jacks. Cribbing shall be used as necessary. Outriggers shall be extended per the manufacturer's specifications.
- Before drilling equipment is mobilized to the drilling pad, the travel route shall be surveyed for overhead and terrain hazards. Access roads shall be designed, constructed, and maintained to safely accommodate the movement of the drill rig and other equipment.
- The drilling equipment shall be equipped with two easily accessible emergency shut down devices. The location of these should be made clear to all affected site personnel.
- Control levels for the drill rig shall be labeled indicating the function and direction of the control levers and shall be posted on the power unit controls.
- Gears and moving parts, constituting a hazard to employees, shall be guarded to prevent accidental contact.
- Drill crewmembers, and other support personnel, shall not wear loose clothing or clothing with loose ends, straps, drawstrings, and belts or otherwise unfastened parts that might catch on rotating or translating components of the drill rig. Rings and jewelry shall not be worn during a work shift.
- Unattended boreholes shall be covered, or protected to avoid the possibility of animals or people accidentally falling into them.
- Good housekeeping shall be maintained at all time. Litter will be properly stored, hand tools and other hardware will be properly secured on the drill rig. Prior to moving a drill rig a check shall be made for loose tools and hardware. Drill rods and augers should be placed on dunnage and secured to prevent movement. Always use a sling or strap while handling rods and augers.
- Stand to the side while tripping and tailing rods and augers. Never stand under the rod/auger or between the rig and service truck while tripping rods or augers.
- Prior to starting the operator shall verify that all gear boxes are in neutral, all hoist levers are disengaged, hydraulic lever are in the correct non-actuating positions.

- The operator shall verbally alert workers and visually verify that workers are clear from the dangerous parts of equipment before starting the equipment.
- Unsecured equipment shall be removed from the mast before raising. Cables, mud lines, and cat line rope must be secured to the mast before raising.
- Drilling equipment shall not be transported for even a short distance with the mast up.
- The drill rig shall always be operated from the control panel. The operator must never leave the control panel while the drill is in operations. Only one person should operate the machine. If the operator must leave the area of the controls, the operator must shift the transmission controlling the rotary drive into neutral and place the feed control level in neutral. The drill rig shall be shut down before the operator leaves the vicinity of the drill.
- Where drill rigs are equipped with a platform, the platform shall be constructed out of material strong enough to support the weight of the load that will be placed on the platform. Platforms shall be accessed using a ladder or steps. Platforms over 4 feet above ground surface shall be equipped with a guardrail system that includes a toeboard.
- Pressurized lines such as airlines, mud hose, etc. shall be equipped with safety-type couplings and secured with wire or chain at each coupling to prevent whipping in the event of failure. All pressurized lines shall not be disconnected until shut off and bled to reduce the pressure.
- The discharging of drilling fluids shall be channeled away from the work area to prevent the ponding of water. Mud pits and drainage channels should be safely sloped and located to provide minimum interference with the work. Where necessary, suitable barricades or temporary fencing should be provided to reduce the possibility of injury.
- All wire ropes and rigging hardware shall be thoroughly inspected before use. Defective equipment shall not be used. Shop fabricated rigging, or hooks without latches, are not permitted. Where a chain sling is used it shall be an alloy chain and shall be tagged.
- Hoist and rigging hardware shall be used only for their designated intent and shall not be loaded beyond their rated capacity. Steps shall be taken to prevent two-blocking of hoist.
- Tool handling hoist shall only be used for vertical lifting of tools. The tool hoist must not be used to pull on objects away from the drill rig, unless the hoist has been designed for this purpose.

- Drill rods shall be neither run nor be rotated through rod slipping devices: no more than 1 foot of drill column shall be hoisted above the top of the drill mast. Drill rod tools joints shall not be made up, tighten, or loosened while a rod-slipping device supports the rod column.
- A string of drill rods shall not be braked, during lowering into the hole, by the chuck jaws. A cat line or hoisting cable or plug should be used for braking prior to tightening the chuck.
- Loads shall not be hoisted over the head, body or feet of any person. Loads shall not be left suspended in the air when the hoist is unattended. Work is not permitted under a suspended load.
- Hoist lines shall not be used to ride up the mast of a drill rig.
- Wire rope must be properly matched with each sheave. Too large and the rope will pinch, too small and the sheave will groove. Once a sheave is grooved, it will pinch and damage the larger rope.
- Protect wire rope from sharp corners and edges. Replace faulty guides and rollers.
- When handling wire rope, always wear gloves. Do not guide rope on to hoist drums with your hands. Replace the wire rope according to manufacturer's specifications. When new rope is installed, first lift a light load to allow the rope to adjust.

Rotary and Core Drilling

- If an air rotary duct becomes plugged, no person shall be positioned toward the front of the ducting – when the plug is released it can send rock and debris out like a shotgun.
- The exclusion zone shall be large enough to ensure that the support zone does not exceed 85 dBA from noise generated by the rig. A general rule of thumb is a radius of 30 feet.
- Water swivels, hoist plugs, rod chuck jaws, etc. shall be inspected prior to use. Defective equipment shall not be used.
- Only the operator of the drill rig shall brake or set a manual chuck so that rotation of the chuck will not occur prior to removing the wrench from the chuck.

- Drill rods shall not be braked during lowering into hole with drill rod chick jaws. Drill rods shall not be held or lowered into the hole with pipe wrenches. If a string of drill rods are accidentally or inadvertently released into the hole, no attempt shall be made to grab the falling rods with hands or a wrench.
- When drill rods are hoisted from the hole, they shall be cleaned for safe handling with a rubber or other suitable rod wiper. The hand should not be used to clean drilling fluids from drill rods.
- Drill rods shall never be lifted and leaned unsecured against the mast. Drill rods shall be secured to the upper ends of the drill rod sections for safe vertical storage or lay the rods down.
- The spinning chain is very powerful and must be treated with respect. Spinning chains must have a rope tail. Good communication between the driller and tool handler will ensure safe operation of the spinning chain.

Backhoe and Excavator Operations

As with drilling equipment, only trained and authorized operators are permitted to use backhoes or excavators and like equipment. The following safety precautions will be utilized when working around an operating backhoe or excavator:

- Equipment inspections must be performed by a competent, trained person prior to use. Inspections must be done in accordance with the manufacturer's recommendations.
- The underground and overhead utilities must be identified prior to digging. If a buried utility will be uncovered, a plan to support it must be arranged in advance. If an unanticipated underground utility is identified work shall stop and the project manager notified.
- No one will be permitted into a trench or excavation without specific procedures provided and a named "competent person."
- The buddy system will be employed at all times.
- No trench or excavation will be left unattended or open without adequate barricades, caution tape, and safety signs.

- Personnel and equipment will maintain a minimum 3-foot clearance from the edge of the excavation.
- The spoil pile will also be kept at least 3-feet back from the edge. The spoil pile shall be sloped to prevent soil from sliding back into the hole.
- Water in the hole shall be evaluated with respect to the safety of the side wall. If there is danger of collapse the minimum clearance shall be extended and/or the sides supported.
- Suitable storage for all tools, materials, supplies will be provided by the contractor (or subcontractor).
- Work areas will be kept free of materials, obstructions, and substances that could cause a surface to become slick or otherwise hazardous.
- Tools and equipment will be used in accordance with the manufacturers recommended methods. The operators shall be responsible for establishing safe equipment use procedures.
- No one shall approach a moving piece of heavy equipment with out first obtaining eye contact and a positive signal to approach from the operator.
- Ground personnel shall wear a highly visible safety vest and stay out of the swing radius of the moving equipment. Ask the operator about blind spots if there is any doubt.
- Soil shall be backfilled as soon as possible.
- Equipment shall be stabilized prior to use.
- Personnel may only ride in designated seats.
- Never stand beneath a suspended load.
- All maintenance must be conducted in accordance with manufacturers directions, any hazardous energy must be locked out prior to being worked.
- Backup alarms must be functional.
- All belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains or other reciprocating, rotating or moving parts must be guarded when exposed to contact by persons or when they otherwise create a hazard.

- All diesel powered equipment shall be shut off prior to refueling.

3.12.9 Ladders

A stairway or ladder shall be provided at all points of personnel access where there is a break in elevation of 19 inches or more and no other means of safe access is available. General requirements include:

- All portable ladders shall be of the extra heavy-duty type (ANSI Type IA ladder).
- A competent person shall periodically inspect ladders for visible defects and after any incident that could affect its safe use.
- When portable extension ladders are used the side rails shall extend at least 3 feet above the upper landing surface. The ladder shall be secured. Ladders that can be displaced by jobsite activities or traffic shall be secured to prevent accidental movement or a barricade should be used to keep traffic activities away from the ladder.
- Ladders should be maintained free of oil, grease and slipping hazards.
- Ladders shall not be loaded beyond the maximum intended load.
- Ladders shall be used only for the purpose for which they are designed.
- Metal ladders shall not be used around electrical equipment.
- The area around the top and bottom of the ladders shall be kept clear.
- Ladders should not be moved, shifted or extended while in use.
- Employees shall not attempt to ascend or descend a ladder while carrying tools or materials in their hands. All tools and materials shall be hoisted by mechanical means to the working level.
- Employees shall face the ladder and should maintain at least 3 points of contact when climbing a ladder.

3.12.10 Ergonomics

Ergonomic injuries are the result of three factors: awkward postures, forceful motions and repetitive motions. The key to minimizing or even eliminating ergonomic injuries is by keeping the body in a neutral position through as much of the day as possible. A neutral position means that all of the bones are in their natural alignment (e.g., neck straight, back with ‘S’ curve, arms dangle from shoulders, not hunched) when a bend is needed such as when sitting or using a computer the elbows, hips and knees are at right angles and the wrists are straight with feet either flat on the floor or on a foot rest. Try to incorporate these natural and neutral postures into all tasks being done throughout the day. When a job requires force – try to think of another means of accomplishing the task, is there a tool or someone that can help? If you do a repetitive job, seek ways to automate it or build in frequent breaks from that task to give your body some rest. Build in a stretching routine throughout your day to give you back, wrists and neck a break. Ask your OSO for some tips if you are unsure of a good way to stretch.

Consider the following list developed by Humantech (1995), a specialty ergonomics consulting firm, and try to find ways of incorporating proper posture, less force and breakup repetitive tasks as much as possible:

| Ergonomics Hit List | Comment |
|------------------------------|--|
| Wash rag | Wrists twisted and bent – try to arrange work so that wrist is straight |
| Tool/target interface | Try to arrange so that the body is in a neutral position |
| Elbows out, winging it | Often a compensation to keep the wrist straight. Back off and try to rearrange the work to keep the whole body in neutral. |
| Bad vibes | Often from hand tool use – ensure that tools are in good working order, try anti-vibration gloves. If riding on bumpy roads in vehicles, build in breaks to get out and stretch. |
| Shoulder too high or too low | If the shoulder is too high, the job is too high. If the shoulder is too low, the job is too low. |

| Ergonomics Hit List | Comment |
|----------------------|--|
| Comfort zone | Look at the span of your arm – try to keep work in this zone. |
| Hungry head | If you find your head searching so you can see the job, your neck is in an awkward posture |
| Butts up | When bent over for prolonged periods the spine is subject to high compressive forces – take a seat on a bucket or put the item you are working on at a higher level. |
| Twist and shout | Twisted body parts lead to injuries. |
| Sit – stand | Choose the best method to do the job safely. Visual jobs are best done seated, forceful jobs are best done standing. |
| Don't give me static | Prolonged static postures are fatiguing. Make sure to keep the body moving throughout the day, get up and stretch. |

3.13 EMERGENCY RESPONSE PLAN

The objective of this HSP is to minimize the potential for chemical, biological, and physical hazards, and operational incidents. As part of this program, emergency response planning provides procedures for responding to emergencies that may occur during the project. ***It is not the intention of this program to include professional emergency response activities as part of the field operations. Thus, all site personnel are instructed to assess emergencies in terms of whether the problem can be solved safely with the personnel and equipment at the site. If it is determined that site personnel are able to contain the emergency safely, they should do so. If it is determined that the emergency is beyond the abilities of site personnel, evacuation and notification must take place immediately.*** This section provides general information for responding to emergency situations.

Emergency Medical Assistance Network. Section 10 provides this site-specific information. Emergency telephone numbers and a map showing the locations of the hospital(s) or emergency clinic(s) capable of providing emergency service for hazardous waste site workers are provided. Telephone numbers for the Poison Control Center, local Police and/or Sheriff's Department, local Fire Department, Office of Emergency Services, utility service or "one call" system number, management, workers' compensation reporting and BRC contacts also are included. This information must be reviewed periodically by the OSO to ensure that it is current.

Standby Vehicles. Vehicles that can be used to transport injured personnel, if an ambulance is not necessary, from work sites will be available during working hours.

Communication System. If cellular phones or two-way radios can not be used at the site or are ineffective due to terrain an alternate communication system must be preplanned and communicated. This information will be inserted in Section 10 or posted at the site.

Emergency Response Leader. The OSO assumes overall lead of the situation. Each subcontractor's "competent person" will work with the OSO to control the emergency. These people will take time during the beginning of the project to establish or confirm the following:

- Best route to the specified medical facility.
- Assembly area, in the event of an emergency (preferably upwind, up hill at least 100 feet from the support zone).
- Number of people on site at any given time (a count must be made at assembly area during emergencies).
- Alarms and communication methods (phones, horn, verbal, etc.).
- First aid supplies available and in clean condition; identification of at least two field team members with current training certificates.
- Evacuation routes clear and posted (as necessary, such as inside buildings).

Emergency Reporting. All accidents, safety related incidents, and safety related near misses will be documented and reported to the OSO who will make the subsequent necessary notifications.

SECTION 4

4 HEALTH AND SAFETY TRAINING REQUIREMENTS

Health and safety training is an integral part of the total project health and safety program. The objectives of such training are to educate workers about the potential health and safety hazards associated with working at the project site. The Project Manager is expected to instruct employees about the hazards of the project and site before allowing them to perform work on site. The site orientation should include an overview of this HSP, emergency information, and other relevant information that would provide the worker with safety and health information prior to entering the project site. Examples of health and safety training that apply to work activities, as applicable:

- Excavation and Trenching
- Fall Protection
- First Aid and CPR
- Hazard Communication
- Hearing Protection
- Lockout/Tagout
- Personal Protective Equipment

This is not an all-inclusive list of training requirements; as work scope changes and new training requirements are identified, they will be incorporated into the program. BRC and contractors are required to verify that their employees have received the necessary training and that documentation is available.

Prior to commencement of site activities, the H&S Representative will ensure that all BRC and contractor's employees engaged in a work activity are informed of the nature and degree of exposure to chemical and physical hazards that are likely to result from performance of work. All BRC and contractor employees must also complete any other training that may be required for the project and by OSHA-specific standards or other applicable standards before initiating work requiring specific training.

4.1 PERSONNEL TRAINING

All personnel who enter a hazardous waste site or construction site must recognize and understand the potential hazards to health and safety associated with operations at the site. It is the intent of this health and safety program to provide every person engaged in on-site activities a level of health and safety training consistent with his or her job functions and responsibilities.

Employees working on hazardous waste and construction job sites will be provided the training described in HAZWOPER, 29 CFR 1910.120/29 CFR 1926.65 (e) and like State laws.

In addition to HAZWOPER specific topics there are other related safety and health regulations requiring training applicable to this project. Information about these subjects is included in the initial off-site training as well as the refresher training and supplemented as deemed necessary. These include the training requirements specified in:

- “Respiratory Protection” (29 CFR 1910.134)
- “Hearing Conservation” (29 CFR 1910.95)
- “Hazard Communication Standard” (29 CFR 1910.1200)
- “Bloodborne Pathogens” (29 CFR 1910.1030)
- “Confined Space Entry” (29 CFR 1910.146)
- “Excavation and Trenching” (29 CFR 1926 Subpart P)
- “Construction Safety Awareness” (29 CFR 1926)

When a State regulation exists for a standard presented above, the standards of the State regulation shall supersede the Federal equivalent.

4.1.1 Initial Training

BRC and contractor employees assigned to hazardous waste sites will receive 40 hours of initial off-site instruction, and a minimum of three days actual field experience under the direct supervision of a trained, experienced supervisor. Some individuals, Company officers or surveyors, that meet the occasional site worker requirements, will receive a minimum 24 hours of initial off-site instruction and a minimum of one day actual field experience under the direct

supervision of a trained, experienced supervisor. These individuals are limited to work areas that have been characterized and do not pose the hazard of exposure to chemical contaminants in concentrations exceeding published occupational exposure limits. The initial off-site training must be documented with a certificate of completion by the instructor. The supervised field work must also be documented with the name of the supervisor, company affiliation, dates and location. Training topics to be covered in the initial training include the following:

- Review of the HAZWOPER standard and associated safety and health regulations.
- Names and roles of personnel responsible for site safety and health.
- Safety, health and other typical hazardous waste site operation hazards present at a site.
- Use of PPE.
- Types and use of equipment used to monitor the breathing zone and work areas of site personnel (i.e., photoionization detectors, combustible gas indicators, colorimetric indicator tube systems, dust meters and noise monitors).
- Work practices by which the employee can minimize risks from hazards.
- Safe use of engineering controls and equipment.
- Medical surveillance program requirements, including recognition of symptoms and signs that might indicate overexposure to hazards.
- Decontamination set-up and procedures.
- Emergency response planning, including proper PPE and equipment selection and use for emergency response.
- Spill containment program elements.
- General principles of toxicology and review of the major categories of typical hazardous waste site contaminants.
- General industrial hygiene principles of recognition, evaluation and control of health and safety hazards.

4.1.2 On-Site Managers and Safety Officer Training

The on-site managers and individuals responsible for supervising personnel engaged in site work must have at least eight additional hours of specialized training on managing such operations. This specialized training includes a review of BRC's safety and health program (including training programs), PPE selection, use, maintenance and limitations, spill containment program, and health hazard monitoring procedures and techniques. This training must be documented with a certificate of completion from the instructor. Persons designated as the OSO must also be currently certified in First Aid and CPR.

4.1.3 Refresher Training

All site workers shall complete 8 hours of off-site refresher training annually on the items covered in the 40-hour or 24-hour initial training program. Additional topics include a review of site incidents and lessons learned during the previous year. This training must be documented with a certificate of completion signed by the instructor.

4.1.4 Site-Specific Training

Prior to starting site work all personnel assigned to the job site shall receive a site-specific orientation. This is also referred to as the "kick-off" meeting or "pre-entry briefing." This includes contractors and subcontractors who plan to enter the exclusion and contamination reduction zones at the site and who have met the requirements of 29 CFR 1910.120/29 CFR 1926.65. Training will be conducted prior to job start-up and, as necessary, thereafter. The PSO, OSO or Field Team Leader/Field Manager will conduct initial site-specific training. The purpose of the pre job start-up training/orientation is to ensure that employees have a thorough understanding of the HSP, Standard Operating Procedures (SOPs), and physical, safety, biological, radiological, and chemical hazards of the site. This training is documented by signing the Personal Acknowledgement Form (Appendix A). Topics addressed in the initial site-specific health and safety training will include:

- Names of employees and others responsible for safety and health.
- General rules of conduct.
- Review of the chemicals of concern (radiation hazards, if applicable) and specific air monitoring that will be conducted as well as action levels of up- or down-grading PPE or evacuating the site.

- Review of major machinery and physical hazards, ergonomics hazards, and biological hazards and recommended controls.
- Personal cleanliness and restrictions on eating, drinking, and smoking.
- Review of emergency procedures and facilities, including bloodborne pathogens and universal precautions.
- Incident reporting procedures.

