phelps dodge Sierrita Inc.
6200 W. Duval Mine Road • P. O. Box 527 • Green Valley, AZ 85622-0527
(520) 648-8500

November 13, 2006

Certified Mail # 7002 1000 0005 6776 4562
Return Receipt Requested

Robert Casey, Manager
Water Quality Enforcement Unit
Arizona Department of Environmental Quality
1110 West Washington Street
Phoenix, Arizona 85007

RE: Health and Safety Plan for
Aquifer Characterization Plan – Mitigation Order on Consent Docket No. P-500-06

Dear Mr. Casey:

Enclosed please find three copies of the Health and Safety Plan prepared by Hydro Geo Chem, Inc. for Aquifer Characterization Plan work to be conducted under the Mitigation Order on Consent Docket No. P-500-060.

Should you have any questions regarding this plan please contact me at (520) 648-8857 or Mr. Stuart Brown at (503) 675-5252.

Sincerely,

Ned Hall

E. L. (Ned) Hall
Chief Environmental Engineer

ELH:ms
Attachments

xc: Cynthia Campbell, Arizona Department of Environmental Quality, w/o attachment
Chad Fretz, Phelps Dodge Sierrita, Inc., w/o attachment
Ray Lazuk, Phelps Dodge Corporation, w/o attachment
Stuart Brown, Bridgewater Group, Inc., w/o attachment

HEALTH AND SAFETY PLAN
FOR
AQUIFER CHARACTERIZATION PLAN
MITIGATION ORDER ON CONSENT DOCKET NO. P-500-06
PIMA COUNTY, ARIZONA

Prepared for:

PHELPS DODGE SIERRITA, INC.
6200 West Duval Mine Road
Green Valley, Arizona 85614

Prepared by:

HYDRO GEO CHEM, INC.
51 West Wetmore Road, Suite 101
Tucson, Arizona 85705
(520) 293-1500

November 13, 2006

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APPENDICES

1. PURPOSE

This Health and Safety Plan (HASP) establishes policies and procedures to protect workers from the hazards posed by field work carried out pursuant to a Mitigation Order on Consent (Docket No. P-50-06) (MO). Section III.A of the MO requires Phelps Dodge Sierrita, Inc. (PDSI) to characterize the vertical and horizontal extent of a plume of sulfate-bearing groundwater downgradient of the Phelps Dodge Sierrita Tailing Impoundment (PDSTI) (ADEQ, 2006). To that end, PDSI and Hydro Geo Chem (HGC) will implement field work for the Aquifer Characterization Plan (ACP) described in HGC (2006). This HASP is intended to inform all field personnel carrying out work pursuant to the ACP.

1.1 HASP Objectives and Applicability

The objective of this HASP is to inform the worker of health and safety requirements for his or her protection during work carried out both on PDSI property and on public and private land in the vicinity of Green Valley, Arizona. As a supplement to this HASP, Phelps Dodge's General Code of Safe Practices is provided in Appendix A. The guidelines presented in this HASP and Appendix A are intended to minimize the potential for exposure to hazardous materials, conditions, accidents, or physical injury during daily field activities or under adverse circumstances.

When work requires use of heavy equipment or other machinery, access to work areas will be limited to PDSI or HGC personnel and their subcontractors (Section 10). All personnel working on tasks related to the ACP are responsible for understanding and complying with all safety requirements. Field personnel will, at a minimum, meet hazardous waste operations training requirements specified by the federal Occupational Safety and Health Administration (OSHA) (Code of Federal Regulations [CFR] Title 29, Section 1910.120). Personnel working on PDSI property are required to have current Mining Safety and Health Administration (MSHA) 24-hour training and PDSI site-specific hazard recognition training. All field participants must provide a signature attesting to the fact that they are familiar with the provisions of this HASP (Section 12).

Subcontractors and third parties are responsible for understanding and complying with all safety requirements. HGC will provide supervision including: performing a daily job site hazard evaluation during a tailgate safety meeting (Section 5.1); ensuring proper usage of personal protective equipment (PPE); and overseeing best management practices with respect to equipment wash-downs, good housekeeping, and PPE. Subcontractors and third parties are required to supply their own PPE.

Field work for the ACP will consist of well drilling, installation, development, and testing; and groundwater sampling. Field work will not take place in locations expected to have hazardous chemicals in soil and groundwater. For this reason, decontamination of personnel and equipment, medical surveillance, Level C respiratory protection, and site control zones will not

be necessary for this HASP. References to sites or site conditions are meant to include any and all work locations.

If working conditions change at any time during the project to present a different set of hazards requiring upgrading to Level C protection, air quality monitoring, or chemical decontamination procedures, an addendum will be made to this document to include appropriate hazard communication. Copies of modifications to this HASP must be retained on-site by the on site safety coordinator. HGC's project director will not permit changes to this HASP without prior approval. Section 2 describes key personnel and their respective duties.

The following table summarizes the contents and applicability of this HASP:

Subject Area	Included	Not Included / Not Applicable	Document Section No.
Key personnel and assignment of safety responsibility	X		2
Site background and environmental setting	X		3
Work objective and scope	X		4
Job-site hazard analysis	X		5
Personal protective equipment	X		6
Emergency plan	X		7
Employee training information	X		8
General safe work practices	X		9
Site control	X		10
Accident reporting	X		11
Verification of understanding	X		12
Recordkeeping requirements	X		13
Medical surveillance program		X	NA
Respiratory protection program		X	NA
Control zones and decontamination areas		X	NA

2. KEY PERSONNEL AND ASSIGNMENT OF SAFETY RESPONSIBILITY

The following is a description of designated HGC key personnel and their assignment of safety responsibility for the investigative activities to be conducted pursuant to the ACP.

HGC personnel and subcontractors are required to have current 40-hour OSHA training and 24-hour MSHA training. Personnel working on PDSI property are required to undergo site-specific hazard recognition training conducted at the main gate during the initial entry. Subcontracted personnel will work under the direct supervision of HGC personnel, and will follow the provisions described in this HASP.

2.1 Project Director

James Norris will act as the HGC project director. He is responsible for implementing addenda to this HASP as necessary and conducting appropriate follow-up in the event of any reported safety incidents.

2.2 Project Safety Manager

Richard Zimmerman will act as the HGC project safety manager. He is responsible for the overall health and safety of the employees assigned to the project, and for advising each subcontractor of the potential hazards and the minimum general requirements of the HASP. He

is responsible for issuing task assignments to project personnel and maintaining employee training records that verify current OSHA, MSHA, and PDSI hazard recognition training.

2.3 On-Site Safety Coordinator

The HGC site geologist or field technician assigned to each specific task will be the on-site safety coordinator, and is responsible for implementation of the site-specific HASP. He or she will:

- provide field supervision and coordination of subcontractors,
- ensure bluestake compliance as required,
- perform a daily job site hazard evaluation during a tailgate safety meeting (Table 1,
- Section 5.1),
- ensure proper usage of PPE (Section 6),
- conduct emergency response planning and coordination (Section 7),
- enforce safe work and hygiene practices (Section 9),
- maintain a first-aid kit for HGC employees,
- perform necessary recordkeeping duties,
- complete PDSI Product Approval Forms as necessary (Appendix C),
- control access to work areas (Section 10), and
- communicate approved safety requirements and information to site personnel.

The on-site safety coordinator will enforce subcontractor compliance with the HASP. He or she will keep signed copies of tailgate safety meeting sheets (Table 1) and the HASP signature page (Section 12) and provide them to the project safety manager. The on-site safety coordinator will also monitor the work site for changing conditions during operations, and implement preventative measures in response to those conditions. It is the on-site safety coordinator's responsibility to compile and submit Product Approval Forms and MSDS sheets to workers and

PDSI as necessary for chemicals used or stored on PDSI property by both HGC and subcontractor personnel.