4.2 FIRST AID, CPR AND BLOODBORNE PATHOGENS

Personnel assigned to conduct field work for this project do not conduct first aid or CPR as a primary job function. Rather, selected employees are trained in CPR and first aid for emergency situations only. Acting in the capacity of a designated emergency first aid provider is not mandatory, and anyone who is uncomfortable with the possibility of being so designated should notify the OSO or Project Manager.

An indoctrination to the bloodborne pathogens standard (29 CFR 1910.1030) will be provided to all employees either during their first aid training, and/or during the initial site health and safety meeting. The Hepatitis B and Human Immunodeficiency Virus (HIV) which causes Acquired Immune Deficiency Syndrome (AIDS), among other pathogenic microorganisms, can be contracted during emergency first aid and CPR through contact with blood. It is important to recognize the concept of universal precautions. Universal precautions require one to assume that all blood and bodily fluids contain pathogens and require the use of protective barriers to prevent exposure. Latex gloves and CPR barriers will be available in the first aid supplies stored at each site and should be used prior to attending to a victim's needs. Additionally, washing any body part or surface that has been contaminated with blood is an important part of the universal precautions. The OSO should be notified of any potential contact with blood or bodily fluids resulting from first aid or CPR administered on the job.

A vaccine exists for Hepatitis B. Employees trained in first aid and CPR may elect to acquire the vaccine, their employer will arrange to have the series of inoculations provided. Employees offered the vaccine that do not want it must sign a declination form to be kept with the employee's medical surveillance records (see the PSO if there are any questions). While less efficient, the Hepatitis B vaccine also is effective when administered after exposure to blood containing the Hepatitis B virus.

SECTION 5

5 REQUIRED MEETINGS

BRC and contractor employees are to attend a project safety orientation, as well as periodic safety meetings. BRC meeting safety topics discussed are to be documented accompanied with an attendance signature sheet. The BRC meetings to be conducted are as follows:

| Meeting Type | Purpose | Length | Frequency |
|--|--|------------------------------|---|
| Project Orientation | To acquaint employees with the BRC Project scope of work and field activities. | Approximately one hour. | At time of first assignment to the Project. |
| Monthly Safety Meeting or Pre-Task review of field work. | To cover specific safety topics; or to review hazards and safety practices required for field walk downs | Approximately 10-30 minutes. | Monthly or at the beginning of new field activities |

5.1 DAILY TAILGATE SAFETY MEETINGS

The OSO or designee at each active work site shall hold a Tailgate Safety Meeting (also called Toolbox Safety Talks) prior to starting work in the morning or later in the day if conditions change. The meeting is to be documented using a form such as the one included in Appendix A. The contents of the meeting shall include:

- Discussion of work to be done that day or portion of the day.
- Anticipated chemical, physical, radiological, ergonomic and biological hazards and controls.
- Method(s) of communication and emergency reporting.
- Review of materials covered in the orientation as they apply to daily activities.
- Employee issues or concerns.

SECTION 6

6 PROJECT/SITE HAZARDS AND THEIR CONTROL

6.1 SITE HAZARDS

Field personnel may be subject to the hazards posed by various activities taking place. This section of the HSP is meant to provide a brief description of the controls that should be taken to prevent injury to employees observing or participating in such tasks. The following types of activities are anticipated on the project.

- Biological Hazards
- Confined space entry
- Electrical work
- Excavation
- Hand tools
- Temperature Extremes
- Severe Weather
- Traffic Safety

6.1.1 Field Site Access

Any staff member entering a project area managed by the Client or Client's Construction Contractor will comply with their health and safety requirements. Staff will inquire as to the work activities being performed, potential hazards, policies and site requirements and the protocol for site visitors entering the site. A site briefing may be provided by the Client or Contractor prior to entering the site.

Staff making a single day or occasional field or facility visit will receive a project site/safety briefing regarding site conditions and safety practices. Staff shall wear the proper personal protective equipment (PPE) while performing their tasks. Safety vests are required for all field activities where staff is exposed to equipment operation or vehicle traffic.

6.1.2 Biological Hazards

Potential biological hazards may include of snakes, spiders, ticks, fleas, poisonous plants such as poison oak and poison ivy, and microorganisms such as the Hantavirus or yeasts left in dried bird excrement. There are no unique or significant biological hazards observed at this site. Animal and plant populations were characterized by Audobon International during two events in 1999 (March and June). No poisonous plants or animals were observed during the surveys. However, due to the desert location of the site, rattlesnakes and scorpions may potentially be encountered as well as black widow or brown recluse spiders. Detailed information on possible biological hazards at work sites are discussed below.

Spiders, snakes, and fleas exist in cool, dark, moist areas. The potential for encounters exist when reaching into dark, covered places. Suggestions for control include using a long stick to break apart webs or loosen soil from certain areas. A flashlight should also be used when reaching into a dark area. Field personnel shall be aware of their surroundings and avoid contact with all insects. An insect repellent with the active ingredient DEET (no more than 35 percent) should be considered if insects are a hazard. The repellent can be applied to clothing or hard hats if skin contact is undesirable. Avoiding the use of perfumes/colognes and choosing light colored clothing or wearing paper tyvek suites can also help prevent insect bites. In the case of ticks it is a good habit to check oneself at the end of each field day paying close attention to the hair, neck and cuff areas (e.g., pant leg bottoms, wrists). Medical attention should be sought if symptoms persist or if one has an allergy or if an infection is starting to appear.

Venomous spiders may also pose a hazard during fieldwork. The black widow (*Latrodectus mactans*) is a large spider that is easily recognized by its shiny bulbous abdomen. The brown recluse (*Loxosceles reclusa*), or “fiddleback” spider is a brown spider with a fiddle-shaped marking on the head. Both spiders can be found in brush and loose debris. Hazard controls for spider bites are the same as those for snakebite and scorpion stings. In the event of a spider bite, the victim should contact the OSO immediately for assistance. The OSO should transport the victim to the nearest medical facility where antivenin or other medical treatment can be administered.

Rattlesnakes and scorpions are indigenous to many parts of the United States. The OSO will inform field team members at the daily tailgate safety meetings to be on the lookout for rattlesnakes and scorpions if they may be present. It should be noted that the American Red Cross does not advocate the use of snake bite kits for snake bite injuries. Rather, experience has

shown that the victim has a better chance of recovery without permanent damage when the site of the wound is immobilized and the victim rushed to the closest emergency medical facility (preferably within 30 minutes).

Poisonous plants such as poison ivy and poison oak grow wild in dark, moist areas, and at the base or surrounding seedling or adult trees. Some individuals are prone to break out in dermal (skin) rashes upon contact with the plant oil. A visual site inspection and identification of the plants should be completed prior to each work shift so that all individuals are aware of the potential exposure. Barrier creams may be used or paper Tyvek suites to help prevent direct contact.

Hantavirus has resulted in several deaths in the southwestern part of the United States. Most infections result from exposure in closed spaces to active infestations of infected rodents. While there may not have been any outbreaks or notices of the virus at a particular project site, field team members should be aware of the cause and potential control methods. The Hantavirus has been shown to be transmitted through the aerosolization of dried rodent excreta. The Hantavirus-associated disease begins with one or more symptoms including fever, muscle aches, headache, and cough and progresses rapidly to severe lung disease, often requiring intensive care treatment. To control potential contact with dust that may be carrying the rodent excreta, the field team will conduct a visual survey of the area around each site to note whether rodents are thriving in the area. If it is determined that non-domesticated rodents may be living near the work area, or the area is affected by wind blowing dust into the work area, dust suppression techniques and/or respiratory protection (dust mask or dual cartridge air purifying respirator [APR] with dust filters) will be required. The Center for Disease Control, in Atlanta Georgia, has established a hotline for inquiries regarding the Hantavirus: (800) 532-9929.

Other microbiological hazards can exist at projects sites such as landfills and include yeasts from bird excrement and medical (biological) wastes. If these hazards are suspected this HSP will be updated to include specific information about the site specific conditions.

6.1.3 Confined Space Entry

No confined space entry will be performed.

6.1.4 Elevated Surfaces (Scaffolding and Ladders)

No BRC employees or contractors working on elevated surfaces or at elevated heights should be exposed to unprotected falls of four feet or greater for general work activities or six feet or greater for construction work activities. Refer to the appropriate OSHA standard for specific fall protection requirements. Where work must be performed at unprotected elevations, a job hazard analysis should be completed to identify the specific hazard, requirements, and fall protection equipment needed.

6.1.5 Temperature Extremes

Hot or cold weather is generally a consideration at any site and can not be controlled. Site workers need to be aware of controls that can reduce temperature stress, the signs and symptoms of temperatures stress, and first aid measures for victims of temperature stress.

The project site is located in Henderson, Nevada, in a typical desert climate. Average maximum temperatures exceed 80 degrees Fahrenheit in the months of May, June, July, August, September, and October. June, July, and August are the hottest months with average maximum temperatures of 100.6, 102.1, and 104.3 degrees Fahrenheit, respectively. Heat stress is a major concern at this jobsite and should be closely monitored in all field personnel. Heat stress is discussed in detail in below.

Heat Stress

The OSO shall determine the extent to which heat stress monitoring and control is needed based on the guidance provided in this section. The stress of working in a hot environment can cause a variety of illnesses including heat exhaustion or heat stroke; the latter can be fatal. PPE (i.e., U.S. Environmental Protection Agency [USEPA] Level C protection) can increase heat stress significantly. To reduce or prevent heat stress, frequent rest periods and beverage consumption to replace body fluids and salts is required. It should be noted that heat stress can occur in people wearing regular, permeable work clothing.

Quantitative physiological monitoring for heat stress may be conducted. Physiological monitoring for heat stress includes heart rate as a primary indicator and oral temperature as a secondary indicator. The frequency of monitoring depends on the ambient temperature and the level of protection used on site. To determine the initial monitoring frequency, after a work period of moderate exertion, use the table below (source, NIOSH/OSHA/United States Coast

Guard/USEPA Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities):

| Adjusted Temperature* | Level D | Level C |
|-----------------------|-------------------|-------------------|
| 90 F or above | After 45 minutes | After 15 minutes |
| 87.5 to 90 F | After 60 minutes | After 30 minutes |
| 82.5 to 87.5 F | After 90 minutes | After 60 minutes |
| 77.5 to 82.5 F | After 120 minutes | After 90 minutes |
| 72.5 to 77.5 F | After 150 minutes | After 120 minutes |

F – Degrees Fahrenheit

*Adjusted air temperature (F) = observed temp + (0.13 x percent sunshine)

Observed temp = air temperature measured with bulb shielded from radiant heat.

Percent sunshine = the time sun is not covered by clouds thick enough to produce a shadow (100 percent = no cloud cover and a sharp, distinct shadow; 0 percent = no shadows).

Heart rate: Count the radial pulse during a 30-second period as early as possible in the rest period. If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle one-third and keep the rest period the same. If the heart rate exceeds the 110 beats per minute at the next rest period, shorten the following work cycle by another one-third and also monitor oral temperature.

Oral temperature: Use a clinical thermometer (3 minutes under the tongue), temperature strip or ear thermometer to measure the temperature at the end of the work period (before drinking). If the temperature exceeds 99.6 F, shorten the next work cycle by one-third without changing the rest period. If the temperature exceeds 99.6 F at the beginning of the next rest period, shorten the following work cycle by one-third. **DO NOT** allow a field team member to wear USEPA Level C protection when the measured temperature exceeds 100.6 °F.

Personnel will pay particular attention to the information in this section in order to recognize the symptoms of heat stress and the appropriate action to take upon recognition. Even though physiological monitoring is not always necessary, it is essential that personnel understand the significance of heat stress and its recognition.

Symptoms that indicate **heat exhaustion** are:

- Clammy skin
- Weakness, fatigue
- Lightheadedness
- Confusion
- Slurred speech
- Fainting
- Rapid pulse
- Nausea (vomiting)

If these conditions are noted, the following steps should be taken:

- Remove the victim to a cool and uncontaminated area
- Remove protective clothing
- Give water to drink, if conscious.

Symptoms that indicate **heat stroke** include:

- Staggering gait
- Mental confusion
- Hot skin, high temp (yet may feel chilled)
- Convulsions
- Unconsciousness
- Incoherent, delirious

If heat stroke conditions are noted, immediately perform the following steps:

- Remove victim to a cool, uncontaminated area
- Cool the victim, whole body, with water, compresses and/or rapid fanning
- Give water to drink, if conscious
- Transport the victim to the designated medical facility for further cooling and monitoring of body functions. ***HEAT STROKE IS A MEDICAL EMERGENCY!***

Sunburns are another hazard of performing outdoor work. If hard hats are not necessary, team members should consider a brimmed hat and possibly neck flaps. Many weather reports now include an ultraviolet index to aid in the determination to apply sunscreen. When using sunscreen it is important to get one with a sun protection factor of about 30. Apply the sunscreen at least 30 minutes prior to going outdoors and reapply during the day. The OSO is responsible for ensuring that sunscreen is brought to the site and available for use.

Cold Stress

On days with low temperatures, high winds, and humidity, anyone can suffer from the extreme cold. Severe cold exposure can be life threatening. Several factors increase the harmful effects of cold: being very young or very old, wet clothing, having wounds or fractures, smoking, drinking alcoholic beverages, fatigue, emotional stress, and certain diseases and medications.

Cold weather injuries may be local or systemic. Local cold weather injuries include chilblains (chronic injury of the skin and peripheral capillary circulation) and frostbite. Frostbite occurs in three progressive stages: frostnip, superficial frostbite, and deep frostbite. Systemic cold injuries, due to hypothermia, are those that affect the entire body system. Hypothermia is caused by exposure to cold and is aggravated by moisture, cold winds, fatigue, hunger and inadequate clothing or shelter. Precautionary measures that will be taken include:

- Providing field shelters or wind screens.
- Monitoring temperature and wind speed to determine appropriate cold stress personal safety measures.

- Adjusting work schedule based on weather conditions and temperature.
- Providing insulated clothing for field workers.
- Adhering strictly to the buddy system so that workers can assess cold stress symptoms in their co-workers.

Frostbite Monitoring. Frostbite is a potentially crippling condition that can occur when inadequately protected skin or body parts are subjected to freezing weather. All team members should continually be alert for signs of frostbite in coworkers and bring it to the attention of the OSO. A cold feeling, pain, and numbness precede the onset of frostbite. Frostbite usually appears as gray or white waxy spots on skin. Areas most susceptible are nose, ears, and cheeks. The following steps should be taken to avoid frostbite:

- Dress warmly (avoid cotton, wear polypropylene, wool, gortex or other moisture wicking materials instead).
- Wear layers of clothes.
- Keep boots and gloves loose-fitting.
- Stay dry; carry extra clothing.
- Avoid touching cold metal with bare hands.
- Avoid spilling cold fuel, alcohol, or other liquids that freeze below 32 degrees F on your body or clothing.

If a person suffers frostbite, get them to a hospital as soon as possible. If transport to a hospital is not immediately available, get the person to a warm shelter and immediately perform the following:

- Cover exposed areas with additional clothing while still exposed to the elements.
- Wrap the person in blankets or a sleeping bag.
- Give the person warm drinks (no liquor).

- Undress the frozen part and submerge the frozen part in a tub of warm water (102° F to 105°F), or put the frostbitten person in a large tub of warm water, if available, and stir the water.
- Warm with skin to skin contact, such as placing warm hands on frozen nose or ears, but do not rub.
- Get the person to a hospital as soon as possible.

Do **not** allow the following to occur:

- Do not rub the frozen part.
- Do not give the person liquor.
- Do not allow the person to walk on thawed feet.
- Do not let the person smoke.
- Do not break any blisters that may form.
- Do not let the thawed part freeze again.
- Do not warm the frozen part in front of a source of dry heat (open fire, oven, etc.).

Hypothermia Monitoring. Hypothermia is a lowering of the body's temperature due to exposure to cold or cool temperatures. All team members should continually be alert for signs of hypothermia in co-workers and bring it to the attention of the OSO. Most cases of hypothermia occur at temperatures between 30 degrees F and 50 degrees F. If not properly treated, hypothermia can cause death. Safety equipment for hypothermia should include a synthetic sleeping bag and a hypothermia thermometer. ***HYPOTHERMIA IS A MEDICAL EMERGENCY!*** Transport to a hospital as soon as possible, even if victim appears to be recovering.

To prevent hypothermia:

- Eat well prior to exposure.
- Dress warmly (avoid cotton, wear polypropylene, wool, gortex or other moisture wicking materials instead).

- Avoid becoming wet due to sweating, rain or snow, or falling in water.

Early signs of hypothermia may include:

- Violent shivering.
- Slurred speech.
- Decrease in coordination.
- Confusion, inability to answer simple questions.
- Unusually irritable behavior.
- Strange behavior.
- Tendency to drop or lose clothing or equipment.

As hypothermia progresses into more serious stages victims typically:

- Develop trouble seeing clearly.
- Become sleepy and numb.
- Move with difficulty.
- Eventually become unconscious, if not properly cared for.

The following actions should be taken to treat a hypothermia victim:

- Get the victim to a warm, dry shelter as soon as possible.
- Remove any wet or cold garments and dry the person thoroughly.
- Wrap the victim in blankets, sleeping bags or dry clothing to prevent more heat loss.
- If a warm area is not available:
 - Build a shelter and put the victim in the warmest, driest area available.
 - Remove any wet or cold garments.

- Have one or more persons remove their clothing and lay next to the victim, providing skin to skin contact.
- Wrap the victim and rescuers in dry warm blankets, sleeping bags or clothing.
- When the victim becomes conscious, place warm objects along the victim's sides to warm vital areas.
- When the victim is able to swallow easily, provide warm, sweetened drinks and food (preferably candy or sweetened food).
- Do not give the victim alcohol or allow to smoke.
- Do not rub the victim's skin.
- Keep checking the victim and give additional assistance as needed.

6.1.6 Severe Weather

While each project site will be subject to varying types of weather conditions, this section provides general information and controls on several types of severe weather.

Lightning. If a lightning storm is suspected or observed, all site activities must be stopped, and site equipment must be evaluated for its potential for acting as a lightning rod. Drill rig masts provide conduits for lightning to strike and injure workers. Personnel should wait indoors for the storm or lightning event to end. If the strike of lightning occurs and personnel are out in the field, the response should be to disband from one another and lay low to the ground by dropping to your knees and bending forward with your hands wrapped around your knees, away from any poles or trees.

Persons struck by lightning receive a severe electrical shock and may be burned, but they carry no electrical charge and can be handled safely. Someone who appears to have been killed by lightning often can be revived by prompt action. Those unconscious but breathing probably will recover spontaneously. First aid and CPR should be administered as appropriate until medical assistance arrives. Realize that victims who appear to be only stunned or otherwise unhurt also need attention. Check for burns, especially at fingers and toes and next to metal buckles, jewelry, or personal items that the victim is wearing. Remember to treat for shock.

Tornadoes. Tornadoes usually develop from thunderstorms and normally occur at the trailing edge of the storm. Most tornadoes occur in the months of May, June, and July in the late afternoon and early evening hours. When storms are predicted for the project areas, monitor weather conditions on a radio. A tornado watch is issued when favorable conditions exist for the development of a tornado. A tornado warning is issued by the local weather service office whenever a tornado has actually been sighted or is strongly indicated by radar.

If a tornado warning is issued, seek shelter immediately. If there are permanent buildings located on site, go there immediately, moving toward interior hallways or small rooms on the lowest floor. If you are in a vehicle or a site trailer, leave and go to the nearest building. If there are no buildings nearby, go in the nearest ditch, ravine, or culvert, with your hands shielding your head. If a tornado is sighted or a warning issued while you are in open country, lie flat in a ditch or depression. Hold onto something on the ground, such as a bush or wooden fence post, if possible.

Once a tornado has passed the site, site personnel are to assemble at the designated assembly area to determine if anyone is missing or injured. Administer first aid and seek medical attention as needed.

Winter Storms. When snow or ice storms are predicted for the project area, site personnel should monitor radio reported weather conditions. A winter storm watch is issued when a storm has formed and is approaching the area. A winter storm warning is issued when a storm is imminent and immediate action is to be taken.

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

- Stay in the vehicle. Disorientation comes quickly in blowing and drifting snow.
- Wait for help.
- Keep a window open an inch or so to avoid carbon monoxide poisoning.
- Run the engine and heater sparingly.
- Keep watch - do not let everyone sleep at the same time.

- Exercise occasionally.

6.1.7 Radiation Hazards

Gross alpha radiation has been detected at the site in concentrations ranging from 15 to 50 picocuries per liter. A radiation survey meter capable of measuring alpha radiation will be used onsite to monitor radiation levels. Action levels for upgrading to Level C PPE will be set at 10 times the background radiation levels (background radiation levels are typically 0.02 to 0.04 milliRem per hour). The action level shall not exceed 2 milliRem per hour at any time. In addition, gross alpha particles usually adhere to solids, therefore dust generation should be minimized during field activities. Use of water to minimize dust generation may be used, as needed.

6.1.8 Traffic Safety

Where exposed to vehicle traffic, it is necessary for employees on foot to remain aware of vehicle traffic and to wear a high-visibility safety vest. Where BRC or contractor employees must block active roadways to perform their work activities, personnel will establish traffic control in accordance with the Department of Transportation Manual on Uniform Traffic Control Devices, Part IV. (See <http://mutcd.fhwa.dot.gov/pdfs/2003/Ch6A-E.pdf> or contact the BRC Project Manager for assistance.)

6.2 THE BUDDY SYSTEM

The “buddy” system will be used at all times when employees are within an exclusion or contamination reduction zone. The “buddy” system is a method of organizing work groups so that there is someone that is always available to:

- Provide his or her partner with assistance in an emergency.
- Observe his or her partner for signs of chemical or physical exposure.
- Periodically check the integrity of his or her partner’s PPE.
- Notify the emergency response personnel when an emergency situation occurs.

The “buddy” system usually requires that two or more people work within visual range from one another. However, the “buddy” system can include radio contact if site conditions are such that a person could otherwise work alone. In order to deviate from the “buddy” system, an explanation

of the specific task to be completed is required, along with a procedure for assuring that single person work parties are safe. Any deviations from the “buddy” system as it is described here will be presented.

6.3 SITE WORK ZONES

USEPA suggests that contaminated work sites be divided into three working zones: exclusion (hot or work) zone, CRZ, and support (cool) zone. Site work zones are discussed below and a generic representation is depicted in Figure 2.

6.3.1 Exclusion Zone

The exclusion zone is the zone where contamination or potential contamination exists. Because this zone has the potential for workers to be exposed to contaminants, all field staff entering this zone will wear the appropriate PPE, and adhere to the training and medical surveillance requirements presented in Sections 7 and 9 of this document. Field personnel will enter and exit the exclusion zone through an identified entry/exit point. Gross decontamination will take place near the “hotline,” before proceeding to the CRZ. The exclusion zone will be demarcated by using lines, traffic cones, hazard tape and/or signs, or enclosed by physical barriers, such as chains, fences or ropes.

6.3.2 Contamination Reduction Zone

The CRZ is either a zone or the entry/exit point of the exclusion zone where field staff and equipment will undergo gross decontamination. This zone or point is located between the exclusion and support zones. The CRZ will serve as a buffer to further reduce the probability of the clean zone becoming contaminated or being affected by other existing hazards. In most Level D projects, the CRZ is simply the entry/exit point to the exclusion zone. In Levels C or B it is an actual zone.

Initially, the CRZ will be considered to be a noncontaminated area. As operations proceed, the area around the decontamination station may become contaminated, but to a much lesser degree than the exclusion zone. At the boundary between the exclusion and the CRZ, decontamination stations will be established, one for personnel and one for heavy equipment. Personnel assisting with decontamination will wear a level of PPE at or one below that used by personnel in the exclusion zone.

6.3.3 Support Zone

The support zone, the outermost part of the regulated area, is free from recognized site hazards. Support equipment such as a command post, site vehicles, and paperwork stations will be located in this area. Since normal work attire is appropriate within this zone, potentially contaminated personal protective clothing, equipment and un-containerized samples will not be permitted.

The location of support facilities in the support zone should be set up, to the extent possible at the site, upwind, uphill and where people would logically congregate in an emergency evacuation scenario. When the CRZ is actually a zone, specific entry and exit points shall be identified from the support zone.

6.3.4 Site Security

Site control at project sites will vary from no controls to strict property perimeter controls. When possible, BRC personnel will be requested to investigate any suspicious activities at the field sites. In some cases an independent security watch may be needed. Security at the sites will be the responsibility of BRC during nonactivity times (including weekends).

To maintain security at the sites during working hours, the OSO will:

- Control all site entrances/exits through the support zone via appropriate barricades, signs, and/or signal lights.
- Require field team members to sign in on the daily tailgate safety meeting form and require visitors to sign in on the visitor log.
- Utilize temporary fencing, where feasible and necessary.
- Post warning signs around the perimeter of the support zone, should the use of temporary fencing be infeasible or insufficient.

To maintain security during nonworking hours, the OSO will secure the site prior to leaving at the end of a working day. All equipment and supplies will be secured or stored in locked facilities, and open holes and trenches will be covered with plywood or similar materials.

6.3.5 Communication Systems

Two general types of communications systems should be available for all workers assigned to field projects. One system will ensure adequate communication between site personnel, and the other will ensure the ability to contact personnel and emergency assistance off the site. On-site communications are generally audible and/or visual. Off-site or communications among several sites at one project location or property is usually accomplished with electronic devices such as radios or cell phones. Any deviations from these standard modes of communication must be pre-arranged.

Common types of internal communications include conversation, noisemakers (horns, bells) or hand signals. The common hand signals are provided below:

| Signal | Interpretation |
|---|------------------------------------|
| Hand gripping throat | Respirator problems, can't breathe |
| Grip team member's wrist or place both hands around waist | Leave site immediately; no debate! |
| Thumbs up | OK, I'm all right; I understand |
| Thumbs down | No, negative |
| Hands on face | Put on respirator |

SECTION 7

7 PERSONAL PROTECTIVE EQUIPMENT

Work conducted as part of a HAZWOPER program must meet a minimum level of personal protection. OSHA and the USEPA have identified standard levels of PPE, a description of USEPA Levels A, B, C and D (Figure 3) are provided below of the standard part of this HSP. This section indicates the specific PPE ensembles for work at the site.

The proper selection, fit-testing, use, maintenance, disposal and limitations of each piece of PPE shall be reviewed during the training programs described in Section 4. These training topics should be reviewed periodically during tailgate safety meetings. All respiratory protective equipment, APR or supplied air respirators, shall be National Institute for Occupational Safety and Health (NIOSH) approved. All footwear, hard hats and safety glasses/goggles shall be American National Standards Institute (ANSI) approved. There is no longer an OSHA prohibition for the use of contact lenses with respiratory protective devices. Individuals who feel that the contact lens provides them superior vision and comfort may use them on site and with respirators.

All of the work conducted at the site is anticipated to be completed in Level D PPE. Level C PPE information is provided herein in the event that site conditions warrant upgrade. Level B conditions will require work to stop until the situation is evaluated and an addendum prepared for work to continue safely.

The standard PPE ensemble for work is Level D as specified below. Tasks with a deviation from the standard are listed in the table, with only the changed information. If a sign posted by the OSO indicates that a piece of PPE is needed, obey the posted sign regardless of what the task is or the table below indicates.

7.1 STANDARD LEVEL D PPE

The following items must be available for use during all field programs. Individual items may not be necessary if the hazard is not present (e.g., no overhead machinery or hazards means no hard hat required, unless posted signs state the area as hard hat required, or moving heavy equipment is present). It is acceptable when exposures above occupational exposure limits are not anticipated, immersion or engulfment is not expected and the atmosphere contains between 19.5 and 22 percent oxygen.

The standard Level D PPE ensemble includes:

| Item | Description |
|---------------------------|---|
| Boots | Steel-toed work boots or steel toed rubber or polyvinyl chloride (PVC) boots. |
| Clothing | Dedicated work clothing includes long pants, long sleeve shirts, or coverall. Can be cotton, poly-cotton blend or Tyvek. If splashing occurs during well development or groundwater sampling, workers handling the task shall incorporate a coated tyvek coverall for that task only. |
| Gloves | Thin nitrile gloves (e.g., N-Dex) when handling potentially contaminated soil, water, debris, equipment or articles. Heavy work gloves are to be available for handling sharp objects or when using a sharp cutting tool. |
| Safety glasses | Side shields (plain or sun glass tint depending on brightness). |
| Hard hat | When overhead hazard or working around heavy equipment (ANSI Z89.1). |
| Safety vest | Brightly colored traffic-type safety vest when working in roadways or around moving heavy equipment. |
| Hearing protection | When working in areas where noise levels exceed 85 decibels on the “A” weighted scale (dBA). If unsure, have the task or area tested. A rule of thumb is having to shout to be heard at a distance of 3 feet. |

The only recognized modified Level D PPE ensemble is a standard Level D ensemble changed to accommodate biological hazards (e.g., Hantavirus, bird droppings). If there is documented evidence or a strong likelihood that a microbial hazard exists, the need for respiratory protection (APR, half-face or full-face, with either a dust filter [any N, R or P series filter] or high efficiency particulate air [HEPA], now referred to as P100, filter) will be indicated. Otherwise, employees may opt to wear an APR to protect against potential microorganisms that may be present at the site.

7.2 STANDARD LEVEL C PPE

In the event that air monitoring indicates the need to upgrade into Level C PPE, additions shall be made to the existing standard Level D PPE ensemble. A half-facepiece or full-facepiece APR will be used in combination with organic vapor/acid mist/P100 (yellow stacked with purple cartridges). The cartridges should be changed every hour of active use. Double gloves with thin Nitrile under thick Nitrile will be worn and taped to the sleeves of a disposable coverall. Either

boot covers, with substantial tread, or PVC or rubber steel-toed boots will be worn, taped to a disposal coverall. A poly-coated Tyvek, or equivalent, coverall will be worn.

| Item | Description |
|---------------------------|--|
| Boots | Steel-toed work boots or steel toed rubber or PVC boots. |
| Clothing | Chemical resistant coveralls as specified in Section 7.5. Cuffs duct-taped to hand and foot protection. |
| Gloves | Inner and outer chemical resistant gloves as specified in Section 7.5 to be used with work gloves and cut resistant gloves. |
| Safety glasses | Safety glasses with side shields or goggles (ANSI Z87.1). Faceshield over safety glasses or goggles, when saw cutting, working with pressure devices or when splash is likely. If corrective lenses are needed when wearing a full-face APR, brand-specific inserts must be purchased in advance. |
| Hard hat | When overhead hazard or working around heavy equipment (ANSI Z89.1). |
| Safety vest | Brightly colored traffic-type safety vest when working in roadways or around moving heavy equipment. |
| Hearing protection | When working in areas where noise levels exceed 85 decibels on the "A" weighted scale (dBA). If unsure, have the task or area tested. A rule of thumb is having to shout to be heard at a distance of 3 feet. |

The following items must be available for use during all field programs. Individual items may not be necessary if the hazard is not present (e.g., no overhead machinery or hazards means no hard hat required, unless posted signs state the area as hard hat required, or moving heavy equipment is present). It is acceptable when exposures above occupational exposure limits are not anticipated, immersion or engulfment is not expected and the atmosphere contains between 19.5 and 22 percent oxygen.

7.3 STANDARD LEVEL B PPE

Level B protection shall be used as either the initial level of PPE or when action levels specified in Section 7.5 indicate the need to upgrade from the initial level prescribed. Level B is appropriate when the types of air contaminants have not been fully identified, but skin exposure is not considered significant. This includes immediately dangerous to life and health (IDLH) and oxygen deficient atmospheres.

The standard Level B PPE ensemble generally uses the standard Level C ensemble but changes to supplied air respiratory protective equipment. The supplied air equipment can be airline or self contained breathing apparatus; however, both require the use of an emergency egress bottle. An electronic communication system should also be considered if the line of sight method of keeping track and talking will not work. Use of Level B PPE requires that at least one person be available as a backup, ready to provide emergency assistance and to assist with the air supply.

7.4 STANDARD LEVEL A PPE

Level A is not permitted under this HSP. Should Level A conditions arise, work shall stop and an amendment to this HSP developed to adequately address the increased hazards, protective gear and site personnel.

7.5 EXPOSURE ASSESSMENT AND AIR MONITORING

This section describes the exposure assessment methodology for field work. Cartridge change out schedules are based in part on the USEPA Personal Protection and Safety document, *Chapter 2 Air-Purifying Respirators* and the studies conducted on generic cartridges. The common pieces of instrumentation are listed below.

- Photoionization detector (PID) with a 10.2 or 10.6 electron volt (eV) probe (calibrated to 100 parts per million [ppm] isobutylene), or flame ionization detector (FID) (calibrated to 25 ppm methane) that can be interchanged with a PID at any time.
- Radiation survey meter capable of measuring gross alpha radiation.
- Benzene specific monitoring: Draeger Chip Measurement System (CMS) with benzene chip or UltraRAE PID with benzene filter tube.
- Chloroform specific monitoring: Draeger CMS with chloroform chip.
- Chloroform specific monitoring: Draeger CMS with chloroform chip.
- Vinyl Chloride / 1,1-dichloroethene (DCE) specific monitoring (possibly): Colorimetric detector tubes for vinyl chloride (used for measuring 1,1-DCE also), Draeger tube Vinyl Chloride 0.5/b 8101721, Draeger CMS or UltraRAE PID with halocarbon filter tube). Note, this is a conservative monitoring method performed for chlorinated solvents of concern, including 1,2-dichloroethane.

- Combination combustible gas indicator (CGI) (indoor drilling use) provides reading in percent of the lower explosive limit (LEL)/oxygen meter/hydrogen sulfide meter (calibrated with specific span gas for the meter that includes testing the sensors for flammability, oxygen concentration and hydrogen sulfide)
- Dust meter (possibly)
- Sound Level Meter or Dosimeter (possibly)

While the contamination at the site poses an environmental hazard, the concentrations of the chemicals are not in the range to pose a significant occupational health hazard (i.e., they are below OSHA, NIOSH, and American Conference of Governmental Industrial Scientists [ACGIH] exposure limits).

| Activity | Instrument | Action Level |
|---|--|--|
| Site Reconnaissance Walks | Not Required | Not Applicable |
| Rig Drilling, Soil Sample Collection, Well Installation | <ol style="list-style-type: none"> 1. PID, have on hand vinyl chloride/1,1-DCE measuring devices 2. Radiation survey meter. 3. CGI, use during active drilling indoors only. 4. Noise meter if not automatically wearing hearing protection 5. Dust meter if visible dust can not be controlled | <ol style="list-style-type: none"> 1. PID <ul style="list-style-type: none"> • ≥ 1 ppm sustained for 15 minutes: collect vinyl chloride/1,1-DCE measurement. • If ≥ 1 ppm on the vinyl chloride/1,1-DCE upgrade to Level C. • If no reading on the vinyl chloride/1,1-DCE instrument(s) upgrade to Level C at 15 ppm. • At 150 ppm on the PID stop work and contact the PSO. 2. Radiation survey meter <ul style="list-style-type: none"> • At 10 times background level upgrade to Level C. Note: background gross alpha is typically between 0.02 and 0.04 milliRem per hour. • At 2 milliRem per hour stop work and contact the PSO. • Implement dust suppression during all activities, as needed, to lower gross alpha concentration. 3. CGI: $> 10\%$ LEL stop work and contact the PSO 4. Dust: If unable to control visible dust, implement dust suppression (e.g., water spray). If still visible get dust meter and |

| Activity | Instrument | Action Level |
|---|---|---|
| | | <p>upgrade to Level C. At 10 milligrams per cubic meter (mg/m^3) stop work and contact the PSO.</p> <p>5. Noise: > 85 dBA wear hearing protection.</p> |
| Groundwater Well Development, Hydraulic Testing, Groundwater Sampling | <ol style="list-style-type: none"> PID, have on hand vinyl chloride/1,1-DCE measuring devices Radiation survey meter. CGI, use if gasoline or diesel powered generators or other exhaust-emitting equipment is used indoors Noise meter if not automatically wearing hearing protection | <ol style="list-style-type: none"> PID <ul style="list-style-type: none"> ≥ 1 ppm sustained for 15 minutes: collect vinyl chloride/1,1-DCE measurement. If ≥ 1 ppm on the vinyl chloride/1,1-DCE upgrade to Level C. If no reading on the vinyl chloride/1,1-DCE instrument(s) upgrade to Level C at 15 ppm. At 150 ppm on the PID stop work and contact the PSO. Radiation survey meter <ul style="list-style-type: none"> At 10 times background level upgrade to Level C. Note: background gross alpha is typically between 0.02 and 0.04 milliRem per hour. At 2 milliRem per hour stop work and contact the PSO. CGI: > 10% LEL stop work and contact the PSO Noise: > 85 dBA wear hearing protection. |

7.6 ACTIVITY HAZARD ANALYSIS

Activity Hazard Analyses summarize the text herein and identify specific physical hazards associated with site tasks. Table 2 presents Activity Hazard Analyses for the work tasks listed below:

- Site reconnaissance walks;
- Rig drilling, soil sample collection, well installation;
- Groundwater well development, hydraulic testing, and groundwater sampling

SECTION 8

8 PERSONNEL AND EQUIPMENT DECONTAMINATION

Decontamination procedures are implemented to control potential migration of chemicals or other site contaminants to clean areas, and to prevent personnel exposure to chemicals or pathogens that may contaminate clothing or protective gear. ***Personnel entering exclusion zones during field activities must decontaminate upon exit from the exclusion zone.*** Any material that is generated during decontamination procedures will be labeled and stored until final disposal arrangements are made.

Standard decontamination materials and procedures are included in this section. Deviation from the standard protocol will be identified.

8.1 PERSONNEL DECONTAMINATION

All personnel will go through decontamination before leaving the exclusion zone. This requires that at a minimum, people wash their hands (and face optional) with soap before eating, drinking (unless specific procedures are in place to ensure that a drink can be taken without the possibility of contamination), and before leaving the CRZ or line. Personnel also will go through decontamination if their protective clothing becomes torn. Personnel may return to the exclusion zone after changing into clean protective gear. The standard decontamination procedures for Level D and Level C field work are provided in Table 3. Typical materials needed for decontamination include the following:

- Plastic sheeting or trash bags to place things on
- Plastic buckets
- Spray bottles for soap and water
- Long handled, soft bristled brushes
- Hand soap
- Detergent like Alconox
- Water
- Paper towels

- Clean sealable plastic bags for respirator storage
- Steam cleaning equipment

8.2 GENERAL DECONTAMINATION PROCEDURES

The following decontamination procedures and guidelines shall be implemented:

- Any respirators used will be inspected and washed in soapy water, if necessary, at least at the end of each work shift. All respirators used will be disinfected with sanitary wipes or sanitizer solution every day. All respirators will be stored in sealable plastic bags in a location that is free from chemical or biologic hazards and temperature extremes.
- The decontamination sequence will be designed to prevent or minimize direct contact with waste materials.
- Use of disposable protective clothing will eliminate the need for extensive decontamination procedures and subsequent evaluation of the effectiveness of decontamination procedures. Thus, disposable items shall be chosen when feasible.
- Nondisposable clothing will either be decontaminated on site or taken offsite for laundering.