All workers are required to report any injury, including minor injuries, to the on-site safety coordinator. The on-site safety coordinator will report any injury or "near miss" to the project safety manager (Section 11). A "near miss" is described as a safety-related incident where a serious injury or accident could have occurred but did not.

3. SITE BACKGROUND AND ENVIRONMENTAL SETTING

3.1 Site Location

The PDSTI is approximately 25 miles south of Tucson and from 0.5 to 1.5 miles west of Green Valley in Pima County, Arizona (Figures 1 and 2). The PDSTI covers approximately 3,600 acres located east of the Phelps Dodge Sierrita Mine open pit and mineral processing operations, and west of Green Valley.

Field work will also take place in various locations on PDSI property and on public and private property within the town of Green Valley. Work sites may include traffic medians, parking lots, Arizona State lands, and urban lots. PDSI maintains a written property entry procedure, which is provided in Appendix B. The PDSI property entry procedure is applicable whenever working on PDSI property.

3.2 Environmental Setting

The southern Arizona climate is characterized by a hot summer and mild winter, with rainy seasons occurring in late summer (July through September) and early winter (late November through January). The average yearly temperature recorded in Green Valley, Arizona is 65º Fahrenheit (ºF), and the average yearly precipitation is 16 inches. The prevailing wind direction for the Green Valley area is from the east during January through August and from the

south September through December. Mean wind speed is typically 8 miles per hour (mph), with the potential for gusts up to 50 mph, particularly during monsoon season in July and August.

4. SCOPE OF WORK

Field activities included in the scope of work for the ACP will include but are not limited to inventorying wells, drilling wells, sampling groundwater, performing aquifer tests, and conducting depth-specific sampling. The objectives of the ACP are to: 1) identify drinking water wells within one mile downgradient and crossgradient of the 250-mg/L sulfate plume in groundwater, 2) determine the vertical and horizontal extent of the sulfate plume, 3) gather data for use in evaluating the fate and transport of the sulfate plume, and 4) gather data for use in evaluating the effectiveness of the PDSI interceptor wellfield as a groundwater sulfate control system. HGC (2006) contains the complete work plan for the ACP and the following is a brief summary of the scope of work for the ACP:

1) Well Inventory - The locations of drinking water supply wells will be identified and verified in the field. Water quality sampling will be conducted at drinking water supply wells participating in sampling offered by PDSI.

2) Plume Characterization

    a) Horizontal Extent of Sulfate Plume - Field work conducted for this task will involve groundwater monitoring and the installation and sampling of additional wells to further delineate the horizontal extent of the plume.

    b) Vertical Distributions of Sulfate - Depth-specific water quality sampling in existing wells at the east and north ends of the plume will be conducted to investigate the vertical distribution of sulfate with depth. Depth-specific sampling will also be conducted at selected monitoring wells where well access is available.

    c) Water Level and Water Quality Information - Water level and water quality data will be updated in areas lacking current information and the spatial coverage of water level and water quality data will be expanded.

Groundwater monitoring will collect contemporaneous water level and water quality data for a large geographic area outside the plume.

3) Aquifer Structure and Hydraulic Properties - Depth-specific flow testing in wells at the east and north ends of the plume will be conducted for Task 3 to identify any apparent variations in permeability with depth. Aquifer testing to be conducted at monitoring wells installed for Task 2 will characterize the horizontal and vertical distribution of hydraulic properties.

Drilling activities utilize heavy equipment and drilling materials that pose both chemical and physical hazards. Hazards associated with sampling may also involve heavy equipment utilized to install temporary pumps and/or packers. Personnel performing sample collection will be exposed to minute amounts of chemicals associated with sample preservation. General physical hazards present in most work locations include moving equipment and machinery and biological hazards such as insects, mammals, and reptiles. A complete job-site hazard analysis is provided in Section 5.

5. JOB-SITE HAZARD ANALYSIS

The on-site safety coordinator will establish site control (Section 10) and conduct a daily job-site hazard analysis to evaluate the work site for potential conditions that may contribute to injury. The job-site hazard analysis, including evaluation and recognition of potential job-site hazards, is provided below. However, the hazard analysis should not be limited to the following, and the job site should be assessed daily for specific and/or changing conditions.

5.1 Daily Tailgate Safety Meetings

The daily job-site hazard analysis will be conducted during a tailgate safety meeting. Table 1 provides the daily tailgate safety meeting checklist. Emergency warning systems and safe meeting locations will be discussed and agreed-upon during the tailgate safety meeting. The on-site safety coordinator will distribute copies of the HASP to project personnel and discuss safety issues. Personnel will be required to provide a signature both on the daily tailgate safety meeting sheet (Table 1) and in Section 12 indicating that they are familiar with the provisions of this HASP.

The tailgate safety meeting will not be required for personnel working alone. It is the responsibility of each worker to assess the work site and to conduct work activities safely. Unsafe acts are unacceptable, and will not be tolerated by HGC.

5.2 Physical Hazards

Physical and mechanical hazards are the most significant hazards associated with field work conducted for the ACP. Appendix A (Section I) provides a PDSI General Code of Safe Practices and Hot Work Policy, which address numerous physical hazards applicable to PDSI work areas. The potential physical hazards that can be encountered will include but should not be limited to the following.

5.2.1 Mechanical Failures and Breakages

When using heavy equipment and machinery, broken cables, pipes, and falling parts can all cause fatal injuries during a mechanical failure. Personnel should conduct regular maintenance checks on heavy equipment and maintain an observant awareness of surroundings during operation of machinery such as drilling and pump rigs and support equipment.

5.2.2 Unexploded Ordnance

The vicinity immediately northeast of the PDSTI and some public lands in Sahuarita may contain unexploded ordnance related to previous land use. Unfamiliar objects embedded in or resting on the ground should not be disturbed. Personnel should flag or barricade the object, notify all site personnel, and call PDSI emergency services at (520) 648-8888.

5.2.3 Noise Exposure

Personnel may have limited, unnecessary exposures to occupational noise during field work activities where noise levels exceed 85 decibels. The operation of equipment such as, drilling rigs, pumps, or generators can cause elevated noise levels in the work area. Hearing protection will be worn during the operation of generators, pumps, and various heavy equipment as directed by the on-site safety coordinator. Symptoms of overexposure to noise are stress, tensing of muscles, headache, and temporary or permanent hearing loss.

5.2.4 Slipping, Tripping, or Falling

Personnel may encounter loose, wet, or uneven walking surfaces. Proper footwear and vigilance will help prevent injury. All work areas should be maintained in a neat, orderly fashion. All tools and supplies must be properly stored and secured when not in use.

5.2.5 Biological Hazards

Exposure to biological hazards (i.e., plants, reptiles, mammals, and insects) is expected in remote areas. When wild animals are encountered in work areas, they should be left undisturbed. Indigenous microorganisms known to cause respiratory illness may also be present. Thorough washing of any exposed body parts and equipment will help protect against infection.

5.2.6 Air Hazards

Silica and indigenous dust may be present at the work site. Proper donning of an N-95 dust mask is optional. To reduce inhalation potentials, a good rule of thumb is to stand upwind of the source.

5.2.7 Smoking Hazards

Smoking will not be permitted within 50 feet of fuel storage areas or similar potential fire hazards.

5.2.8 Cold Exposure

During field work, personnel may encounter low temperatures, rain, snow, or wind. Exposure to cold must be limited by providing proper clothing, access to warm shelter, and a temperature-dependant work regimen that limits periods of outdoor activity under adverse conditions. Otherwise, cold stress could manifest itself as hypothermia.

Hypothermia is a cold-induced decrease in core body temperature that causes shivering, numbness, drowsiness, muscular weakness, and if symptoms are sufficiently severe, death. First-aid for hypothermia includes removing cold, wet clothing; warming the victim by wrapping

him or her in blankets or placing him or her in a tub of warm water; and administering hot, nonalcoholic liquids.