8.3 EMERGENCY DECONTAMINATION

It is not anticipated that emergency decontamination of heavy equipment will be necessary. Emergency decontamination of site personnel may be necessary for medical reasons or in the event of major contamination by contact with contaminated material. Emergency procedures will include:

- Assistance by on-site personnel for removal of contaminated protective clothing.
- If the employee is injured and cannot be moved, attempts will be made to cut away any contaminated clothing for removal.
- If the situation is life-threatening, decontamination or removal of protective clothing must still be considered. Many hospital emergency rooms and ambulance services will not risk putting the facility out of service due to decontamination issues. Thus, in order to minimize the spread of contaminants, contaminated personnel will be wrapped in blankets and/or plastic sheeting (maintaining an open airway) during transport to the emergency treatment

facility. Emergency personnel will be notified of the nature of the contaminated material so that necessary protective measures can be taken by emergency personnel.

- If the employee can walk or be moved without injury, all affected skin areas should be washed thoroughly with soapy water and rinsed.
- Equipment will be disposed in appropriate collection containers.

8.4 EQUIPMENT DECONTAMINATION

Equipment used in the exclusion zone in areas where contact with site contaminants is likely will be protected from contamination by measures such as enclosure in plastic bags, or by preventing contact with contaminated materials. Equipment decontamination will be determined by the nature and extent of contamination. Employees engaged in equipment and vehicle decontamination will wear adequate PPE to protect from splashes.

Heavy equipment and vehicles involved with site work or construction associated with potentially contaminated material will be decontaminated in a designated decontamination area. In some cases a centralized decontamination pad will be available and will require gross decontamination (brushing off mud or clumps) in the exclusion zone. Most pieces of heavy equipment are steam cleaned.

8.5 DECONTAMINATION WASTE HANDLING AND DISPOSAL

Wastes generated as a result of site activities will be handled in accordance with applicable environmental regulations. Unless otherwise specified, water used during personnel decontamination activities will be considered contaminated. Investigation derived wastes and contaminated site materials will be handled and disposed of in accordance with the provisions of an accompanying work plan or BRC specifications. Unless, specifically stated, personnel are to treat decontamination wastes as part of the investigation or remediation derived wastes. If in doubt about what to do, ask the Field Manager or OSO.

SECTION 9

9 MEDICAL SURVEILLANCE

All personnel entering the exclusion or contamination reduction zones as defined in this HSP must be actively participating in a medical surveillance program tailored to hazardous waste operations, respiratory protection, hearing conservation and any site-specific substance-specific standards (e.g., lead, radiation, sewage). These standards have been referenced in Section 4 above for the training requirements and anything listed as a unique site condition that varies from the standard protocol.

9.1 PROGRAM ADMINISTRATION

BRC's medical surveillance program may be administered by WorkCare, an occupational medical consulting firm directed by a licensed physician, or other occupational medical service. WorkCare can be reached at:

WorkCare
333 South Anita Drive
Orange, California 92868
800-455-6155

Contractors and other site personnel shall participate in an equivalent program overseen by a licensed physician who is certified in Occupational Medicine by the American Board of Preventive Medicine, or who by necessary training and experience is Board-eligible. The medical surveillance examinations, and necessary consultations, are provided at no cost to employees.

The medical surveillance program includes the following types of examinations:

- Initial, prior to hazardous waste site activities.
- Periodic, usually annually, bi-annually for people in the field less than 30 days per year.
- Upon termination.
- Following exposure or injury.
- Additionally, as necessary, on a case-specific basis.

Prior to the examination, employees are required to complete Medical Surveillance Forms, including the OSHA Respirator Medical Evaluation Questionnaire. Examinations are scheduled by WorkCare or other occupational medical service at clinics set up to process employees in accordance with a standard protocol and send biological samples to a contracted laboratory. Each examination record is reviewed by a WorkCare or other occupational health physician. Upon completion of each examination and review, a Health Status Report is issued that signifies the person is fit for duty, not fit for duty or has restrictions. A copy of the Health Status Report (or subcontractor's fitness for duty form) shall be kept in a file maintained by the OSO at the site, in addition to the home office master employee file. The home office file copy of the Health Status Report is kept for the duration of employment plus an additional 30 years.

An injury or illness (whether on or off the job) may require work restrictions after the employee returns to work. If the injury or illness required seeing a physician, either the attending physician or the physician giving the employment physical will be involved in the decision of when the employee will return to work, and if any work restrictions will apply.

9.2 STANDARD EXAMINATION PROTOCOL

The standard hazardous waste site medical surveillance examination consists of the following elements:

- Occupational and Personal Medical History Questionnaire
- Physical examination performed by a medical doctor
- Testing of vital signs
- Pulmonary Function Test
- Vision Test
- Audiogram
- X-Ray (typical frequency is every 3 years)
- Resting Electrocardiogram (EKG) (typical frequency is every 3 years)
- Laboratory blood tests

- Laboratory urine tests

9.3 NON-STANDARD EXAMINATION PROTOCOL

Any non-standard protocols will be listed. Some common non-standard examination elements include:

- Substance-specific testing (e.g., lead/zinc protoporphyrin, asbestos).
- Radiation counts.
- Optional immunizations for working with sewage (e.g., Hepatitis A, Hepatitis B, Tetanus).
- International travel vaccines.
- Tests consistent with employee complaints of exposure to chemicals of concern at the site.
- Substance abuse testing –BRC and contractor employees will adhere to a strict Substance Abuse Policy. The substance abuse testing program is administered by WorkCare.

9.4 EMERGENCY MEDICAL ASSISTANCE AND FIRST AID

Prior to work start-up, an emergency medical assistance network will be established. The Fire Department, ambulance service, and clinic or hospital emergency room are identified in Section 10 of this HSP. A vehicle shall be available on site during all work activities to transport injured personnel to the identified emergency medical facility if an ambulance is clearly not needed.

The OSO shall ensure that, when necessary, an ample supply of the following is available for all site personnel:

- Insect repellent, with active ingredient N,N-diethyl-m-toluamide (DEET) at about 30 percent.
- Ivy Block, Tecnu, or equivalent, barrier or washing cream for work around poison ivy, poison oak or poison sumac as well as itch relief products.
- Sunscreen with sun protection factor of at least 30.
- Electrolyte replacing fluids such as Gatorade, Squencher, etc.

The OSO and at least one other field team member will be certified to render both first aid and CPR. A first aid kit, including necessary protection against bloodborne pathogens, will be available at each site for use by trained personnel. Table 4 presents a list of first aid supplies that should be available for use during field work. An adequate supply of fresh potable water for emergency eye wash purposes or a portable emergency eyewash, also will be available at each site.

SECTION 10

10 EMERGENCY CONTACT INFORMATION

ALWAYS PROVIDE YOUR EXACT LOCATION TO A 911 OPERATOR

The Project Manager, or designee, will be responsible for taking necessary action and contacting the appropriate emergency contacts (e.g., BRC Project Manager, contractor) and BRC or contractor employees in the event of an emergency. The following are contacts for emergencies that may occur during fieldwork activities in the BMI Common Areas:

10.1 SITE-SPECIFIC INFORMATION

Site Location: Basic Management Incorporated Site
Between Pabco Road and East Lake Mead Drive,
north of North Boulder Highway
Henderson, Nevada

10.2 24-HOUR EMERGENCY HOSPITAL

St. Rose Dominican Hospital-Rose de Lima Campus
102 East Lake Mead Drive at Boulder Highway
Henderson, Nevada 89015
Phone: (702) 616-5000

Directions (See Figure 4 Hospital Route Map). Start on Pabco Road, going South from the site (towards Lake Mead Dr.). Pabco Road becomes West Warm Springs Road, continue. Turn left (Southeast) on North Boulder Highway. Turn right (Southwest) on East Lake Mead Drive. The hospital is on the right (North) side of the street.

10.3 BRC AND CONTRACTOR PERSONNEL CONTACT LIST

Personnel and Emergency Reporting:

| Position | Name | Phone Number(s) |
|-----------------|-------------|------------------------|
| | | |
| | | |
| | | |

10.4 24-HOUR EMERGENCY HOSPITAL

Emergency Contact Numbers

| | |
|-------------------------------------|--------------|
| Ambulance | 911 |
| Fire Department | 911 |
| Police Department | 911 |
| Poison Control | 800-876-4766 |
| National Response Center | 800-424-8802 |
| Utilities Underground Service Alert | 800-227-2600 |

SECTION 11

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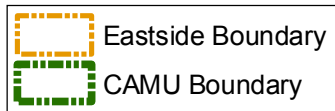
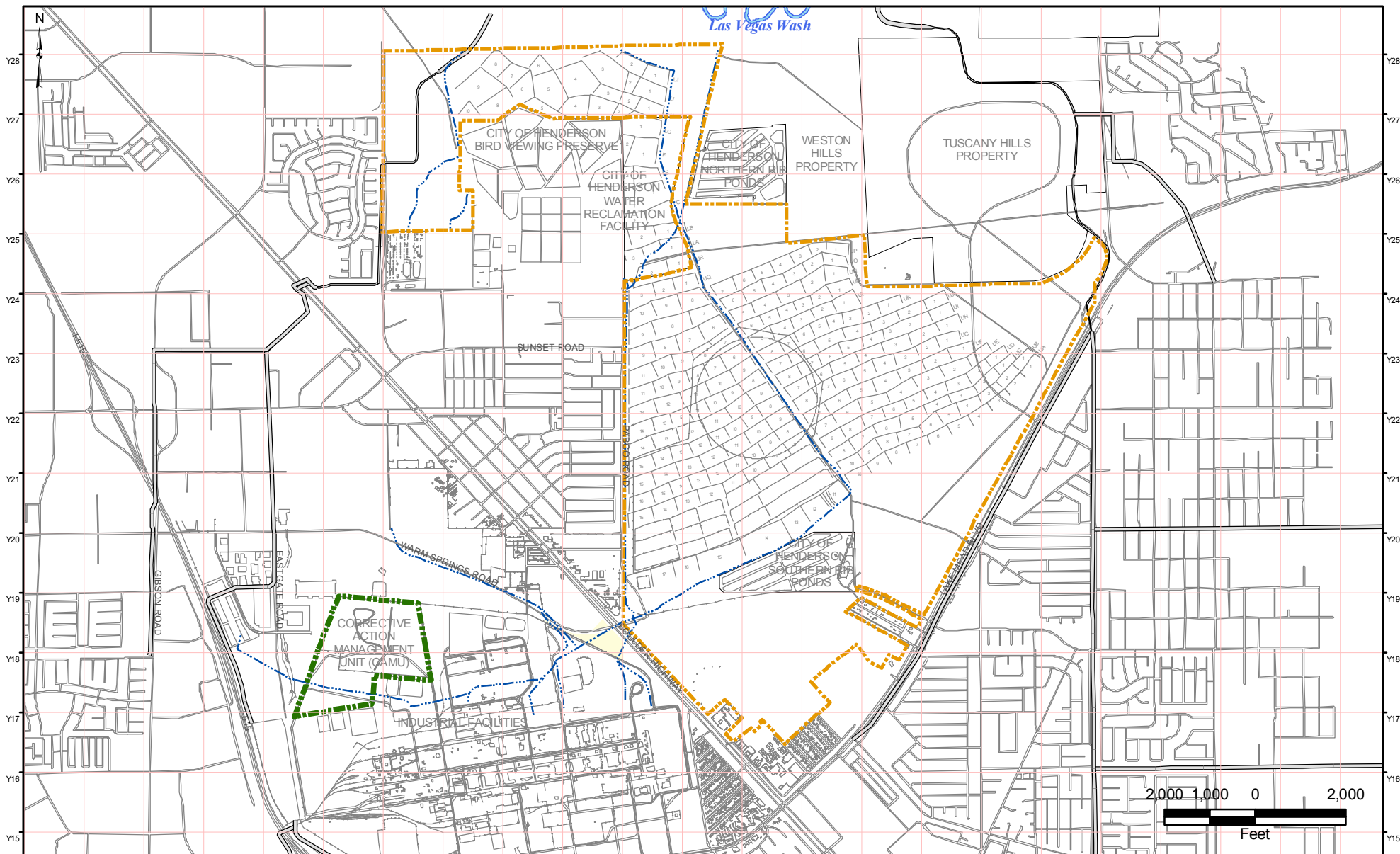
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FIGURES



Corrective Action Management Unit (CAMU)
BMI Complex, Henderson, Nevada

FIGURE 1
SITE LOCATION MAP



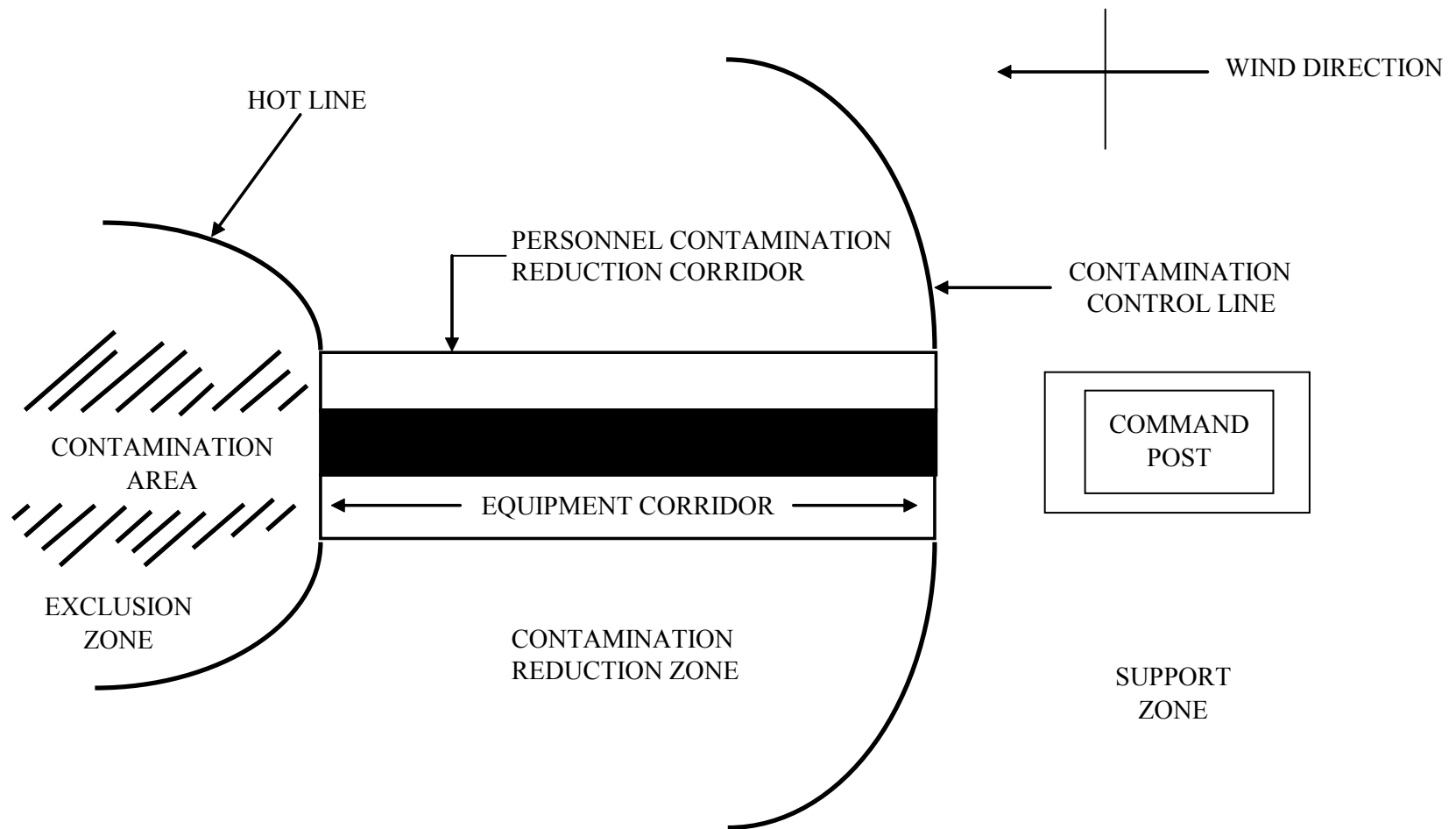
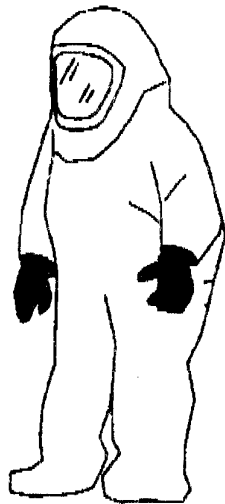
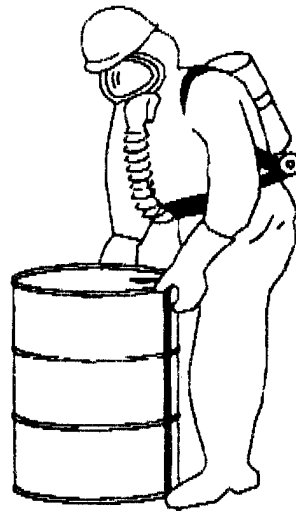


DIAGRAM OF LEVEL A, B, C, AND D SITE ZONES
 (NOTE: LEVEL D SITE ZONES MAY NOT INCLUDE A CONTAMINATION REDUCTION ZONE)



LEVEL A Protection
Totally encapsulating
vapor-tight suit with full-
facepiece SCBA or
supplied-air respirator.



LEVEL B Protection
Totally encapsulated suit
does not have to be vapor
tight. Same level of
respiratory protection



LEVEL C Protection
Full-face canister air
purifying respirator.
Chemical protective suit
with full body coverage.



LEVEL D Protection
Basic work uniform, i.e.
longsleeve coveralls,
gloves, hardhat, boot,
faceshield or goggles.