5.2.9 Heat Stress

During conditions of high temperatures, personnel should be monitored for conditions of heat stress. Heat stress monitoring shall commence at temperatures of 70 ºF and above if semi-permeable protective clothing (i.e. coated Tyvek) is worn. Adverse climatic conditions are important considerations in planning and conducting site operations.

The effects of ambient temperature may cause physical discomfort, loss of efficiency, personal injury, and increased accident probability. In particular, heat stress due to protective clothing that decreases evaporative heat loss from sweating and body ventilation is an important factor. One or more of the following recommendations will help reduce heat stress:

- Employees should replace body fluids and electrolytes lost to sweat. Quenching of thirst is not an adequate indicator of replacing liquids or electrolytes sufficiently. Workers should drink a minimum of 16 ounces of water prior to the start of work daily, and throughout the day as needed.
- A work schedule that provides sufficient rest periods is necessary. The need for a shaded rest area may be established.

Heat stress causes minor symptoms, such as heat rash or heat cramps, as well as severe ones such as exhaustion or heat stroke.

Heat rash is a skin irritation resulting from prolonged contact with wet clothing. It can be prevented by allowing the skin to dry completely during rest periods, and by showering at the end of the work day. Heat cramps, heat exhaustion, and heat stroke all result from excessive loss of body fluids and electrolytes. Symptoms of heat cramps are spasms in the abdomen or limbs. Heat exhaustion is caused by more severe dehydration; symptoms include pale, clammy skin, profuse perspiration, weakness, headache, and nausea. Heat stroke is a life-threatening condition that occurs when the body's temperature regulating system no longer functions properly; symptoms include hot, dry skin, high fever, dizziness, nausea, rapid pulse, and unconsciousness. Brain damage and death can occur as a result of heat stroke.

If any of these symptoms occur, remove the victim's protective clothing, take his or her temperature, and cool the skin's surface with a light water spray. Encourage the victim to slowly drink cool water, diluted and unsweetened fruit juice, or a sport drink. Rest the victim until his or her oral temperature is less than 99 ºF; if the temperature measured is over 100 ºF, seek medical attention immediately.

5.2.10 Rain and Electrical Storms

Rain and electrical storms can pose a hazard to the job site. Short-duration, heavy, rain storms can increase the potential for flash flooding. The on-site safety coordinator will monitor weather conditions and schedule work appropriately. In the event of heavy rain, personnel are cautioned to remain aware of surrounding conditions and avoid low-lying areas. Rain can also

impair the ability to work; to avoid injury, personnel will use appropriate clothing (i.e., rain coat), and readily-available shelter when necessary. Rain creates slick conditions at a job site, and all personnel are therefore advised to use caution when working in rainy conditions.

Thunderstorms are often associated with rain and electrical storm conditions. The National Weather Service advises the following actions during a thunderstorm:

- Seek shelter.
- Stay off higher elevations.
- Stay away from metal objects.

5.2.11 Moving Equipment Hazards

Moving equipment or machinery may represent the most significant potential work-site hazard. All moving equipment and machinery must have the necessary safety devices required by OSHA and MSHA. Consideration should be given to all moving parts to avoid being struck by, struck against, pinched, or caught in, on, or between materials, structures, or machinery. Special consideration must be given to mine equipment when on PDSI property as described in Appendix A.

5.2.12 Traffic Hazards

Depending on the specific work location, traffic can be a major physical hazard. When working on PDSI property, workers must be aware of left-hand-drive mine trucks and earth

moving equipment. When working in urban areas, workers must remain aware of vehicular traffic conditions. The on-site safety manager will assess the hazards daily and institute the appropriate controls. Traffic controls to be considered include: approved traffic control plans, bright orange vests, flagging, barricades, cones, and lights.

Whenever driving or operating a vehicle, safety belts must be worn. Hard hats are to be worn inside and outside vehicles when on PDSI property. Appendix A outlines vehicle backup warning procedures to follow on PDSI property.

5.2.13 Utilities

Prior to doing any digging or drilling, the HGC on-site safety coordinator will ensure that all aboveground and underground utilities have been properly identified. An Arizona Bluestake ticket must be called in at least one week prior to starting work and renewed every 15 working days as necessary to complete work. Digging on PDSI property requires calling in a bluestake ticket to a specific PDSI number. Appendix E provides the PDSI bluestake policy. Prior to conducting any digging or drilling operations, all bluestake tickets will be verified in the field for markings and the first five feet of any borehole will be hand dug or otherwise excavated. An air knife or vacuum truck may be utilized to pot-hole locations in gravelly or calcified soil without damaging underground utilities. Drilling rigs and boom-trucks will be allowed to set up at a minimum distance of 25 feet from any overhead utility line or at a larger distance at the discretion of the driller.

5.3 Chemical Hazards

Any chemical brought onto PDSI property requires a Product Approval Form. The Product Approval Form is used as part of the PDSI hazard communications program and is provided in Appendix C. Material Safety Data Sheets (MSDS) for chemicals and materials described in this section are provided in Appendix D.

Groundwater in the vicinity of the PDSTI has been impacted by sulfate. Concentrations of sulfate have been recorded at concentrations exceeding 2,000 milligrams per liter (mg/L) in the aquifer. Other substances that will be used or encountered during field activities include chemical dye, drilling fluids and well construction materials, nitric acid, and 10 percent hydrochloric acid.

It is important to note that sulfate dissolved in groundwater does not constitute a significant health hazard (US Environmental Protection Agency, 1999). Ingesting sulfate is not likely to cause harm to most people, however ingestion of sulfate in drinking water at concentrations greater than 500 mg/L may cause gastrointestinal irritation particularly in elderly and infant populations. Sulfate does not pose a significant inhalation, chronic exposure, skin contact, or eye contact hazard according to the MSDS for sodium sulfate, the compound typically found in water impacted by sulfate.

Ten percent hydrochloric acid solution will be used by the site geologist to test cuttings samples for carbonate minerals. Nitric acid will be used as a preservative in sample bottles during water quality sampling. Acids are corrosive and can cause damage to the following during acute exposure: the respiratory system if inhaled; the mouth, throat, esophagus, and gastrointestinal tract if ingested; and the skin and eyes through dermal contact. With chronic exposure to acids, the teeth and eyes can become corroded due to contact with acidic vapors.

Drilling fluids and well construction materials include bentonite products such as Enviroplug drilling fluid additive, bentonite pellets, and bentonite grout; well construction materials such as silica sand, pea gravel, and Portland cement; and various drilling polymers and foaming agents. Polymers and foaming agents are used on an as-needed and site-specific basis. Subcontractors will be required to fill out PDSI Product Approval Forms for any chemicals intended for use or storage on PDSI property and to supply MSDS information for specific products intended for use in any work area.

Skin contact with bentonite products can cause dryness leading to dermatitis. Eye contact with bentonite and silica dust can cause mechanical discomfort. Bentonite products are not toxic when ingested. Inhalation is the primary route of exposure to bentonite products and poses the most significant potential health hazard. Bentonite products and silica sand contain crystalline silica which is a potential human carcinogen. Chronic inhalation of crystalline silica may not cause noticeable immediate injury but can cause permanent lung damage in the form of silicosis,

a progressive and sometimes fatal lung disease. Inhalation of crystalline silica can also aggravate existing respiratory illnesses.

Acute exposure to Portland cement can cause chemical burns in eyes and irritation leading to dermatitis in the skin. Inhalation of Portland cement can cause irritation in the nose, throat, and lungs. Silica dust in Portland cement is a known human carcinogen and its primary exposure pathway is inhalation. Chronic exposure to Portland cement dust can lead to silicosis. When ingested, Portland cement can cause internal discomfort.

Xanthene chemical dye will be used to characterize relative permeability with depth in the screened interval of the wells tested during depth-specific sampling and dynamic inflow profiling. The dye should not be mixed with acid and may be irritating to the skin and eyes on contact. Conflicting evidence as to the mutagenicity of the dye is indicated on the MSDS. Specific PPE recommended for use of xanthene dye includes goggles, protective clothing to prevent staining, and gloves.

Subcontractors are required to have a hazard communication program, and each will be required to maintain an MSDS file for chemicals used. Each subcontractor must provide HGC with an MSDS for every hazardous chemical stored or used at each work location.

6. PERSONAL PROTECTIVE EQUIPMENT

The individual components of protective clothing and equipment must be assembled into a full protective ensemble that protects the worker from site-specific hazards and minimizes the hazards and drawbacks of the PPE itself. Loose clothing and jewelry are not permitted to be worn on PDSI property or around mechanical and heavy equipment. Steel-toed boots, hard hats and safety glasses/goggles are required to be worn inside and outside vehicles when on PDSI property.

6.1 Required Level of Personal Protective Equipment

Level D PPE shall be required in all work areas on PDSI property and to conduct drilling and heavy equipment operations. Changes in the required PPE will be based on changed work conditions and field observations, and will be assessed by the project safety manager on a task-by-task basis. Level D protection will include the following:

- Hard Hat: A hard hat must be worn properly and not altered in any way that would lessen the degree of protection offered. All hard hats will meet American National Standards Institute (ANSI) Standard Z89.l.

- Safety Glasses/Goggles: Safety glasses with side shields are the minimum required eye protection. All safety eye protection must meet ANSI Standard Z87.1. Contact lenses will not be worn during drilling activities.

- Safety Footwear. Steel-toed safety work shoes/boots must be worn on PDSI property and during activities involving drilling or heavy equipment. All safety boots must meet ANSI Standard Z41.1/75.

- Coveralls (Tyvek), optional.
- Rubber, poly vinyl alcohol, latex, or nitrile gloves, as required.
- Hearing protection, as required in work areas exceeding 85 decibels or as signed.
- N-95 dust masks, optional.
- Reflective traffic vests, as required.

Hearing protection shall be worn when using generators, pumps, and drilling equipment. Long-sleeved rubber gloves and dust masks may be worn when working with Portland cement, silica sand, and bentonite products. Nitrile, latex, or similar gloves shall be worn when collecting groundwater samples.

HGC and its subcontractors shall provide their employees with the appropriate PPE, as required. No changes to the specified PPE will be made without the approval of the project safety manager.

7. EMERGENCIES

During the daily tailgate safety meeting, workers will be trained in the emergency provisions of this HASP, as well as instructions for use of the communication systems and evacuation routes. Emergency procedures specific to PDSI property are provided in Appendix A. Figure 3 shows the locations of emergency facilities in the Green Valley area. To facilitate emergency response, the following planning measures will be instituted before field work begins:

- The project safety manager will verify that the field staff has fulfilled project training requirements.
- The on-site safety coordinator will verify that required safety equipment is at the site and in good working condition.
- Warning and communication systems will be established during the tailgate safety meeting. Warning systems can include verbal communications, hand signals, vehicle horns, and portable hand-held compressed gas horns.

Emergencies can include accidental releases of gases, chemical spills, mechanical failures and breakages, fires, explosions, and personal injuries. Time is a critical factor in an emergency. Personnel must try to remain calm in an emergency to ensure clarity of thought for appropriate decision making.

7.1 Emergency Procedures

7.1.1 General

General emergency procedures are as follows:

- Call emergency services such as 911 for ambulance or fire rescue and (520) 648-8888 for PDSI emergency services.
- The on-site safety coordinator shall be notified immediately of all emergencies. The on-site safety coordinator has the responsibility for responding to and correcting emergency situations. This may include taking appropriate measures to protect the safety of site personnel and the public. Possible actions may involve evacuation of personnel from the area. The on-site safety coordinator is additionally responsible for notifying appropriate supervisors.
- When alerted to an emergency, all non-emergency communications will cease. Crew members will proceed to give all pertinent information to the on-site safety coordinator in a systematic and orderly manner.
- Power equipment will be shut down and operators will stand by for instruction.
- Individuals not assigned specific contingency response duties will proceed immediately to a pre-arranged safe site.
- Upon arrival at the safe site, a complete head count will be given to the on-site safety coordinator. Individuals will stay at the safe site until further instructions are given.
- At least one 10-pound ABC-type dry-chemical fire extinguisher will be provided at the work area. Heavy equipment will be equipped with an appropriate size and type fire extinguisher as requested by OSHA and MSHA.
- Additional emergency response equipment such as spill-response materials (absorbent pads and litter) and tools should be maintained on site.

7.1.2 Accidental Release of a Gas

Underground gas utility lines may be present in work areas. If these lines are punctured:

- Notify all personnel within the immediate area of the release and shut down all equipment.
- Evacuate the area if the gas release cannot be secured safely.
- Notify Southwest Gas (520) 889-1888.
- Notify PDSI emergency services at (520) 648-8888.
- Notify an immediate supervisor.

In the event of a gas release, the on-site safety coordinator is responsible for completing the tasks outlined above.

7.1.3 Chemical Spill

If fuel is spilled, an absorbent will be used to clean up the fuel spill. If a chemical spill occurs:

- Notify all personnel within the immediate area of the spill.
- Evacuate the area if the chemical spill cannot be contained or cleaned up safely.
- Notify PDSI emergency services at (520) 648-8888 and call 911.
- Notify an immediate supervisor.

In the event of a chemical spill, the on-site safety coordinator will take the appropriate actions as described above.

7.1.4 Fires

In the case of a fire:

- Notify all personnel within the immediate area of the fire.
- Evacuate the area in the event the fire cannot be extinguished safely.
- Go directly to the closest telephone and summon the fire department by dialing 911.
- Notify the on-site safety coordinator.
- Notify PDSI emergency services at (520) 648-8888 and call 911.

In the event of a fire, the on-site safety coordinator will take the appropriate actions as described above.

7.1.5 Explosion

In the case of an explosion:

- If uninjured, report to the pre-designated area for a head count.
- Stand by for further assignment from the on-site safety coordinator.
- Notify PDSI emergency services at (520) 648-8888.

In the event of an explosion, the on-site safety coordinator will take the appropriate actions as described above.

7.1.6 Personal Injuries

In the case of a personal injury:

- Personnel trained in first-aid should administer first-aid to the injured party. Medical attention may be required beyond first-aid treatment; refer to Figure 3 for the location of the nearest clinic and hospital.
- Designate someone to call either 911 or PDSI emergency services at (520) 648-8888 depending on the severity of the injury.
- Transport/move the injured only if the injuries will permit.
- If the injured cannot be moved, call PDSI emergency services at (520) 648-8888 if on PDSI property or 911 if not on PDSI property.
- All personal injuries must be reported to the individual's immediate supervisor.
- Supervisors must report all worker personal injuries to the on-site safety coordinator.

7.1.7 Medical Emergency

A first-aid kit will be located at the site in a clearly-marked location. The first-aid kit will be maintained by the on-site safety coordinator for HGC employees. Subcontracted personnel are responsible for maintaining portable first-aid kits suitable for the number of employees on site and including a portable eye wash as described below.

A portable eye wash will be located with the first-aid kit at the site in case of eye exposure to chemicals or other materials. An American National Standards Institute (ANSI) 16- or 24-unit first aid kit will supply a portable eye wash. Chemicals and/or particulates must be immediately flushed from the eyes using copious amounts of water or saline solution. Particular attention should be given to flushing the chemical or particulate from under the top and bottom of the eyelids.