Corrective Action Management Unit (CAMU)
BMI Complex, Henderson, Nevada

FIGURE 3

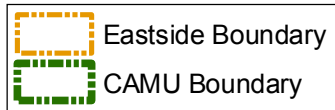
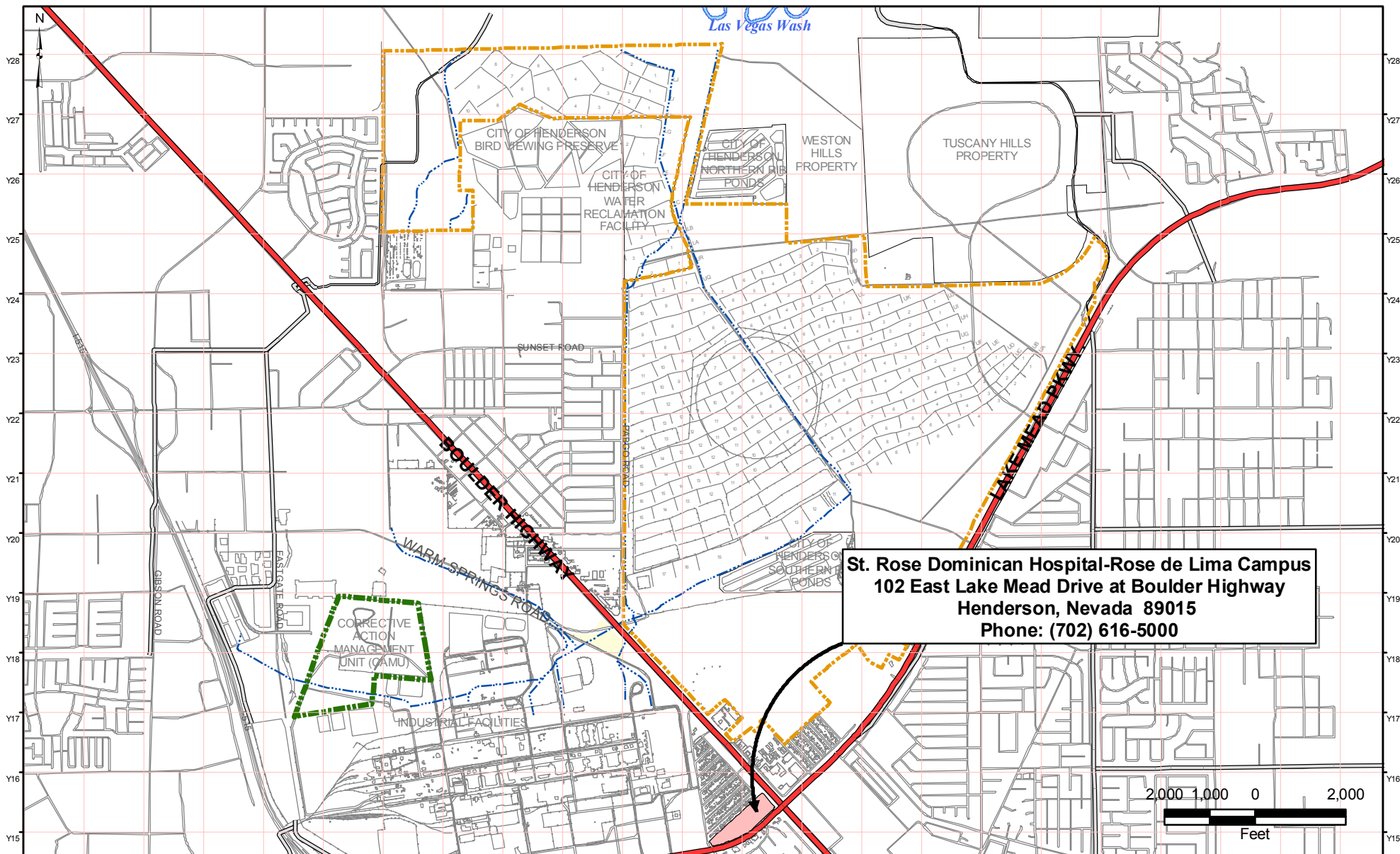
**SAMPLE PROTECTIVE
EQUIPMENT ENSEMBLES**



Prepared by:
MWH MKJ

Date
10/07/05

JOB NO.: 1881262
FILE: GIS/BRCHSP/FIGURE_3.AI



Corrective Action Management Unit (CAMU)
BMI Complex, Henderson, Nevada

FIGURE 4
HOSPITAL ROUTE MAP



Prepared by: MWH Date: 10/07/05

JOB NO.: 1881262
FILE: GIS/BRCHSP/FIGURE_4.MXD

TABLES

TABLE 1
OCCUPATIONAL HEALTH EXPOSURE AND TOXICOLOGICAL PROPERTIES FOR
CONTAMINANTS OF OCCUPATIONAL HEALTH CONCERN

| Contaminant | OSHA PEL | NIOSH REL | ACGIH TLV | ACGIH/OSHA STEL | OSHA/NIOSH IDLH | IP eV | Vapor Pressure (mmHg) | Route of Exposure | Symptoms of Exposure |
|-----------------------------|---------------------------------------|------------------------------|------------------------|-----------------|-----------------------|-------|-----------------------|--------------------|--|
| 1,1-DICHLOROETHANE | 100 ppm | 100 ppm | 100 ppm | NA | 3,000 ppm | 11.06 | 182 | INH, ING, CON | Central nervous system depression; skin irritant; liver and kidney damage. |
| 1,2-DICHLOROETHANE | 1 ppm | 1 ppm Ca | 10 ppm | 2 ppm | 400 ppm | 11.05 | NA | INH, CON, ING, ABS | Central nervous system depression; nausea, vomiting; dermatitis; eye irritant; corneal opacity; CARCINOGEN |
| 1,2-DICHLOROBENZENE (ORTHO) | 50 ppm Ceiling | 50 ppm Ceiling | 25 ppm | 50 ppm | 200 ppm | 9.06 | 1 | INH, ING, CON, ABS | Irritant to eyes, nose; liver and kidney damage; skin blisters. |
| 1,3-DICHLOROBENZENE (META) | No occupational exposure values exist | | | | | NA | NA | NA | NA Used as a fumigant and insecticide. |
| 1,4-DICHLOROBENZENE (PARA) | 75 ppm | Carcinogen (Lowest feasible) | 75 ppm | 110 ppm | 150 ppm | 8.98 | 1.3 | INH, ING, CON | Headache; eye irritation, periorbital swelling, profuse rhinitis; anorexia, nausea, vomiting; low-weight, jaundice; CARCINOGEN. |
| ANTIMONY | 0.5 mg/m ³ | 0.5 mg/m ³ | 0.5 mg/m ³ | NA | 50 mg/m ³ | NA | NA | ING, CON | Irritant to nose, throat, mouth; cough, dizziness, headache, nausea, vomiting, diarrhea, stomach cramps, insomnia, anorexia, irritant to skin; unable to smell properly. |
| ARSENIC | 0.01 mg/m ³ | 0.002 mg/m ³ | 0.01 mg/m ³ | NA | 100 mg/m ³ | NA | NA | INH, ING, CON, ABS | Ulceration of nasal septum, dermatitis, gastro-intestinal disturbances, peripheral neuropathy, respiratory irritant, hyperpigmentation of the skin, CARCINOGEN. |

INH = Inhalation ING = Ingestion ABS = Skin Absorption CON = Skin or mucous membrane contact
 NA = Not applicable or available Ca = NIOSH considered carcinogen CNS = Central Nervous System

TABLE 1
OCCUPATIONAL HEALTH EXPOSURE AND TOXICOLOGICAL PROPERTIES FOR
CONTAMINANTS OF OCCUPATIONAL HEALTH CONCERN

| Contaminant | OSHA PEL | NIOSH REL | ACGIH TLV | ACGIH/OSHA STEL | OSHA/NIOSH IDLH | IP eV | Vapor Pressure | Route of Exposure | Symptoms of Exposure |
|---|---|---------------------------------|-----------------------|-----------------|----------------------|-------|----------------|--------------------|---|
| ASBESTOS | 0.1 fibers/cc | 0.1 fibers/cc | 0.2 fibers/cc | NA | Carcinogen | NA | NA | INH, ING | Dyspnea, interstitial fibrosis, restricted pulmonary function; finger clubbing, CARCINOGEN. |
| BARIUM | 0.5 mg/m ³ | 0.5 mg/m ³ | 0.5 mg/m ³ | NA | 50 mg/m ³ | NA | Low | INH, ING, CON | Upper respiratory tract irritant; gastroenteritis; muscle spasm; slow pulse, extrasystoles; hypokalemia; irritant to eyes, skin; skin burns. |
| BHC (Benzene Hexachloride. beta and delta isomers) | There are no occupational exposure values for this material | | | | | NA | NA | INH, CON, ING, ABS | Poisoning may occur by ingestion, inhalation or percutaneous absorption. Topical use may cause local sensitivity reactions. Vapor may irritate eyes, nose and throat. |
| CARBON TETRACHLORIDE (TETRACHLOROMETHANE) | 10 ppm (5-minute max peak in any 4 hrs) | 2 ppm 60-Minutes only | 5 ppm | 2 ppm | 200 ppm | 11.47 | 91 | INH, ING, CON, ABS | Central nervous system depressant; nausea, vomiting; liver and kidney damage; skin irritant; CARCINOGEN |
| CHLOROBENZENE | 75 ppm | NA | 10 ppm | NA | 1,000 ppm | 9.07 | 9 | INH, ING CON | Irritant to the skin, eyes and nose; drowsiness; incoherence. |
| CHLOROFORM | 50 (ceiling) | Carcinogen (lowest possible) | 10 ppm | 2 ppm | 500 ppm carcinogen | 11.42 | 160 | INH, ING CON, ABS | Irritant to eyes and skin; dizziness, mental dullness, nausea, confusion; headache, fatigue; anesthesia; enlarged liver; CARCINOGEN. |

INH = Inhalation ING = Ingestion ABS = Skin Absorption CON = Skin or mucous membrane contact
NA = Not applicable or available Ca = NIOSH considered carcinogen CNS = Central Nervous System

TABLE 1
OCCUPATIONAL HEALTH EXPOSURE AND TOXICOLOGICAL PROPERTIES FOR
CONTAMINANTS OF OCCUPATIONAL HEALTH CONCERN

| Contaminant | OSHA PEL | NIOSH REL | ACGIH TLV | ACGIH/OSHA STEL | OSHA/NIOSH IDLH | IP eV | Vapor Pressure | Route of Exposure | Symptoms of Exposure |
|----------------|---|-------------------------|------------------------|-----------------|-----------------------|-------|---------------------|----------------------|---|
| CHROMIUM (VI) | 0.1 mg/m ³ | 0.001 mg/m ³ | 0.05 mg/m ³ | NA | 30 mg/m ³ | NA | NA | INH, ING, CON | Respiratory system irritant, nasal septum perforation; liver, kidney damage; leukocytosis, leukopenia, monocytosis, eosinophilia; eye injury, conjunctivitis; skin ulcer, sensitivity dermatitis; CARCINOGEN. |
| CHROMIUM (III) | 0.5 mg/m ³ | 0.5 mg/m ³ | 0.5 mg/m ³ | NA | 25 mg/m ³ | NA | Depends on compound | INH, ING, CON | Irritant to eyes; sensitizer, dermatitis. |
| DDD AND DDE | No values exist for these pesticides, see DDT | | | | | | | | |
| DDT | 1 mg/m ³ | 0.5 mg/m ³ | 1 mg/m ³ | NA | 500 mg/m ³ | NA | 0.0000002 | INH, CON ING, ABS | Paresthesia tongue, lips, face; tremor; apprehension; dizziness, confusion, malaise, headache, fatigue; convulsion; paresis hands; vomiting; irritation to eyes and skin; CARCINOGEN |
| DIOXIN | Not Established | Not Established | Not Established | Not Established | Not Established | NA | NA | INH, ING, CON | Carcinogen, teratogen, potential immunotoxin, chlorachne. |

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 NA = Not applicable or available Ca = NIOSH considered carcinogen CNS = Central Nervous System

TABLE 1
OCCUPATIONAL HEALTH EXPOSURE AND TOXICOLOGICAL PROPERTIES FOR
CONTAMINANTS OF OCCUPATIONAL HEALTH CONCERN

| Contaminant | OSHA PEL | NIOSH REL | ACGIH TLV | ACGIH/OSHA STEL | OSHA/ NIOSH IDLH | IP eV | Vapor Pressure | Route of Exposure | Symptoms of Exposure |
|-------------|------------------------------------|-------------------------|------------------------|--------------------|------------------------|-------|---------------------|-----------------------|---|
| LEAD | 0.05 mg/m ³ | 0.100 mg/m ³ | 0.15 mg/m ³ | NA | 100 mg/m ³ | NA | NA | INH, ING CON | Weakness, lassitude, insomnia, facial pallor; pale eyes, anorexia; malnutrition, constipation; abdominal pain, colic, anemia; gingival lead line; tremors, paralysis of the wrist and ankles; encephalopathy; nephropathy; irritant to eyes; hypotension. |
| MAGNESIUM | 10mg/m ³ | 10mg/m ³ | 10mg/m ³ | NA | NA | NA | NA | INH, CON | Irritant to eyes, nose, metal fume fever, cough, chest pain, flu-like fever. |
| PCB | 0.5 mg/m ³ | 0.001 mg/m ³ | 0.5 mg/m ³ | NA | 5 mg/m ³ | NA | NA | INH, ING, CON, ABS | Irritant to eyes, skin; acne-form dermatitis; CARCINOGEN. |
| PERCHLORATE | No occupational limits established | | | | | | | ING | Solely an ingestion hazard-control by handwashing |
| THALLIUM | 0.1 mg/m ³ | 0.1 mg/m ³ | 0.1 mg/m ³ | NA | 20 mg/m ³ | NA | Depends on compound | INH, ING, CON, ABS | Nausea, diarrhea, abdominal pain, vomiting; ptosis, strabismus; peripheral neuritis, tremor; retrosternal tightness, chest pain, pulmonary edema; seizure, chorea, psychosis; liver and kidney damage; alopecia; paresthesia in the legs. |

INH = Inhalation ING = Ingestion ABS = Skin Absorption CON = Skin or mucous membrane contact
 NA = Not applicable or available Ca = NIOSH considered carcinogen CNS = Central Nervous System

TABLE 1
OCCUPATIONAL HEALTH EXPOSURE AND TOXICOLOGICAL PROPERTIES FOR
CONTAMINANTS OF OCCUPATIONAL HEALTH CONCERN

| Contaminant | OSHA PEL | NIOSH REL | ACGIH TLV | ACGIH/OSHA STEL | OSHA/NIOSH IDLH | IP eV | Vapor Pressure | Route of Exposure | Symptoms of Exposure |
|---------------------------------------|-----------------------|----------------------------------|------------------------|-----------------|----------------------|-------|----------------|--------------------|---|
| 1,2,4-TRICHLOROBENZENE | vacated | 5 ppm (ceiling) | 5 ppm (ceiling) | 5 ppm (ceiling) | Not determined | NA | 1 mm | INH, ING, CON, ABS | Irritant to eyes, skin, and mucous membranes, in animals causes liver and kidney damage, possible teratogenic effects |
| VANADIUM (AS VANADIUM PENTOXIDE) DUST | 0.5 mg/m ³ | 0.05 mg/m ³ (ceiling) | 0.05 mg/m ³ | NA | 35 mg/m ³ | NA | NA | INH, ING, CON | Irritant to the eyes; green tongue, metallic taste, eczema; cough; fine rales, wheezing, bronchitis, dyspnea; irritant to the throat. |

INH = Inhalation ING = Ingestion ABS = Skin Absorption CON = Skin or mucous membrane contact
 NA = Not applicable or available Ca = NIOSH considered carcinogen CNS = Central Nervous System

TABLE 2
ACTIVITY HAZARD ANALYSIS FORM

ACTIVITY: See Below

CERTIFIED BY/DATE: _____ REVIEWED BY/DATE: _____

| PRINCIPAL STEPS | POTENTIAL HAZARDS | RECOMMENDED CONTROLS |
|---|--|--|
| SONIC AND MUD ROTARY DRILLING 1. Mobilization of rig 2. Hand auger first 5 feet 3. Set up of rig 4. Set up of drill pipe/bit 5. Drilling 6. Retract drill pipe 7. Grout space 8. Cleanup and decontamination 9. Concrete coring | <p><u>Chemical/Toxicological Hazards:</u></p> 1. Potential exposure to COCs as described in the HSP. 2. Bentonite grout containing silica 3. Grout mixing operations | <p><u>Chemical/Toxicological Hazards:</u></p> 1. Air monitoring using a PID with a 10.2 or 10.6 eV probe (and a CGI if indoors) 2. Level D or C PPE as described in the HSP, upgrading or downgrading pending air monitoring results. 3. Use of fans and exhaust ducting to blow carbon monoxide out of the building and away from the workers. If working indoors |
| | <p><u>Biological Hazards:</u></p> 1. Possibly spiders, insects, snakes, or scorpions in covered areas. | <p><u>Biological Hazards:</u></p> 1. Do not reach into covered areas without first looking for signs of animals or using heavy gloves as protection. Break away webs with a stick or flashlight. |
| | <p><u>Radiological Hazards:</u></p> None associated with this program | <p><u>Radiological Hazards:</u></p> Nothing required. |
| | <p><u>Physical Hazards:</u></p> 1. Contact with overhead obstructions or underground utilities. 2. Vehicle sliding or tipping 3. Slip/trip/fall 4. Thermal stress 5. Heavy lifting 6. Pinch points to the hands 7. Being struck by equipment/vehicles 8. Being struck or caught by or between something 9. Noise 10. Flying debris to the eye 11. Rotating blade on concrete corer | <p><u>Physical Hazards:</u></p> 1. Prior to drilling an underground utility survey must be completed. Try to allow a five foot clearance to marked underground utilities. 2. Check for overhead obstructions prior to raising mast of rig. Maintain a 20-foot clearance from overhead power lines. The location of buried or underground utilities and services must be known before starting drill. 3. Always take the drill carrier unit out of gear and set emergency brake and block wheels before engaging remote ignition. Use caution when vehicle is parked on loose or soft ground. Do not apply enough force to the leveling jacks to lighten the load on the carrier vehicle suspension. Reduced weight on the vehicle tires may allow the vehicle to shift or slide on loose surfaces. Never exert downward pressure on the drill pipe so as to lift the rig off the ground. Stay away from rotating or vibrating parts. 4. For safe work practices around drilling equipment refer to Section 2.14.8.1. In general, ensure that the drilling contractor inspects the rig, keeps a tidy workplace around the rig, replaces any faulty or suspect items. Stay away from rotating or vibrating parts (ask driller to identify pinch points – do not touch anything you are not familiar with and know is safe), approach only when the operator knows you are |

TABLE 2
ACTIVITY HAZARD ANALYSIS FORM

ACTIVITY: See Below

CERTIFIED BY/DATE: _____ REVIEWED BY/DATE: _____

| PRINCIPAL STEPS | POTENTIAL HAZARDS | RECOMMENDED CONTROLS |
|--------------------|----------------------|---|
| | | <p>there (e.g., make eye contact).</p> <ol style="list-style-type: none"> 5. Be sure that the rig and support vehicles have emergency brakes set and wheels chocked. Use leveling jacks as necessary to stabilize the rig. 6. Watch where you step, be aware of uneven terrain. Keep footwear and work area free of mud and drilling fluids. Maintain 3 points of contact when mounting and dismounting rig. All unattended bore holes must be covered or filled in. 7. Refer to HSP Section 2.11 for a thorough discussion on thermal stress and severe weather. 8. When lifting, be sure to size up the load, get assistance when possible and follow proper lifting techniques. Bend at the knees, keep back with natural 'S' curve, hold load close, do not twist, ensure clear path prior to lift, straddle load, lock stomach muscles. 9. Use heavy work gloves when hand augering. Be watchful of the moving parts. 10. Ensure adequate footing; wear shoes with gripping soles. 11. Hard hat, hearing protection, steel-toed footwear and safety glasses are required while operating or working around the machine. Only one person should operate the machine. This ensures that one person will not accidentally engage the controls while an others person's hand, fingers, or other appendages are on or around any moving parts. Ensure that everyone is clear of all moving parts before starting the engine. 12. Shut down the drilling system and stop the vehicle before attempting to clean or service equipment. Do not wear loose clothing while operating or work on/near the machine. All crew members must familiarize themselves with the location of the Emergency Kill button before operating the machine. 13. Wear hearing protection near drill rigs and during concrete coring. 14. Wear safety glasses when in the exclusion zone and around concrete coring. 15. When using high pressure/temperature steam for decontamination – ensure that the person using the equipment has been trained and operates it in accordance with the manufacturer's guidelines (good idea to ask for a copy of the manual to be sure it is available for reference). Metatarsal guards may be necessary for the operation to protect against lacerations. |