In the event of a medical emergency, the on-site safety coordinator will be responsible for contacting emergency services.

7.2 Emergency Telephone Location and Call Protocol

7.2.1 Telephone Location

A cellular telephone or handheld radio provided by PDSI will be located at each work site.

7.3 Contacts

Figure 3 shows the locations of the nearest acute care facility and hospital. In the event of an injury or illness requiring emergency medical care beyond the capabilities of CPR or first-aid trained personnel, the following resources will be utilized:

Local Clinic and Acute Care Facility United Family Health Center, Inc. 1260 S Campbell Road Green Valley, AZ 85614 (520) 625-3691 **Hospital and Emergency Room** UPH Hospital at Kino Campus (Figure 4) 2800 E. Ajo Way Tucson, Arizona 85713 (520) 874-3500	**PDSI Emergency Number** (520) 648-8888 **Emergency Medical Information** Poison Control Center (600) 253-3334 **Emergency Transportation System** Ambulance 911 Fire Department 911 Police 911

For non-emergency situations the following resources will be utilized:

HGC Project Director, Jim Norris
(520) 293-1500 x112

HGC Project Safety Manager, Rick Zimmerman
(520) 293-1500 x131

8. EMPLOYEE TRAINING AND INFORMATION

HGC personnel are trained in accordance with applicable MSHA and OSHA regulations. General site workers and subcontractors entering restricted work areas involving drilling, heavy equipment, and sampling are required to be trained in accordance with 29 CFR 1910.120 (Hazardous Waste Operations and Emergency Response-40 hours) and MSHA 24-hour training.

Personnel entering PDSI property are also required to undergo PDSI's site-specific hazard recognition training. Phelps Dodge practices zero tolerance for unsafe practices that could result in serious injury or death. The following summarizes zero tolerances rules in place at Phelps Dodge:

1. No drug and alcohol abuse.
2. No fighting or physical assault.
3. Always lock out, tag out, try out for applicable maintenance.
4. Always bluestake using PDSI bluestake before digging.
5. Always follow the Hot Work Policy (Appendix A) for applicable tasks.
6. Always obey restricted access signs, policies, and structures.

Individuals should not report for work physically or mentally unfit for duty. Personnel should never work under the influence of drugs or alcohol. Horse play, fighting, and physical assault will not be tolerated. Individuals conducting applicable maintenance must adhere to the

lock out, tag out, try out policies. PDSI bluestake must be contacted before digging on PDSI property. All cutting, welding, and applying of heat to various structures must be carried out in accordance with Phelps Dodge's Hot Work Policy (Appendix A). Entrance by individuals not approved for access in restricted areas including confined spaces will not be tolerated.

PDSI documents including the General Code of Safe Practices, the Property Entry Policy, and the Bluestake Policy are provided in Appendices A, B, and E, respectively. Documents verifying adequate training will be maintained by the project safety manager.

9. GENERAL SAFE WORK PRACTICES

Refer to Appendix A (Section I) to review the Phelps Dodge code of conduct for general safe practices. Safety meetings are described in Section 5.1. PPE is discussed in Section 6 and site control including restricted work areas is discussed in Section 10.

9.1 Confined Space Entry

Personnel will not enter confined spaces at any time during the field activities.

9.2 Contaminant Ingestion

The ACP consists of an investigation of sulfate in groundwater. Sulfate is a non-hazardous constituent. Therefore, exposure to contamination by hazardous constituents is not expected. Nonetheless, good hygiene is recommend such as refraining from eating, drinking, chewing gum or tobacco, smoking, or any practice that involves hand-to-mouth contact in any area where the possibility of unclean conditions or contamination exists. Smoking will be allowed anywhere except within 50 feet of fuel storage areas or other fire hazards.

9.3 Hand and Face Washing

Hands and faces should be thoroughly washed upon completing daily work or before eating or smoking.

9.4 Fire Extinguishers

HGC will locate, at a minimum, a sufficient number of 10-pound ABC-type fire extinguishers within the immediate work area. Vehicles and excavation equipment will contain fire extinguishers as required by OSHA regulations.

9.5 Personnel Communication

Communications between personnel must be maintained at all times. A cell phone will be utilized on site to establish contact with emergency or off-site personnel as necessary. In areas where cell phone coverage is unavailable, two-way radios will be provided by PDSI. Emergency communication signals will be discussed in daily safety meetings.

9.6 Safety Labeling

Hazardous materials are not expected to be encountered during work for the ACP. Legible and understandable precautionary labels will be prominently affixed to containers of

hazardous and non-hazardous raw materials, intermediates, products, by-products, mixtures, scrap, wastes, debris, and contaminated clothing.

Chemicals and materials stored on PDSI property are required to receive approval utilizing the PDSI Product Approval Form provided in Appendix C.

9.7 Chemical Exposure Symptoms

Hazardous chemicals are not expected to be encountered in large quantities during work for the ACP. In the event of a chemical exposure, personnel must inform the on-site safety coordinator or their immediate supervisor of any subjective symptoms of chemical exposure such as headaches, dizziness, nausea, and irritation of the respiratory tract, eyes, or skin. The on-site safety coordinator or the worker's immediate supervisor must arrange immediate first-aid or medical attention, whichever is most appropriate.

The project safety manager must be informed of all work related injuries and illnesses as soon as possible (Section 11).

9.8 Site Engineering Control Measures

During the field activities conducted as part of the ACP, engineering controls will be implemented to reduce the potential exposure of on-site personnel to unnecessary hazards. Site engineering control measures, at a minimum, will consist of consolidating, securing, or storing

refuse generated during field work to minimize tripping hazards. Barricades may also be used to restrict unauthorized access to the work area.

9.9 Sanitation

Portable bathroom facilities will be located as necessary at each work location. Field staff should independently maintain water and soap for hand washing on site. If used, dust masks will be discarded after each use and replaced by a new mask.

10. SITE CONTROL AND MANAGEMENT

10.1 PDSI Site Control and Management

Personnel conducting work on PDSI property are required to read Appendix A and undergo site-specific hazard recognition training conducted during the first site entry. Detailed PDSI site entry procedures are provided in Appendix B. HGC personnel and subcontracted personnel entering PDSI property are required to sign in and out at the PDSI main gate. HGC is required to notify any of the following PDSI Environmental Management personnel when HGC personnel or subcontractors enter and exit PDSI property:

1. Ned Hall, Chief Environmental Engineer, (520) 648-8857
2. Deborah Chismar, Environmental Engineer I, (520) 648-8557
3. Billy Dorris, Senior Environmental Technician, (520) 648-8873

10.2 General Site Control and Management

Any restricted-access work area will be designated at the beginning of field work. Depending upon the site-specific hazards encountered, various levels of site control should be implemented to reduce the potential for injuries and accidents. The on-site safety coordinator will control access to the work areas on public and private property where heavy equipment will be used. The restricted work area will be delineated by portable fencing, barricades, and flagging tape. Only authorized personnel wearing the appropriate PPE will be allowed in restricted work areas.

10.3 Best Management Practices

Decontamination may not be required at job sites unless contaminants are encountered in soil or groundwater. However, best management practices such as washing down drilling rigs and heavy equipment will be required before the equipment can be moved to another job site. Additionally, personnel should brush off and (where needed) wipe off boots, gloves, and coveralls with clean, disposable, moistened towels; remove and dispose of gloves and other disposable PPE; wipe off and wash hands and face with clean towels, soap and water; and check the site for any garbage or trip hazards before leaving for the day. Refuse generated during field work will be consolidated, secured, and stored to minimize impact to the work area and tripping hazards.

10.3.1 Equipment Washdown

All heavy equipment with the exception of personal vehicles should be washed down using a power washer or steam cleaner. Water level sounders and other technical down-hole equipment should be washed in de-ionized water prior to the next use.

11. ACCIDENT REPORTING

All "near-misses" and incidents resulting in personal injury, exposure to toxic substances, illness, or property damage must be reported by the involved individual(s) to the on-site safety coordinator immediately. The on-site safety coordinator, the injured employee, and the employee's supervisor will complete a written accident report as soon as practicable, but no later than 24 hours after the injury or incident is reported. This report will be submitted to the project director and project safety manager within the 24-hour period.

The project safety manager will notify PDSI as necessary and conduct a follow-up investigation to evaluate what corrective actions are needed to prevent the recurrence of the accident. The results of this investigation will be reported within four working days to the project director and PDSI. Based on the information provided, a more thorough investigation or additional corrective actions may be required by the project safety manager.

Records of site-specific injuries and accidents will be maintained by each contractor. These records will be made available upon request to the project safety manager.

12. INFORMATION VERIFICATION

All personnel assigned work pursuant to the ACP are required to review this HASP including appendices and addenda, if necessary. All personnel assigned to work on ACP tasks are required to attend the daily safety meetings when one or more people will be working. Personnel attending daily safety meetings will verify their attendance by signing the daily tailgate safety meeting summary sheet included as Table 1. The following personnel are familiar with the provisions of this HASP:

Printed Name	Representing	Signature and Date

13. RECORDKEEPING REQUIREMENTS

HGC will maintain the following project records, as well as a copy of the site-specific HASP at the site. HGC and all subcontractors will be responsible for maintaining and providing the following reports and records as required:

- Employee health and safety training records.
- Current site-specific OSHA 200 log.
- Accident/incident investigation reports.
- Health and safety meeting briefings and attendance sheets.
- Information verification (Section 12).
- HASP addenda.

14. LIMITATIONS

This HASP was prepared by HGC for the use of HGC and is subcontractors. No other warranty, expressed or implied, is made as to the professional findings or advice in this plan. Any use of or reliance on the data in this plan by a third party shall be at such a party's sole risk. HGC can offer no assurances and assumes no responsibility for site conditions or activities outside the scope of the plan.

15. REFERENCES

Arizona Department of Environmental Quality (ADEQ). 2006. Mitigation Order on Consent. Docket No. P-50-06, ADEQ Identification Number 101679. June 14, 2006.

American National Standards Institute (ANSI). 1991. "USA Standard for Personal Protection - Protective Footwear." Z41.1, 1991 ed.

ANSI. 2003. "Occupational and Educational Personal Eye and Face Protection Devices." Z87.1, 2003 ed.

ANSI. 2003. "Industrial Head Protection." Z891.1, 2003 ed.

Hydro Geo Chem, Inc. (HGC). 2006. Work Plan to Characterize and Mitigate Sulfate with Respect to Drinking Water Supplies in the Vicinity of the Phelps Dodge Sierrita Tailing Impoundment, Pima County, Arizona. October 31, 2006.

Occupational Safety and Health Administration. 1996. "OSHA Hazard Communication Standard." Code of Federal Regulations Title 29, Subpart Z, Section 1910.1200, 1996 ed.

United States Environmental Protection Agency (US EPA). 2001. "Health Effects from Exposure to High Levels of Sulfate in Drinking Water Study." January 21, 1999.

TABLE

TABLE 1

Daily Tailgate Safety Meeting Summary

Date:_____

Project Name:_____ Project Code:_____

On-site Safety Coordinator(s):_____ Subcontractor(s):_____

_____ _____

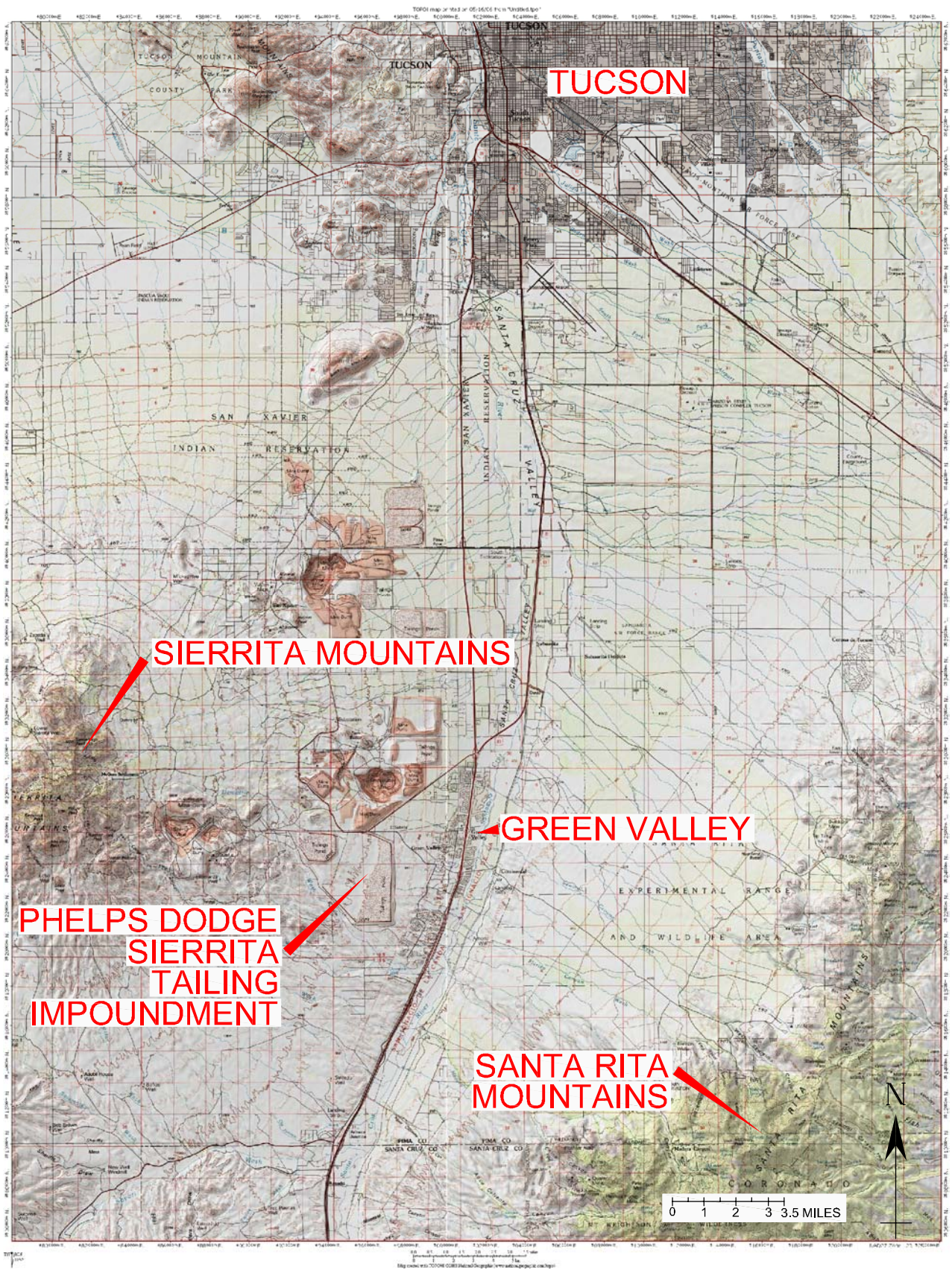
Topics Discussed:

_____**Emergency preparedness** (wind direction, alarm signals, meeting area, hospital location, first aid kit, emergency numbers, fire extinguishers, spill containment, cell phone/radio coverage).
_____**Job Site Hazard Analysis** (chemical and physical hazards, engineering controls, MSDS location, heat stress/stroke, fluids and sun protection, biological hazards).
_____**Personal Protective Equipment Required and Optional**
_____**Training Requirements** (MSHA, OSHA, Site-specific, applicable HASP).
_____**Site Control** (control areas, smoking, site entry/exit, decontamination procedures, hygiene).