TABLE 2
ACTIVITY HAZARD ANALYSIS FORM

ACTIVITY: See Below

CERTIFIED BY/DATE: _____ REVIEWED BY/DATE: _____

| PRINCIPAL STEPS | POTENTIAL HAZARDS | RECOMMENDED CONTROLS |
|--|--|--|
| <u>Equipment List:</u> <ul style="list-style-type: none"> Carrier Vehicle Drilling unit Hand auger Drill pipe and bit Hand tools Service truck | <p><u>Training:</u> As part of BRC's contractor management system, all equipment operators shall be trained and familiar with any equipment they will operate. Proof of such may be audited by BRC without prior notice.</p> <p><u>Training:</u> As part of BRC's contractor management system, all equipment operators shall be trained and familiar with any equipment they will operate. Proof of such may be audited by BRC without prior notice.</p> <p><u>Motor Vehicles</u></p> <ol style="list-style-type: none"> Before initial use vehicles will be inspected by a mechanic and found in safe operating conditions. <p><u>Equipment</u></p> <ol style="list-style-type: none"> Before equipment is placed in use it will be inspected and tested by a competent person. Inspections and test will be in accordance with manufacturer recommendations. All equipment/tools will be inspected daily (when in use) to ensure safe operating conditions. A designated competent person will conduct the daily inspections or test. The rig and all equipment used for | <p><u>Inspections:</u> BRC requires contractors using equipment to perform a daily safety inspection. Equipment must be in good and safe operating condition, with any deficiencies identified and corrected, prior to use. Contractors may use their own inspection forms, or may ask for documentation assistance from BRC. Documentation must be available for audit.</p> <p><u>Site Specific</u></p> <ol style="list-style-type: none"> General HAZWOPER (40-hour initial, plus 8-hour annual refresher). Initial site and site specific indoctrination training. Daily tailgate safety meetings Hazard Communications training for hazardous substances brought onto the job site <p><u>Supervisor Personnel</u></p> <ol style="list-style-type: none"> First Aid and CPR 8-hour HAZWOPER supervisory training <p><u>Equipment General</u></p> <p>Employees will be qualified and trained to operate or service mechanical equipment.</p> |



TABLE 2
ACTIVITY HAZARD ANALYSIS FORM

ACTIVITY: See Below

CERTIFIED BY/DATE: _____ REVIEWED BY/DATE: _____

| PRINCIPAL STEPS | POTENTIAL HAZARDS | RECOMMENDED CONTROLS |
|--------------------|---|-------------------------|
| | <p>drilling shall be inspected prior to use. Special attention shall be given to the hydraulic hoses, and fittings.</p> <p>5. Defective equipment shall not be used</p> <p>6. Inspections and test will be documented and the contractor will maintain records at the site.</p> <p><u>Safety Inspections</u></p> <p>7. The Site Safety Office will conduct daily site safety inspections to ensure that safety procedures are followed.</p> | |

TABLE 2
ACTIVITY HAZARD ANALYSIS FORM

ACTIVITY: See Below

CERTIFIED BY/DATE: _____ REVIEWED BY/DATE: _____

| PRINCIPAL STEPS | POTENTIAL HAZARDS | RECOMMENDED CONTROLS |
|--|--|---|
| GROUNDWATER LEVEL MEASUREMENTS, HYDRAULIC TESTING, AND WELL SAMPLING 1. Depth to groundwater measurement using water level probe 2. Open and close well head cover 3. Position and set up equipment 4. Decontaminate equipment with a soap, water, deionized water sequence | <u>Chemical/Toxicological Hazards:</u> 1. Potential exposure to chlorinated hydrocarbons as described in the HSP. <u>Biological Hazards:</u> 1. Possibly spiders, insects, snakes, or scorpions in covered areas. <u>Radiological Hazards:</u> None associated with this sampling program <u>Physical Hazards:</u> 1. Slip/trip/fall 2. Thermal stress 3. Heavy lifting / prolonged awkward posture 4. Pinch points to the hands 5. Hand injury from hand tools and well equipment 6. Being struck by or caught by or between something 7. Spill or damage to equipment not secured in vehicles during travel | <u>Chemical/Toxicological Hazards:</u> 1. Air monitoring using a PID with a 10.2 or 10.6 eV probe 2. Level D or C PPE as described in the HSP, upgrading or downgrading pending air monitoring results. <u>Biological Hazards:</u> 1. Do not reach into covered areas without first looking for signs of animals or using heavy gloves as protection. Break away webs with a stick or flashlight. <u>Radiological Hazards:</u> Nothing required. <u>Physical Hazards:</u> 1. Use a bucket or cooler to sit on while conducting the groundwater monitoring sample collection and parameter testing – this will take some of the pressure off of the back due to stooped or awkward posture. 2. Watch where you step, be aware of uneven terrain. 3. Refer to HSP Section 2.11 for a thorough discussion on thermal stress and severe weather. 4. When lifting, be sure to size up the load, get assistance when possible and follow proper lifting techniques. Bend at the knees, keep back with natural ‘S’ curve, hold load close, do not twist, ensure clear path prior to lift, straddle load, lock stomach muscles. 5. If working near roads or in road, wear brightly colored traffic safety vest 6. Use heavy work gloves when handling tools or equipment with sharp edges. Select hand tools carefully, considering the relative safety of the tool compared to others. Choose cutters over knives for cutting things like tubing, ties, string, etc. and make a loop and cut away from the body. Use a knife as last resort. 7. Ensure that all hoses, tubing and cords are positioned out of walkways and if they must cross a walkway they must be strung overhead or properly protected from being a trip hazard. |

TABLE 2 ACTIVITY HAZARD ANALYSIS FORM

ACTIVITY: See Below

CERTIFIED BY/DATE: _____ REVIEWED BY/DATE: _____

| PRINCIPAL STEPS | POTENTIAL HAZARDS | RECOMMENDED CONTROLS |
|--|---|---|
| | | As a standard rule of practice, ensure that items are being hauled in vehicles are secured in sturdy containers and held from sliding with bungee cords, ties, or compartments. Any compressed gas cylinders (e.g., for equipment calibration must be secured upright or in a carry case. |
| <u>Equipment List:</u> <ul style="list-style-type: none"> • Water level probe • Hand tools • Field Vehicle • Cooler with ice, sample bottles • Water quality meters • Pumps • Generator • Buckets • Decon water | <u>Training:</u> As part of BRC's contractor management system, all equipment operators shall be trained and familiar with any equipment they will operate. Proof of such may be audited by BRC without prior notice. | <u>Inspections:</u> BRC requires contractors using equipment to perform a daily safety inspection. Equipment must be in good and safe operating condition, with any deficiencies identified and corrected, prior to use. Contractors may use their own inspection forms, or may ask for documentation assistance from BRC. Documentation must be available for audit. |

TABLE 2 ACTIVITY HAZARD ANALYSIS FORM

ACTIVITY: See Below

CERTIFIED BY/DATE: _____ REVIEWED BY/DATE: _____

| PRINCIPAL STEPS | POTENTIAL HAZARDS | RECOMMENDED CONTROLS |
|---|--|---|
| SITE RECONNAISSANCE AND SURVEYS 1. Drive to individual sites. 2. Walking in unknown areas. | <u>Chemical/Toxicological Hazards:</u> No chemical hazards of concern if other invasive work is not in progress. If it is, refer to AHA Form 1. <u>Biological Hazards:</u> 1. Possibly spiders, insects, snakes, or scorpions in covered areas. <u>Radiological Hazards:</u> None associated with this program <u>Physical Hazards:</u> 1. Slip/trip/fall 2. Thermal stress 3. Sun burn 4. Heavy lifting | <u>Chemical/Toxicological Hazards:</u> No monitoring requirements; however if in an active work area, get monitoring information from the OSO <u>Biological Hazards:</u> Do not reach into covered areas without first looking for signs of animals or using heavy gloves as protection. Break away webs with a stick or flashlight. <u>Radiological Hazards:</u> Nothing required. <u>Physical Hazards:</u> 1. Wear sturdy boots with ankle support, significant tread. 2. Watch where you step, be aware of uneven terrain; no writing while walking. 3. On hot days (e.g., over 90 degrees F) wear light colored clothing and a hat (preferable one with a neck coverage), carry at least one liter of water if you will be gone more than two hours, pace accordingly. 4. Use a sun screen with a sun protection factor of at least 30. Wear sun glasses. 5. When lifting, be sure to size up the load, get assistance when possible and follow proper lifting techniques. Bend at the knees, keep back with natural 'S' curve, hold load close, do not twist, ensure clear path prior to lift, straddle load, lock stomach muscles. |
| <u>Equipment List:</u> • Field Vehicle | <u>Training:</u> As part of BRC's contractor management system, all equipment operators shall be trained and familiar with any equipment they will operate. Proof of such may be audited by BRC without prior notice. | <u>Inspections:</u> BRC requires contractors using equipment to perform a daily safety inspection. Equipment must be in good and safe operating condition, with any deficiencies identified and corrected, prior to use. Contractors may use their own inspection forms, or may ask for documentation assistance from BRC. Documentation must be available for audit. |

TABLE 3
TYPICAL LEVEL D AND LEVEL C DECONTAMINATION APPROACH

| | Purpose | Equipment | Discussion |
|-----------------------|-----------------------|---|--|
| Step 1: | Equipment Drop | Plastic Bucket or Trash Bag | Deposit equipment in plastic bucket, or in or on a trash bag to segregate from other equipment. |
| Step 2: | Gross Decontamination | Stiff Brush and/or Stick | Remove visible mud or other muck from outer clothing or equipment. |
| Step 3: (Option 1) | Hand Washing | <ul style="list-style-type: none"> a. Spray Bottle with Soap Solution b. Spray Bottle with Water c. Paper Towels | This setup is used most often for projects where field activities take place in multiple locations in one day. |
| Step 3: (Option 2) | Hand Washing | <ul style="list-style-type: none"> a. Bucket with Clean Water b. Soap Dispenser c. Paper Towels | This setup is used most often on sites where work will take place in one location for at least one day. The supplies are usually set up on a table at the “step-off” decontamination line. |
| Step 3: (Option 3) | Hand Washing | Baby Wipes | This option is used for projects where cold weather prohibits the use of water and hands are covered with both impermeable gloves and cold weather gloves. |
| Step 4: | Disposable PPE Drop | Trash Bags | This station is used to discard disposable gloves, coveralls, ear plugs, respirator cartridges, etc. |

Note:

These steps are generally considered for personnel conducting environmental sampling. Any or all of these steps may be eliminated for personnel conducting site observations that do not contact equipment or potentially contaminated environmental media.

TABLE 4
EMERGENCY SUPPLIES

FIRST AID SUPPLIES

Container that will ensure that all supplies are kept clean and sanitary
Aspirin or non-aspirin substitute
Eye drops
Burn spray or ointment
Cold spray or other topical anesthesia, anti-itch cream
Antiseptic spray, cream or ointment
Hydrogen peroxide 3% solution
Band-aids: knuckle bandaid, elastic strips (3"x7/8"), adhesive bandage (3"x3/4"), finger tip (2"x13/4")
Triangle bandage and safety pins, pressure dressings
Gauze bandages: 2 and 4 inch square pads and 1,2, and 4 inch rolls or compresses
First aid tape
Ace bandage
Clean wipes, antiseptic hand cleaner
Sterile water
Antiseptic swabs
Eye dressing packet
Instant ice packs
Cotton balls
Scissors and tweezers
Latex gloves
CPR barricade, to prevent mouth to mouth contact
Tourniquet and forceps
S.A.M. - moldable splint
Ammonia inhalant
First aid guidebook
Blankets (mylar)
Burn sheet
Plastic sheeting, to be used for wrapping a contaminated victim

OTHER EMERGENCY SUPPLIES, AS NEEDED BASED ON SITE CONDITIONS

Sun screen
Insect repellent
Poison Oak or Ivy cream
Emergency eyewash station capable of delivering 15 minutes of uninterrupted flow
Flashlight
Potable water
Stokes stretcher
10-minute escape breathing apparatus
Fire extinguishers (10 pound ABC minimum)
Water hoses
Spill absorbent and container
Rope
Spare shovels and tools
Communications equipment (e.g., cell phone)

APPENDICES

APPENDIX A

FORMS

APPENDIX A1

PERSONAL ACKNOWLEDGEMENT FORM

PERSONAL ACKNOWLEDGMENT FORM

PROJECT NAME OR DESCRIPTION

As a component of the Health and Safety Plan (HSP) designed to insure personnel safety during field activities, you are required to read and understand the HSP before commencing any work. When you have fulfilled this requirement, please sign and date this personal acknowledgment form.

_____ I have been provided with a copy of the HSP for this field project and have become familiar with it.

_____ I have been provided with a map and understand the route to the hospital nearest the project site.

_____ I have reviewed copies of the Material Safety Data Sheets (MSDS) for hazardous materials brought for use at the project site. I understand that the Hazard Communication Program and MSDSs are located in the field office, and are available for review at any time.

_____ I have been informed that a copy of the Injury and Illness Prevention Program (IIPP) is part of this HSP (Appendix A) and that the person designated as the onsite safety officer (OSO) is the person in charge of implementing the HSP. By signing this form I acknowledge that I know the OSO's name.

_____ I will complete my tasks in a manner conforming to the HSP and additional guidelines provided during daily Tailgate Safety Meetings, and will inform the OSO of any conditions affecting site safety whenever necessary. This includes bringing to the attention of the OSO unsafe conditions, acts or tasks I do not know how to do safely.

SIGNATURE

NAME (PRINTED)

DATE

APPENDIX A2

TAILGATE SAFETY MEETING FORM

TAILGATE SAFETY MEETING FORM

Date: _____ Time: _____ Job Number: _____

Client: _____

Site Specific Location: _____

Safety Topics Presented

Protective Clothing/Equipment: _____

Chemical Hazards: _____

Physical Hazards: _____

Special Equipment: _____

Other: _____

Emergency Procedures: _____

Hospital: _____ Phone: _____ Ambulance Phone: _____

Hospital Address and Route: _____

ATTENDEES

NAME PRINTED

SIGNATURE

Meeting Conducted By: _____
Name Printed

Signature

On-Site Safety Officer: _____

Project Manager: _____

APPENDIX A3

VISITOR LOG

VISITOR SIGN-IN LOG**CLIENT:** _____ **PROJECT SITE:** _____**COMMENTS:** _____

| DATE | NAME PRINTED | NAME SIGNED | COMPANY | TIME IN | TIME OUT |
|------|--------------|-------------|---------|---------|----------|
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APPENDIX A4

HSP CHANGE FORM

This form is used to document clarification or changes in field practices from those identified in the site specific health and safety plan.

APPENDIX A5

PERIODIC INSPECTION FORM

PERIODIC SITE INSPECTION FORM

Conducted by: _____

Date: _____

Site Name: _____

Activities: _____

| No. | Item Description | Yes | No | NA |
|-----|---|-----|----|----|
| 1 | Is the onsite safety officer known? Name: | | | |
| 2 | Is the work area clean and free from obstructions? | | | |
| 3 | Is work activity covered in the safety plan? If not, has change form been completed? | | | |
| 4 | Confined space work? Is permit completed prior to conducting work? | | | |
| 5 | Excavation work? Are people staying at least 3 feet from edge and out of swing radius of equipment operators? | | | |
| 6 | Are access to exits, emergency equipment and controls free and clear? | | | |
| 7 | Have chemicals of concern been identified? | | | |
| 8 | Is the health hazard assessment monitoring equipment described in the safety plan being used? Calibrated twice daily (am and pm)? | | | |
| 9 | If biting/stinging insects or poison plants are a concern has repellent and barrier cream been provided? | | | |
| 10 | Are workers overall wearing prescribed PPE? | | | |
| | Safety glasses | | | |
| | Hard hats | | | |
| | Steel toed boots | | | |
| | Long pants and long sleeve shirt or coveralls | | | |
| | Brightly colored traffic vest | | | |
| | Work gloves | | | |
| | Respiratory protection, specify: | | | |
| | Impervious gloves, specify: | | | |
| 11 | Are work zones clearly identified? | | | |
| 12 | Are workers washing hands when leaving work zone? | | | |
| 13 | Is equipment being decontaminated when leaving the work zone or property? | | | |
| 14 | Is the emergency assistance information conspicuously posted? | | | |
| 15 | Are combustibles and debris being handled in a manner that prevents accumulation and possible fire hazards and pest harbors? | | | |
| 16 | Are there enough fire extinguishers at the site, have they been surveyed to be sure they are charged and in good working order on a monthly basis? | | | |
| 17 | Are workers practicing good lifting and ergonomic techniques? | | | |
| 18 | Has all heavy equipment been inspected and when necessary certified to be in good working order (e.g., cranes require certification)? | | | |
| 19 | If working on energized system has lockout / tagout plan been initiated? Don't forget physical verification of lockout prior to being put in harms way. | | | |
| 20 | Are hand tools inspected to be sure they are in good working order and knives considered last resort to other more safe tools? | | | |
| 21 | Is work being conducted in accordance with the Health and Safety Plan? | | | |
| 22 | Other: | | | |
| 23 | Other: | | | |

APPENDIX A6

OSHA SAFETY AND HEALTH PROTECTION POSTER

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

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



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

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

U.S. Department of Labor  • Occupational Safety and Health Administration • OSHA 3165

APPENDIX A7

EQUIPMENT CALIBRATION LOG

HEALTH HAZARD ASSESSMENT CALIBRATION SHEET

CLIENT: _____ PROJECT SITE: _____

COMMENTS: _____

| DATE / TIME / INITIALS | INSTRUMENT (MAKE AND MODEL) | SERIAL OR ID NUMBER | CALIBRATION GAS OR SUBSTANCE | CONCEN- TRATION OR VALUE | INSTRUMENT READING | COMMENTS | OK? |
|------------------------------|--------------------------------|------------------------|------------------------------------|-----------------------------------|-----------------------|----------|-----|
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APPENDIX B

MATERIAL SAFETY DATA SHEETS

SPI Supplies Division**Structure Probe, Inc.****P.O. Box 656 West Chester, PA 19381-0656 USA****Phone: 1-(610)-436-5400 Fax: 1-(610)-436-5755****E-mail: spi3spi@2spi.com****WWW: <http://www.2spi.com>****Manufacturer's CAGE: 1P573**

Material Safety Data Sheet

SPI #01200-AB and #01200A-AB Alconox® Powdered Detergent

Section 1: Identification

Date Effective..... July 12, 2001
(most recent revision)

Chemical Name/Synonyms... On Label: Alconox®

Chemical Family..... Anionic powdered detergent

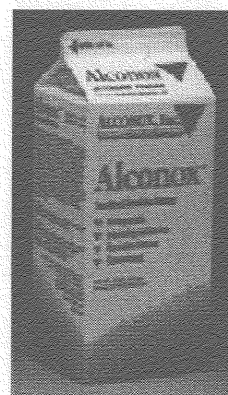
Emergencies
Contacting CHEMTREC:

24 Hour Emergency Use Only #'s...
Worldwide phone: 1-(703)-527-3887
Worldwide FAX: 1-(703)-741-6090
Toll-free phone: 1-(800)-424-9300 USA only

Product or Trade Name.... SPI #01200-AB and #01200A-AB
Alconox® Powdered Detergent

CAS #..... Not applicable

Chemical Formula..... Not applicable

**Section 2 Composition**

| Component Name | CAS # | OSHA | OSHA | ACGIH | ACGIH |
|----------------|-------|------|------|-------|-------|
|----------------|-------|------|------|-------|-------|

No hazardous ingredients in Alconox Powdered Detergent as defined by the OSHA Standard and Hazardous Substance List 29 CFR 1910 Subpart Z.

NEPA Rating: Not known

Section 3: Hazard Identification

Routes of entry

| | |
|-------------|-----|
| Inhalation? | Yes |
| Skin? | No |
| Ingestion? | Yes |

Health Hazards (Acute and chronic):

Inhalation of powder may prove locally irritating to mucous membranes. Ingestion may cause discomfort and/or diarrhea. Eye contact may prove irritating.

Carcinogenicity:

| | |
|------------------|----|
| NTP? | No |
| IARC Monographs? | No |
| OSHA Regulated? | No |

Section 4: First Aid Measures

Signs and Symptoms of Exposure:

Exposure may irritate mucous membranes. May cause sneezing.

Medical conditions generally aggravated by exposure:

Not established. Unnecessary exposure to this product or any industrial chemical should be avoided. Respiratory conditions may be aggravated by powder if air borne.

Emergency and First Aid Procedures:

Eyes: Immediately flush eyes with copious amounts of water for minimum 15 minutes. Call physician.

Skin: Flush with plenty of water.

Ingestion: Drink large quantities of water or milk. Do not induce vomiting. If vomiting occurs re-administer fluids. See a physician for discomfort.