By signing below, I acknowledge that I understand the information presented.

Printed Name	Company	Signature	Date

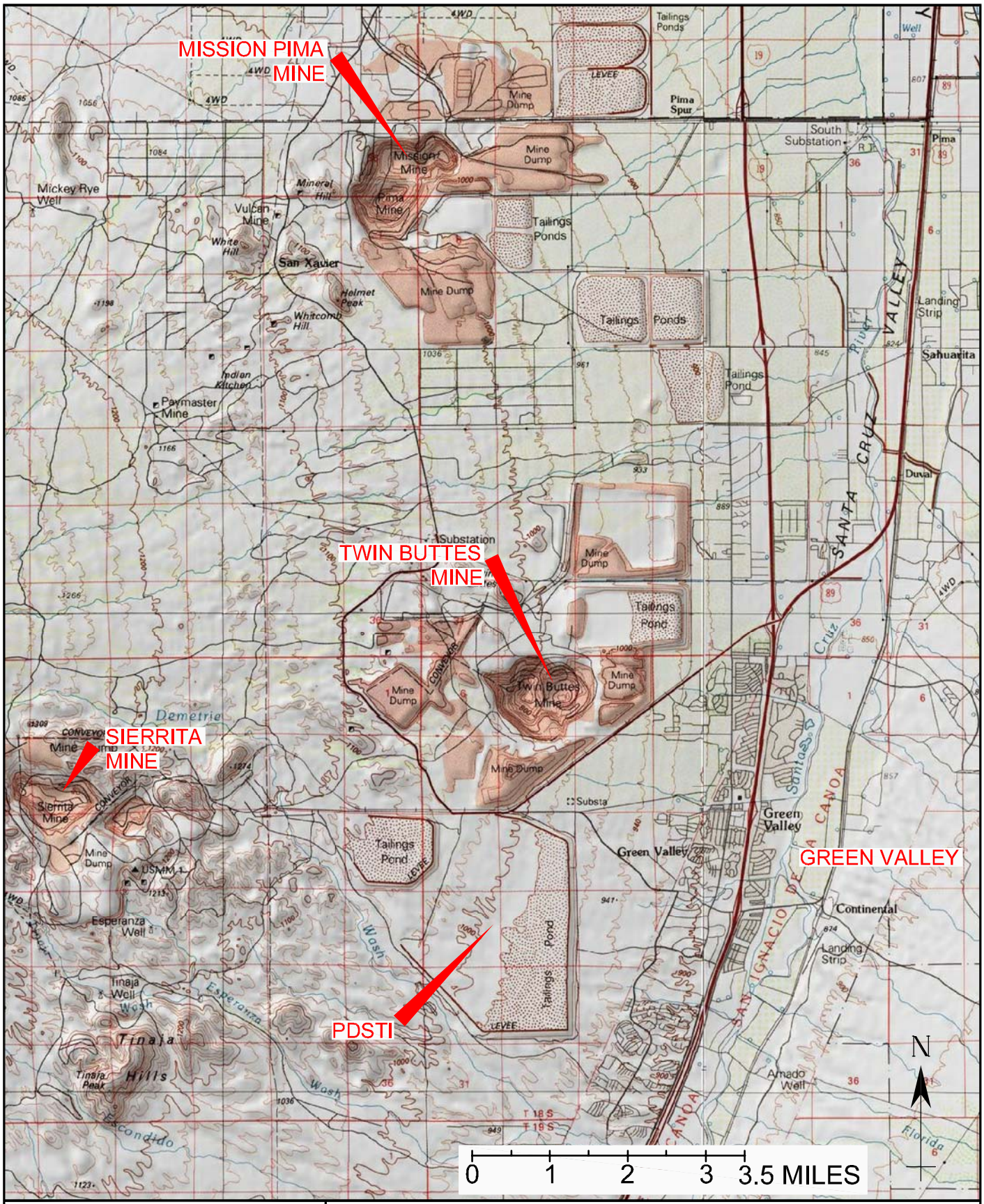
FIGURES



HYDRO GEO CHEM, INC.

REGIONAL LOCATION MAP

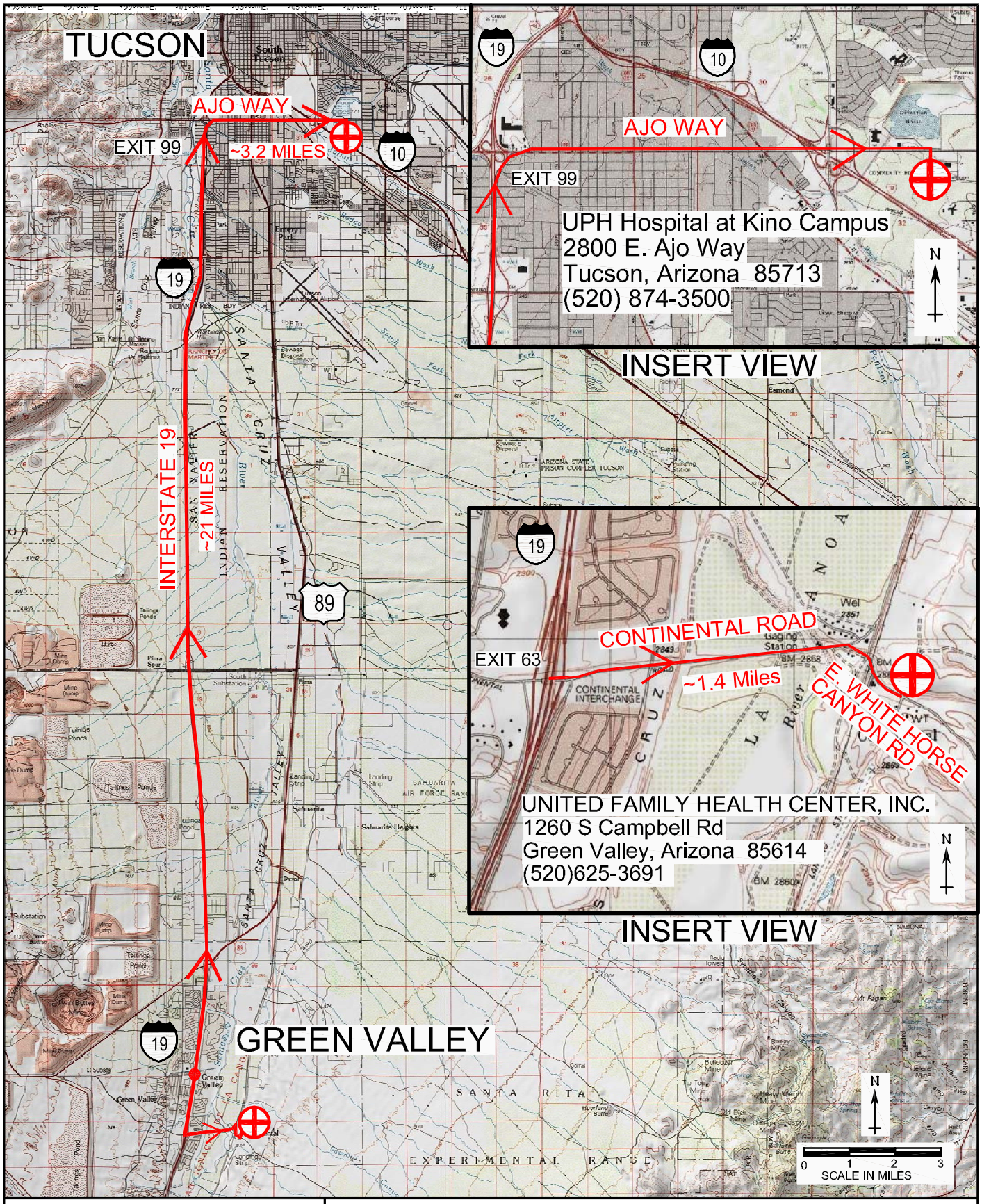
Approved	Date	Revised	Date	Reference:	FIG.
JRN	8/9/06			7830016A	1



HYDRO GEO CHEM, INC.