Section 5: Fire Fighting Measures

NEPA Rating: Not known

Extinguishing Media

Suitable/Not suitable:

SMALL FIRE: Use DRY chemical powder, water, foam, carbon dioxide

LARGE FIRE: Use extinguishing media suitable for the surrounding materials.

Special firefighting procedures:

Self-contained positive pressure breathing apparatus and protective clothing should be worn when fighting fires involving chemicals.

Unusual Fire/Explosion Hazards: None

Hazardous thermal decomposition products: None known.

Protection of fire fighters: No special measures are required.

Flammable Limits:

LEL: No data

UEL: No data

Section 6: Accidental Release Measures

Personal precautions: No special precautions

Environmental Precautions and Clean Up Methods:

Material foams profusely. Recover as much as possible and flush remainder to sewer. Material is biodegradable.

Section 7: Handling and Storage

Material should be stored in a dry area to prevent caking.

Section 8: Exposure Controls and Personal Protection

Engineering controls: Normal ventilation is normally required when handling or using this product. Avoid conditions that could produce dusting.

Personal Protective Equipment

Respiratory system: Dust mask recommended but not required.

Skin and body: Laboratory coat recommended but not required.

Hands: Impervious gloves recommended

Eyes: Goggles are recommended, especially when handling solutions irrespective of what they might be.

Other: Wash hands before eating, drinking, or smoking.

Section 9: Physical and Chemical Properties

Physical State and Appearance: White powder interspersed with cream colored flakes.

Odor: None

Boiling Point: Not applicable

Melting Point: Not applicable

Density (water = 1): Not applicable

Solubility: Appreciable, to 10% at ambient conditions.

Octanol/water partition coefficient: Not available

pH: Not known

Flash Point: None

Flammability: Non-flammable

Autoignition temperature: Not applicable

Section 10: Stability and Reactivity

Chemical Stability: The product is stable

Hazardous polymerization: Will not occur

Conditions to Avoid: None

Hazardous Products of Deposition: May release CO₂ on burning.

Reactions with Air and Water:

Does not react with air, water or other common materials.

Section 11: Toxicological Information

Summary: Not considered to be toxic to humans or animals.

Skin Effects: Can be locally irritating

Eye Irritation: Can be irritating to the eyes

Inhalation: Dust can be irritating to mucous membranes

Sensitization: Not known

Chronic toxicity: There is no known effect from the chronic exposure to this product.

Section 12: Ecological Information

Exotoxicity: Not known but it is expected to be low because the material is biodegradable.

Environmental Fate: It is biodegradable.

Bioaccumulation: Not expected to occur (because the material is biodegradable).

Section 13: Disposal Considerations

This material is NOT classified as a hazardous material by RCRA. Use only licensed transporters and permitted disposal facilities and conform to all laws.

Recycle to process, if possible.

Germany water class: VCI WGK: No products were found.

Methods of disposal; waste of residues; contaminated packaging:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

Proper Shipping Name: Non-Regulated, No dangerous cargo

DOT Hazard Class: Non-Regulated, No dangerous cargo

UN/NA ID: Non-Regulated, No dangerous cargo

Packing Group: Not Applicable

Labels: Not Regulated

Marine Pollutant: No

NAER Guidebook: Not Regulated

DOT Status: Not Regulated

Land-Road/Railway:

ADR/RID Class: No dangerous cargo

Sea:

IMDG Class: No dangerous cargo

Air:

IATA-DGR Class: No dangerous cargo

Section 15: Regulatory Information

TSCA: All components of this product are listed on the TSCA 8(b) inventory. If identified components of this product are listed under the TSCA 12(b) Export Notification Rule, they will be listed below.

| TSCA 12(b) Component | Listed under TSCA Section |
|----------------------|---------------------------|
|----------------------|---------------------------|

SARA Title 3: Section 313 Information/Emissions Reporting (40 CFR 372):

| Component | Reporting Threshold |
|-----------|---------------------|
|-----------|---------------------|

SARA-Section 311/312:

No components present in this product are subject to the reporting requirements of this statute.

CERCLA Hazardous Substances and their Reportable Quantities:

| Component | Reportable Quantity |
|-----------|---------------------|
|-----------|---------------------|

EU Regulations: Risk Phrases: This product is not classified according to the EU regulations.

Safety Phrases: Not applicable

Contains: Not applicable

California Prop. 65:

Proposition 65 requires manufacturers or distributors of consumer products

into the State of California to provide a warning statement if the product contains ingredients for which the State has found to cause cancer, birth defects or other reproductive harm. If this product contains an ingredient listed by the State of California to cause cancer or reproductive toxicity, it will be listed below:

None found

Section 16: Other Information

Disclaimer of Liability:

Caution! Do not use SPI Supplies products or materials in applications involving implantation within the body; direct or indirect contact with the blood pathway; contact with bone, tissue, tissue fluid, or blood; or prolonged contact with mucous membranes. Products offered by SPI Supplies are not designed or manufactured for use in implantation in the human body or in contact with internal body fluids or tissues. SPI Supplies will not provide to customers making devices for such applications any notice, certification, or information necessary for such medical device use required by US FDA (Food and Drug Administration) regulation or any other statute. SPI Supplies and Structure Probe, Inc. make no representation, promise, express warranty or implied warranty concerning the suitability of these materials for use in implantation in the human body or in contact with internal body tissues of fluids.

The information and recommendations set forth above are taken from sources believed to be accurate as of the date hereof, however SPI Supplies and Structure Probe, Inc. make no warranty with respect to the accuracy of the information or the suitability of the recommendations, and assume no liability to any user thereof. The information contained in this sheet does not constitute a hazard assessment and should not be used in place of the user's own assessment of work place risks as required by other health and safety legislation. Be aware of the Structure Probe, Inc. Copyright Policy. Structure Probe, Inc. grants a nonexclusive license to make unlimited copies of this safety sheet for internal use only. Quite obviously, this information would pertain only to this material when purchased from SPI Supplies as product from other sources, with other ingredients and impurity levels could have substantially different properties.

ON-LINE

To Ask a Question or Make a Comment

ON-LINE

To Place an Order or Request a Quote



Return to:

- [Alconox® Powdered Detergent](#)
- [SPI Supplies MSDS Safety Sheets Table of Contents](#)
- [SPI Supplies Catalog Table of Contents](#)
- [SPI Supplies Home Page](#)

WEDNESDAY JANUARY 29, 2003

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[Contacting SPI Supplies and Structure Probe, Inc.](#)

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[Worldwide Distributors, Representatives, and Agents](#) 



Material Safety Data Sheet

ISOBUTYLENE

September 30, 1993

MSDS #: 27520

CHEVRON PHILLIPS CHEMICAL COMPANY LP
1301 McKinney Street
Houston, Texas 77010-3030

PHONE NUMBERS

EMERGENCY: (800) 231-0623 or
(510) 231-0623 (International)
EMERGENCY RESPONSE (ASIA): 800-AlertSGS
or 800-25378477 or 65-542-9595
TRANSPORTATION (24 HR): CHEMTREC
(800)424-9300 OR (703)527-3887
Technical Services: (713) 289-4862
For Additional MSDSs: (800) 852-5530

A. Product Identification

Synonyms: 2-Methyl Propene; Isobutene
Chemical Name: Isobutylene
Chemical Family: Olefinic hydrocarbon
Chemical Formula: C₄H₈
CAS Reg. No.: 115-11-7
Product No.: 010400, 000053

Product and/or Components Entered on EPA's TSCA Inventory: YES
This product is in U.S. commerce, and is listed in the Toxic Substances Control Act (TSCA) Inventory of Chemicals; hence, it may be subject to applicable TSCA provisions and restrictions.

Product and/or Components Entered on Canadian Inventory: YES
Ingredients are listed in either the Domestic or Non-Domestic Substances Lists (DSL or NDSL). Impurities are exempt in accordance with Section 3 of the Canadian Environmental Protection Act (CEPA).

B. Components

| Ingredients | CAS Number | % By Wt. | OSHA PEL* | ACGIH TLV* |
|-------------|---------------|-------------|--------------|---------------|
| Isobutylene | 115-11-7 | 99.3 | NE | NE |
| Butene-1 | 106-98-9 | 0.4 | NE | NE |

| | | | | |
|-----------|----------|-----|----|---------|
| n-Butane | 106-97-8 | 0.2 | NE | 800 ppm |
| Isobutane | 75-28-5 | 0.1 | NE | NE |

* See Section F for additional Recommended Exposure Limits

C. Personal Protection Information

Ventilation: Use adequate ventilation to control concentration below recommended exposure limits.

Respiratory Protection: Not generally required. When entry into or exit from concentrations of unknown exposure, use NIOSH/MSHA approved self-contained breathing apparatus (SCBA).

Eye Protection: Use chemical goggles and face shield.

Skin Protection: Use gloves resistant to the material being used. Wear protective garments to prevent skin contact and freeze burns.

NOTE: Personal protection information shown in Section C is based upon general information as to normal uses and conditions. Where special or unusual uses or conditions exist, it is suggested that the expert assistance of an industrial hygienist or other qualified professional be sought.

D. Handling and Storage Precautions

Do not breathe vapors, mist, fume or dust. Do not get liquefied gas into eyes, on skin, or on clothing. May cause freeze burns upon direct contact. Wear protective equipment and/or garments described in Section C if exposure conditions warrant. Wash thoroughly after handling. Launder contaminated clothing before reuse. Use only with adequate ventilation.

Do not puncture or incinerate container. Keep away from heat, sparks, and flames. Keep out of water sources and sewers. Residual vapors may explode on ignition: Do not cut, drill, grind, or weld near this container. Bond and ground during transfer. Secure container to prevent damage. Store in a well-ventilated area. Store in tightly closed container.

E. Reactivity Data

Stability: Stable

Conditions to Avoid: Not Applicable

Incompatibility (Materials to Avoid): Oxygen and strong oxidizing materials

Hazardous Polymerization: Will Not Occur

Conditions to Avoid: Not Applicable

Hazardous Decomposition Products: Carbon oxides formed when burned.

F. Health Hazard Data

Recommended Exposure Limits:

Liquefied petroleum gas has an ACGIH TLV and an OSHA PEL of 1000 ppm. The Company recommended exposure limit for Isobutylene is 1000 ppm. The Company recommended exposure limit for n-Butane is 600 ppm. Also see Section B.

Acute Effects of Overexposure:

Eye: Vapor may cause mild eye irritation. Liquefied gas may cause freeze burns.

Skin: Vapors are not irritating. Liquefied gas may cause freeze burns.

Inhalation: Simple asphyxiant. At high concentrations dizziness, disorientation, headache, excitation, central nervous system depression, and anesthesia may occur. The LC50 (rats; 4 Hr) is 620 g/m3 for Isobutylene.

Ingestion: Not a likely route; may cause freeze burns to the mucous membranes and central nervous system depression.

Subchronic and Chronic Effects of Overexposure:

No known applicable information.

Other Health Effects:

No known applicable information.

Health Hazard Categories:

| | Animal | Human | | Animal | Human |
|---------------------|--------|-------|-------------------------------|----------|----------|
| Known Carcinogen | ___ | ___ | Toxic | ___ | ___ |
| Suspect Carcinogen | ___ | ___ | Corrosive | ___ | ___ |
| Mutagen | ___ | ___ | Irritant | ___ | ___ |
| Teratogen | ___ | ___ | Target Organ Toxin | <u>X</u> | <u>X</u> |
| Allergic Sensitizer | ___ | ___ | Specify - Freeze burn Hazard; | | |
| Highly Toxic | ___ | ___ | Lung-Simple Asphyxiant | | |

CANADIAN WHMIS

CLASS D: POISONOUS AND INFECTIOUS MATERIAL CATEGORIES

Specify: Does not meet the criteria for any of the Class D: Poisonous and Infectious

Material Categories.

Other: Lung - Asphyxiant; Freeze burn hazard

First Aid and Emergency Procedures:

NOTE: For freeze burns, immediately flush effected area with tap water for at least fifteen minutes, seek immediate medical attention.

Eye: Flush eyes with running water for at least fifteen minutes. If irritation or adverse symptoms develop, seek medical attention.

Skin: Wash skin with soap and water for at least fifteen minutes. If irritation or adverse symptoms develop, seek medical attention.

Inhalation: Immediately remove from exposure. If breathing is difficult, give oxygen. If breathing ceases, administer artificial respiration followed by oxygen. Seek immediate medical attention.

Ingestion: If illness or adverse symptoms develop, seek medical attention.

G. Physical Data

Appearance: Liquefied Petroleum Gas

Odor: Mild

Boiling Point: 20F (-7C)

Vapor Pressure: 63.4 psia (3278 mm Hg) at 100F (37.8C)

Vapor Density (Air = 1): 2.0

Solubility in Water: Negligible

Specific Gravity (H₂O = 1): 0.60 at 60/60F (15.6/15.6C)

Percent Volatile by Volume: 100

Evaporation Rate (Ethyl Ether = 1): >1

Viscosity: Not Established

H. Fire and Explosion Data

Flash Point (Method Used): -105F (-76C) (Estimated)

Flammable Limits (% by Volume in Air): LEL - 1.8
UEL - 9.6

Fire Extinguishing Media: Dry chemical, foam, or carbon dioxide (CO₂)

Special Fire Fighting Procedures: Evacuate area of all unnecessary personnel. Shut off source, if possible. Wear protective equipment and/or garments described in Section C if exposure conditions warrant. Use NIOSH/MSHA approved self-contained breathing apparatus and other protective equipment and/or garments described in Section C if conditions warrant. Water

fog or spray may be used to cool exposed equipment and containers. Heated containers may rupture violently and suddenly without warning due to vessel over-pressure (BLEVE). Fragmentation of the container should be anticipated. If flame is against container, withdraw immediately on hearing a rising sound, if venting increases in volume or intensity, or if there is discoloration of the tank due to fire.

Fire and Explosion Hazards: Carbon oxides, and various hydrocarbons formed when burned. Highly flammable vapors which are heavier than air may accumulate in low areas and/or spread along ground away from handling site. Flash back along vapor trail is possible.

I. Spill, Leak and Disposal Procedures

Precautions Required if Material is Released or Spilled:

Evacuate area of all unnecessary personnel. Wear protective equipment and/or garments described in Section C if exposure conditions warrant. Shut off sources, if possible. Protect from ignition. Ventilate area thoroughly.

Waste Disposal (Insure Conformity with all Applicable Disposal Regulations):

Incinerate or place in permitted waste management facility.

J. DOT Transportation

Shipping Name: Isobutylene

Hazard Class: 2.1 (Flammable gas)

ID Number: UN 1055

Packing Group: Not Applicable

Marking: Isobutylene, UN 1055

Label: Flammable gas

Placard: Flammable gas/1055

Hazardous Substance/RQ: Not Applicable

Shipping Description: Isobutylene, 2.1 (Flammable gas), UN 1055

Packaging References: 49 CFR 173.304, 173.306, 173.314, 173.315

NOTE: For domestic shipments of this material the alternate shipping description "Liquefied petroleum gas, 2.1 (Flammable gas), UN 1075" is authorized.

K. RCRA Classification - Unadulterated Product as a Waste

Ignitable (D001)

Prior to disposal, consult your environmental contact to determine if the TCLP (Toxicity Characteristic Leaching Procedure, EPA Test Method 1311) is required. Reference 40 CFR Part 261.

L. Protection Required for Work on Contaminated Equipment

Contact immediate supervisor for specific instructions before work is initiated. Wear protective equipment and/or garments described in Section C if exposure conditions warrant.

M. Hazard Classification

☐ This product meets the following hazard definition(s) as defined by the Occupational Safety and Health Hazard Communication Standard (29 CFR Section 1910.1200):

| | | |
|--|---|---|
| <input type="checkbox"/> Combustible Liquid | <input type="checkbox"/> Flammable Aerosol | <input type="checkbox"/> Oxidizer |
| <input checked="" type="checkbox"/> Compressed Gas | <input type="checkbox"/> Explosive | <input type="checkbox"/> Pyrophoric |
| <input checked="" type="checkbox"/> Flammable Gas | <input checked="" type="checkbox"/> Health Hazard (Section F) | <input type="checkbox"/> Unstable |
| <input type="checkbox"/> Flammable Liquid | <input type="checkbox"/> Organic Peroxide | <input type="checkbox"/> Water Reactive |
| <input type="checkbox"/> Flammable Solid | | |

☐ Based on information presently available, this product does not meet any of the hazard definitions of 29 CFR Section 1910.1200.

Canadian WHMIS

Class A-Compressed Gas
Class B-Flammable and Combustible Material

N. Additional Comments

SARA 313

As of the preparation date, this product did not contain a chemical or chemicals 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.

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MATERIAL SAFETY DATA SHEET

SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: GASOLINE, UNLEADED

GENERAL USE: Motor fuel

PRODUCT DESCRIPTION: Blend of petroleum distillates, highly flammable. This MSDS covers multiple grades of lead-free and unleaded fuels: regular, premium, extra and oxygenated.



MANUFACTURER'S NAME

Tesoro Petroleum Companies, Inc.

DATE PREPARED: April 18, 2002

SUPERSEDES: February 1, 2002

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ADDRESS (NUMBER, STREET, P.O. BOX)

300 Concord Plaza Drive

TELEPHONE NUMBER FOR INFORMATION

Tesoro Call Center (877) 783-7676

(CITY, STATE AND ZIP CODE)

San Antonio, TX 78216-6999

COUNTRY

USA

EMERGENCY TELEPHONE NUMBER

Chemtrec (800) 424-9300

DISTRIBUTOR'S NAME

Same

ADDRESS (NUMBER, STREET, P.O. BOX)

TELEPHONE NUMBER FOR INFORMATION

(CITY, STATE AND ZIP CODE)

COUNTRY

USA

EMERGENCY TELEPHONE NUMBER

SECTION 2 - HAZARDOUS INGREDIENTS

| HAZARDOUS COMPONENTS | CAS # | % (Sect. 16) (by volume) | OSHA PEL | | ACGIH TWA | | SARA TITLE III | RQ LBS |
|---|------------|-----------------------------|-----------------|-------------------|-----------|-------------------|-------------------|-----------|
| | | | PPM | MG/M ³ | PPM | MG/M ³ | | |
| Gasoline | 8006-61-9 | 100 | 300 | 900 | 300 | | | |
| Contains or may contain: | | | | | | | | |
| Toluene (a,b,c,e,f,g) | 108-88-3 | 0 - 35 | 200 | | 50 | | Yes | 1000 |
| Xylene (mixed) (a,b,c) | 1330-20-7 | 0 - 25 | 100 | 435 | 100 | | Yes | 1000 |
| Pentane | 109-66-0 | 0 - 20 | 1000 | 2950 | 600 | | | |
| Trimethylbenzenes, mixed isomers (a) | 25551-13-7 | 0 - 4 | | | 25 | | Yes | |
| Benzene (a,b,c,d,e,f) | 71-43-2 | 0 - 5 | 1 | | 0.5 | | Yes | 10 |
| Butane | 106-97-8 | 0 - 12 | 800 | 1900 | | 800 | | |
| Ethylbenzene (a,c) | 100-41-4 | 0 - 4 | 100 | 435 | 125 | 545 | Yes | 1000 |
| Heptane | 142-82-5 | 0 - 2 | 500 | 2000 | 400 | | | |
| Cyclohexane (a,b,c) | 110-82-7 | 0 - 5 | 300 | 1050 | 300 | | Yes | 1000 |
| n-Hexane | 110-54-3 | 0 - 8 | 500 | 1800 | 50 | 176 | | |
| n-Octane | 111-65-9 | 0 - 1 | 500 | 2350 | 300 | 1400 | | |
| Ethanol | 64-17-5 | 0 - 20 | 1000 | 1900 | 1000 | | | |
| Naphthalene (a,b,c,g) | 91-20-3 | 0 - 1.1 | 10 | 50 | 10 | | Yes | 100 |
| Trimethylbenzene 1,2,4 (a) | 95-63-6 | 0 - 7 | 25 | 125 | | | Yes | |
| Isopentane | 78-78-4 | 0 - 20 | not established | | | | | |
| Styrene (a,c,d,e,g) | 100-42-5 | 0 - 4 | 100 | | 20 | | Yes | 1000 |
| Methyl tert - butyl ether (a) | 1634-04-4 | 0 - 18 | | | 40 | 144 | Yes | |
| Ethyl tert - butyl ether | 637-92-3 | 0 - 21 | not established | | | | | |
| Tertiary - Amyl methyl ether | 994-05-8 | 0 - 20 | not established | | | | | |
| Alkanes, Cycloalkanes, Alkenes, Aromatic hydrocarbons | | balance | | | | | | |

(a,c) See Section 15

(b) Indicates that the Resource Conservation and Recovery Act (RCRA) has determined the waste for this chemical is listed as hazardous and must be handled according to regulations in 40 CFR 260-281.

(d) Indicates substance appears on National Toxicology Program (NTP) list of carcinogens, International Agency for Research on Cancer (IARC) list of carcinogens or is regulated by the Occupational Safety and Health Administration (OSHA) as a possible carcinogen.

(e) Indicates listing in Table Z - , 29 CFR 1910.1000, one of 25 chemicals with substance - specific requirements; value shown is 8-hour Time Weighted Average. See table for acceptable ceiling concentration limits and acceptable maximum peak above the acceptable ceiling concentration.

(f) California Prop 65, Safe Drinking Water and Toxic Enforcement Act of 1986, chemicals known to the state to cause cancer or reproductive toxicity. A person in the course of doing business must warn others who may consume, come into contact with, or otherwise be exposed to this chemical.

(g) Product is listed or defined as a marine pollutant in IMDG Code or 49 CFR 172.101 Appendix B, List of Marine Pollutants and must be classified as an Environmentally Hazardous Substance, Class 9, in addition to any other defined hazards for this product.

MATERIAL SAFETY DATA SHEETPRODUCT NAME: GASOLINE, UNLEADED
April 18, 2002

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SECTION 3 - HAZARDS IDENTIFICATION**EMERGENCY OVERVIEW**

Bronze to amber colored liquid, extremely flammable, potentially hazardous vapors. Can cause eye and skin irritation upon contact. Inhalation of vapors can cause anesthetic effect leading to death in poorly ventilated areas. Danger Poison! Harmful if swallowed and/or aspirated into the lungs. Hazard symbols for this product - F, XI, XN Risk Phrases - R11 20 36 38.

POTENTIAL HEALTH EFFECTS

INHALATION: High concentrations are irritating to the respiratory tract; may cause headache, dizziness, nausea, vomiting and malaise. Xylene causes central nervous system effects, anemia, liver and kidney effects, and eye damage after repeated or prolonged exposure to high concentrations.

SKIN: Brief contact may cause slight irritation; prolonged contact may cause moderate irritation or dermatitis. Xylene causes central nervous system effects, anemia, liver and kidney effects, and eye damage after repeated or prolonged exposure to high concentrations.

EYES: High vapor concentration or contact may cause irritation and discomfort.

INGESTION: May result in vomiting; aspiration of vomitus into the lungs must be avoided; DO NOT induce vomiting. Minute amounts aspirated into the lungs can produce severe lung injury, chemical pneumonitis, pulmonary edema or death.

| | | | | | | |
|--|------|-----|------------------|-----|-----------------|-----|
| CARCINOGENICITY | NTP? | Yes | IARC MONOGRAPHS? | Yes | OSHA REGULATED? | Yes |
| Gasoline has been classified as a Group 2B carcinogen (possibly carcinogenic to humans) by the International Agency for Research on Cancer (IARC). Contains chemical(s) known to the State of California to cause cancer. Contains benzene, which has been classified as a carcinogen by the National Toxicology Program (NTP), and a Group 1 carcinogen (carcinogenic to humans) by the International Agency for Research on Cancer (IARC). Contains ethylbenzene which has been classified as a Group 2B carcinogen (possibly carcinogenic to humans) by the International Agency for Research on Cancer (IARC). | | | | | | |

SECTION 4 - FIRST AID MEASURES

INHALATION: Remove affected person to fresh air; provide oxygen if breathing is difficult; if affected person is not breathing, administer CPR and seek immediate emergency medical attention.

SKIN: Remove contaminated clothing; wash affected area with soap and water; launder contaminated clothing before reuse; if irritation persists, seek medical attention.

EYES: Remove contact lenses. Flush eyes with clear running water for 15 minutes while holding eyelids open; if irritation persists, seek medical attention.

INGESTION: DO NOT induce vomiting; if vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into lungs; seek immediate medical attention. Vomiting may be induced only under the supervision of a physician.

SECTION 5 - FIRE FIGHTING MEASURES

| | | | |
|---------------------------|---------------------------|-----------------|-----------------------|
| FLASH POINT (METHOD USED) | FLAMMABLE LIMITS | LEL: 1.3% | UEL: 7.6% |
| -45° F (-42.7° C) TCC | AUTOIGNITION TEMPERATURE: | 495° F (257° C) | NFPA CLASS: 1A |

GENERAL HAZARDS: This product presents an extreme fire hazard. Liquid evaporates very quickly, even at low temperatures, and forms vapor (fumes) which can catch fire and burn with explosive violence. Invisible vapor spreads easily and can be set on fire by many sources such as pilot lights, welding equipment, and electrical motors and switches.

EXTINGUISHING MEDIA

Carbon dioxide, water fog, dry chemical, chemical foam

FIRE FIGHTING PROCEDURES

Firefighters must wear full facepiece self - contained breathing apparatus in positive pressure mode. Do not use solid stream of water since stream will scatter and spread fire. Fine water spray can be used to keep fire - exposed containers cool.

UNUSUAL FIRE AND EXPLOSION HAZARDS

Closed containers can explode due to buildup of pressure when exposed to extreme heat. Do not use direct stream of water on pool fires as product may reignite on water surface. Caution - Material is extremely flammable!

HAZARDOUS COMBUSTION PRODUCTS

Smoke, fumes, oxides of carbon

MATERIAL SAFETY DATA SHEETPRODUCT NAME: GASOLINE, UNLEADED
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SECTION 6 - ENVIRONMENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: CAUTION - EXTREMELY FLAMMABLE - Evacuate and ventilate area; confine and absorb into absorbent; place material into approved containers for disposal; for spills in excess of allowable limits (RQ) notify the National Response Center (800) 424 - 8802; refer to CERCLA 40 CFR 302 and SARA Title III, Section 313 40 CFR 372 for detailed instructions concerning reporting requirements.

SECTION 7 - HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Keep container closed when not in use; protect containers from abuse; protect from extreme temperatures. CAUTION - EXTREMELY FLAMMABLE - keep away from all sources of ignition. "Empty" containers may contain residue which may form explosive vapors. Do not weld or cut near empty container that has not been professionally reconditioned. Use non-sparking tools when opening and closing containers. Maintain well ventilated work areas to minimize exposure when handling this material. Review all operations which have the potential of generating an accumulation of electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. Improper filling of portable gasoline containers creates danger of fire. Only dispense gasoline into approved and properly labeled gasoline containers. Always place portable containers on the ground. Be sure pump nozzle is in contact with the container while filling. Do not use a nozzle's lock-open device. Do not fill portable containers that are inside a vehicle or truck/trailer bed.

SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION**ENGINEERING CONTROLS**

The use of local exhaust ventilation is recommended to control emissions near the source. Provide mechanical ventilation of confined spaces. Use explosion-proof ventilation equipment. See Section 2 for Component Exposure Guidelines.

PERSONAL PROTECTION:

RESPIRATORY PROTECTION (SPECIFY TYPE): None required while threshold limits (Section 2) are kept below maximum allowable concentrations; if TWA exceeds limits, NIOSH approved respirator must be worn. Refer to 29 CFR 1910.134 or European Standard EN 149 for complete regulations.

PROTECTIVE GLOVES: Neoprene or nitrile rubber gloves with cuffs.

EYE PROTECTION: Safety goggles with side shields

OTHER PROTECTIVE CLOTHING OR EQUIPMENT: Safety eyewash nearby

WORK / HYGIENIC PRACTICES: Practice safe workplace habits. Minimize body contact with this, as well as all chemicals in general.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

VAPOR PRESSURE (MM Hg)
5 - 15 PSI @ 100° F

VAPOR DENSITY (AIR = 1)
3.0 - 4.0

SPECIFIC GRAVITY (WATER = 1)
0.700 - 0.800

EVAPORATION RATE (n-Butyl Acetate = 1)
< 1

SOLUBILITY IN WATER
Negligible

FREEZING POINT
Not determined

pH
Not applicable

APPEARANCE AND ODOR
Bronze to amber liquid, characteristic gasoline odor

BOILING POINT
80 - 430°F (26.6 - 221° C)

PHYSICAL STATE
Liquid

VISCOSITY
Not specified

VOLATILE ORGANIC COMPOUNDS (Total VOC's)
6.25 lbs / gallon

SECTION 10 - STABILITY AND REACTIVITY

STABILITY
UNSTABLE:
STABLE: XXX

CONDITIONS TO AVOID: Extreme temperatures, open flames, sparks

INCOMPATIBILITY (MATERIALS TO AVOID): May react with strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.

HAZARDOUS DECOMPOSITION OR BYPRODUCTS: Decomposition will not occur if handled and stored properly. In case of a fire, oxides of carbon, hydrocarbons, fumes, and smoke may be produced.

HAZARDOUS POLYMERIZATION
MAY OCCUR:
WILL NOT OCCUR: XXX

CONDITIONS TO AVOID: None

MATERIAL SAFETY DATA SHEETPRODUCT NAME: GASOLINE, UNLEADED
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SECTION 11 - TOXICOLOGICAL INFORMATION

| Hazardous Ingredients | % | CAS # | LD50 of Ingredient (Species and Route) | LC50 of Ingredient (Species) |
|--------------------------------------|---------|------------|---|---|
| Gasoline | 100 | 8006-61-9 | 18.8 ml / kg Oral - rat | 20.7 ml / l Inhalation - rat |
| Contains or may contain: | | | | |
| Toluene (a,b,c,e,f,g) | 0 - 35 | 108-88-3 | 5000 mg / kg Oral - rat | 7525 ppm / 4H |
| Xylene (mixed) (a,b,c) | 0 - 25 | 1330-20-7 | 4300 mg / kg Oral - rat | 5000 ppm / 4H Inhalation - rat |
| Pentane | 0 - 20 | 109-66-0 | Not established | 364 gm / m3 / 4H Inhalation-rat |
| Trimethylbenzenes, mixed isomers (a) | 0 - 4 | 25551-13-7 | Not established | Not established |
| Benzene (a,b,c,d,e,f) | 0 - 5 | 71-43-2 | 930 mg / kg Oral - rat | 10000 ppm / 7H Inhalation - rat |
| Butane | 0 - 12 | 106-97-8 | Not established | 658 mg / L / 4H Inhalation - rat |
| Ethylbenzene (a,c) | 0 - 4 | 100-41-4 | 3500 mg / kg Oral - rat | 4000 ppm/4H(LCLo) Inhalation - rat |
| Heptane | 0 - 2 | 142-82-5 | Not established | 75 gm / m3 / 2H Inhalation - mouse |
| Cyclohexane (a,b,c) | 0 - 5 | 110-82-7 | 813 mg / kg Oral - mouse | Not established |
| n-Hexane | 0 - 8 | 110-54-3 | 28710 mg / kg Oral - rat | 48000 ppm / 4H Inhalation-rat |
| n-Octane | 0 - 1 | 111-65-9 | Not established | 118 gm / m3 / 4H Inhalation - rat |
| Ethanol | 0 - 20 | 64-17-5 | 3450 mg / kg Oral - mouse | 20,000 ppm / 10H Inhalation - rat |
| Naphthalene (a,b,c,g) | 0 - 1.1 | 91-20-3 | 1780 mg / kg Oral - rat | Not established |
| Trimethylbenzene 1,2,4 (a) | 0 - 7 | 95-63-6 | 5 gm / kg Oral - rat | 18 gm / m3 / 4H Inhalation - rat |
| Isopentane | 0 - 20 | 78-78-4 | 1600 - 3200 mg / kg Oral - rat | Not established |
| Styrene (a,c,d,e,g) | 0 - 4 | 100-42-5 | 5000 mg / kg Oral - rat | 24000 mg/m3/2H Inhalation - rat |
| Methyl tert - butyl ether (a) | 0 - 18 | 1634-04-4 | 4 gm / kg Oral - rat | 23576 ppm / 4H Inhalation - rat |
| Ethyl tert - butyl ether | 0 - 21 | 637-92-3 | Not established | 123 gm / m3 / 15M Inhalation - mouse |
| Tertiary - Amyl methyl ether | 0 - 20 | 994-05-8 | Not established | Not established |

SECTION 12 - ECOLOGICAL INFORMATION

No data are available on the adverse effects of this material on the environment. Neither COD nor BOD data are available. Based on the chemical composition of this product it is assumed that the mixture can be treated in an acclimatized biological waste treatment plant system in limited quantities. However, such treatment should be evaluated and approved for each specific biological system. None of the ingredients in this mixture are classified as a Marine Pollutant. In general, non-oxygenated gasoline exhibits some short-term toxicity to freshwater and marine organisms, especially under closed vessel or flow-through exposure conditions in the laboratory. The components which are the most prominent in the water soluble fraction and cause aquatic toxicity, are also highly volatile and can be readily biodegraded by microorganisms.

SECTION 13 - DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD: Dispose of in accordance with Local, State, and Federal Regulations. This product may produce concentrated hazardous vapors or fumes in a disposal container creating a dangerous environment. Refer to "40 CFR Protection of Environment Parts 260 - 299" for complete waste disposal regulations for ignitable materials. Consult your local, state, or Federal Environmental Protection Agency before disposing of any chemicals. Do not flush to sanitary sewer or waterway.

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: GASOLINE, UNLEADED
April 18, 2002

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SECTION 14 - TRANSPORT INFORMATION

PROPER SHIPPING NAME: Gasoline

HAZARD CLASS / Pack Group: 3 / II

REFERENCE: 49 CFR 173.150, .202, .242

IDENTIFICATION NUMBER: UN 1203

LABEL: FLAMMABLE LIQUID

HAZARD SYMBOLS: F

IATA HAZARD CLASS / Pack Group: 3 / II

IMDG HAZARD CLASS: 3.1 / II

RID/ADR Dangerous Goods Code: 3

Canadian TDG Class / Division: 3.2

Note: Transportation information provided is for reference only. Client is urged to consult CFR 49 parts 100 - 177, IMDG, IATA, EC, Canadian TDG, and United Nations TDG information manuals for detailed regulations and exceptions covering specific container sizes, packaging materials and methods of shipping.

SECTION 15 - REGULATORY INFORMATION

TSCA (Toxic Substance Control Act)

Motor gasoline is considered a mixture by EPA under the Toxic Substances Control Act (TSCA). The refinery streams used to blend motor gasoline are all on the TSCA Chemical Substances Inventory. This product may contain methyl tertiary-butyl ether (CAS #1634-04-4) or tert-amyl methyl ether (CAS #994-05-8), both of which are currently undergoing review and testing under TSCA Section 4. Notification to the U.S. EPA Office of Toxic Substances is required prior to export of this material from the United States.

SARA TITLE III (Superfund Amendments and Reauthorization Act)

311/312 Hazard Categories

Immediate (Acute) Health Effects

Delayed (Chronic) Health Effects

Fire Hazard

313 Reportable Ingredients:

(a) Indicates a toxic chemical subject to annual reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 and of 40 CFR 372.

CERCLA (Comprehensive Response Compensation and Liability Act)

(c) The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) has notification requirements for releases or spills to the environment of the Reportable Quantity or greater amounts, according to 40 CFR 302.

CPR (Canadian Controlled Products Regulations)

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations

IDL (Canadian Ingredient Disclosure List)

Components of this product identified by CAS number and listed on the Canadian Ingredient Disclosure List are shown in Section 2.

DSL / NDSL (Canadian Domestic Substances List / Non-Domestic Substances List)

Components of this product identified by CAS number are listed on the DSL or NDSL and may or may not be listed in Section 2 of this document. Only ingredients classified as "hazardous" are listed in Section 2 unless otherwise indicated.

EINECS (European Inventory of Existing Commercial Chemical Substances)

Components of this product identified by CAS numbers are on the European Inventory of Existing Commercial Chemical Substances.

California Prop 65, Safe Drinking Water and Toxic Enforcement Act of 1986

Warning: This product contains a chemical known to the State of California to cause cancer.

EC Risk Phrases

R11 Highly flammable
R20 Harmful by inhalation
R36 Irritating to eyes
R38 Irritating to skin.

EC Safety Phrases

S16 Keep away from sources of ignition
S23 Do not breathe vapor
S25 Avoid contact with eyes
S28 After contact with skin, wash immediately with plenty of soap and water.
S29 Do not empty into drains

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: GASOLINE, UNLEADED
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SECTION 16 - OTHER INFORMATION

Values stated in "%" column in Section 2 and Section 11 do not reflect absolute minimums and maximums; these values are typical which may vary from time to time.

| | | | | |
|-------------------------------|--------------|---|------------------------|-------------|
| NFPA HAZARD RATINGS | HEALTH | 1 | 0 = INSIGNIFICANT | 3 = HIGH |
| | FLAMMABILITY | 3 | 1 = SLIGHT | 4 = EXTREME |
| | REACTIVITY | 0 | 2 = MODERATE | |
| PERSONAL PROTECTIVE EQUIPMENT | | B | Safety Glasses, Gloves | |

REVISION SUMMARY:

This MSDS has been revised in the following sections:

Section 2 - Changes in quantities
Changes in product numbers

MSDS Prepared by: Chem-Tel, Inc.
1305 N. Florida Ave.
Tampa, Florida USA 33602
(800) 255-3924 Outside USA (813) 248-0573

DISCLAIMER: The information supplied in this data sheet is obtained from currently available sources, which are believed to be reliable. HOWEVER, THE INFORMATION IS PROVIDED WITHOUT ANY WARRANTY, EXPRESSED OR IMPLIED, REGARDING THE ACCURACY OF THE INFORMATION OR THE RESULTS TO BE OBTAINED FROM ITS USE.

Handling, storage, use or disposal of the above-referenced product is beyond our control and may occur under conditions with which we are unfamiliar. FOR THESE AND OTHER REASONS, WE DO NOT ASSUME RESPONSIBILITY AND EXPRESSLY DISCLAIM ANY LIABILITY FOR DAMAGE, INJURY AND COST ARISING FROM OR RELATED TO THE USE OF THE PRODUCT.

Product Number(s) :

| | | | | | |
|----|----|-----|-----|-----|------|
| 05 | 20 | 73 | 133 | 270 | 517 |
| 06 | 21 | 74 | 166 | 281 | 1106 |
| 08 | 25 | 76 | 181 | 305 | |
| 09 | 26 | 77 | 185 | 326 | |
| 10 | 51 | 84 | 188 | 327 | |
| 11 | 61 | 85 | 190 | 328 | |
| 12 | 62 | 91 | 199 | 334 | |
| 13 | 63 | 95 | 257 | 335 | |
| 14 | 64 | 107 | 265 | 336 | |
| 15 | 67 | 110 | 266 | 338 | |
| 16 | 68 | 112 | 267 | 339 | |
| 17 | 69 | 131 | 268 | 340 | |
| 19 | | 132 | 269 | 354 | |