PDSTI AND GREEN VALLEY

Approved	Date	Revised	Date	Reference:	FIG.
JRN	8/9/06			7830016A	2



HYDRO GEO CHEM, INC.

HOSPITAL LOCATION MAP

Approved	Date	Revised	Date	Reference:	FIG.
AE	11/03/06			7830067A	3

APPENDIX A

PHELPS DODGE GENERAL CODE OF SAFE PRACTICES AND HOT WORK POLICY

Phelps Dodge NAOM Operations

General Code Of Safe Practices

ZERO AND BEYOND

I have received this "General Code of Safe Practices," and I understand it is my duty to read this code and abide by its contents. If I have a question about any provision in this code, it is my responsibility to contact my immediate supervisor for clarification.

Employee: _____
Please Print Full Name

Payroll Number: _____

Date received: _____

Employee Signature: _____

Title: _____
Please Print

Issued by: _____

Submit signature page to Human Resources

Table of Contents

SECTION I

Phelps Dodge is committed to the philosophy of ***Zero and Beyond*** which means Zero incidents, injuries, fatalities, and occupational illnesses. Any number other than Zero is simply not acceptable. In fact we strive for ***Zero and Beyond***. Beyond means reaching the goal and then going beyond it by sustaining zero and by taking safety awareness beyond the workplace and into our homes and our communities. ***Zero and Beyond*** means integrating safety into all aspects of our lives, into everything that we do and beyond how we ever thought about safety before.

CODE OF CONDUCT

All employees are responsible and accountable for working safely and productively, while remaining aware of the hazards of their jobs and following recognized safe job procedures. Specifically, employees will:

- comply with all health and safety rules, departmental standard operating procedures, and regulations as outlined in the Code of Ethics and Guiding Principles.
- report to work physically fit and mentally alert for duty.
- report any dangerous or potentially dangerous condition to the supervisor/coach.
- stop any unsafe job or task immediately upon observing it and find a way to make it safe before continuing.
- not engage in horseplay.
- not use cell phones while operating mobile equipment or other vehicles.
- not tamper with any emergency medical supplies or emergency vehicles.
- not interfere with any radio communications.
- not interfere or disable remote, automatic equipment, safety interlocks or warning systems or guards which could contribute to a safety event.
- not fail to report fatigue-related issues to your supervisor so proactive measures can be taken.
- not tamper with the scene of a safety event.
- not engage in distracting activities while operating a company vehicle or a piece of equipment.

PURPOSE

The purpose of the General Code of Safe Practices is to provide all employees and contract employees with proven safe practices that are common to all Phelps Dodge, North America One Mine Operations. Each employee must understand these safety practices, become familiar with them, and abide by them. Lack of understanding or familiarity with safety rules is not an acceptable reason for a safety rule violation. Employees violating safety rules may be subject to disciplinary action up to and including discharge in accordance with the provisions of the Guiding Principles.

Coaches/supervisors are responsible for the enforcement of all rules. Coaches/supervisors instructions shall not be contrary to this General Code of Safe

Practices. Changes to this document need to be brought to the attention of the supervisor.

HEALTH AND SAFETY EXPECTATIONS OF ALL EMPLOYEES

- Safety must never be compromised.
- Accept responsibility for your own health and safety as well as the health and safety of others.
- Employees are responsible for evaluating all jobs or tasks and positioning themselves in a manner that will prevent injury to self or others.
- Follow established safety procedures and safe work practices at all times.
- Utilize Consequence Thinking (CT), identify, evaluate and control all energy sources including behaviors, so that injury will not occur to yourself or others.

CARE AND USE OF THIS CODE

- Become familiar with and abide by the contents of this manual. Compliance is a condition of employment.
- For quick reference keep this code in a suitable on-the-job location.

HEALTH AND SAFETY EVENTS / INCIDENTS

Definition of a safety event: All incidents that result in employee injury and/or damage to property or equipment.

- Report all injuries, illnesses, and property damage incidents to your supervisor immediately and no later than the end of your shift.
- Employees are expected to report all incidents and injuries to their supervisor and to obtain first aid or medical treatment as necessary.
- The supervisor is responsible to complete a Health and Safety Incident Report when a safety incident occurs.
- Supervisors will report health and safety events to the Health and Safety Department and department management as soon after the event as possible.

NEAR MISS

A near miss is a health or safety incident that could have resulted in an occupational exposure, injury, fatality, or property damage, but did not. A hazardous condition by itself should not be interpreted as a near miss, unless an action or behavior of a person interacts with the condition, resulting in a close call (i.e., near miss). Utilize your site near miss reporting system.

TASK TRAINING

Each shop and operations area has a task training list. Do not attempt to undertake any task on the list unless you have been task trained. If you are assigned a job that is not on the list consult your supervisor before beginning the task. If you have questions regarding your task training or concerns about your ability to perform any assigned task discuss them with your supervisor prior to performing the task.

Prior to signing any task training card it is the employee's responsibility to understand the task. The employee should review all pertinent SOPs/JSAs and specific codes for that task. If the employee does not understand the task or has additional questions he/she shall contact the supervisor/coach.

SECTION II

SEWAGE AND BLOOD BORNE PATHOGENS

- Work on septic systems, rest rooms or performing any other task where you could come in contact with sewage or body fluids, requires impervious protective gloves, full eye coverage and face protection.
- If skin contact occurs with sewage, blood, or body fluid, wash immediately with soap and water or antibacterial cleaning agent and immediately report the incident to your supervisor.

HAZARD COMMUNICATION PROGRAM

Hazard communication is the employee's right to know about the chemicals they use. The program ensures that all chemicals produced or used in the plant are evaluated and the hazards associated with them identified. Information concerning the hazard is transmitted to employees, who then possess the knowledge to properly use, store and handle the chemicals, both under normal conditions and in foreseeable emergencies.

WORKING WITH CHEMICALS, REAGENTS, SOLVENTS, FUELS, GREASE AND OILS

- The Environmental Department and the Health and Safety Department must approve all chemicals and a copy of the MSDS must be on site before any chemical can be brought onto the property. (This includes chemicals for testing purposes as well.)
- MSDS are to be kept in department work areas and can also be found on the safety web pages.
- Review Material Safety Data Sheets (MSDS) before handling any chemical material. Know the emergency procedures should accidental contact occur.
- Wear appropriate PPE as listed in the Material Safety Data Sheet (MSDS).
- Know the emergency procedures in case of accidental contact.
- Locate exits and inspect emergency wash stations and fire extinguishers.
- Container must be properly labeled to identify the contents.

DOWNED ELECTRICAL LINE

- Contact help; use Emergency/Mayday procedures if needed.
- Secure the area to ensure the safety of others.
- Electrical Department and the Safety Department should be contacted as soon as possible.

- If you are on equipment or in a vehicle in contact with an electrical line do not exit the equipment or vehicle unless the vehicle or equipment becomes unsafe.
  1. Attempt to move the equipment or vehicle away from the downed line if possible.
  2. If the vehicle or equipment is on fire, jump as far as possible to clear the vehicle or equipment, making sure you do not contact the ground while you are touching the vehicle, the equipment or electrical line.
  3. Exit the area by taking short hops or shuffling your feet along the surface without breaking contact with the ground. This reduces the "step potential". Step Potential is the reduction of electrical voltage from the point the electrical energy enters the ground extending in an outward direction away from the point of contact. By taking short hops with your feet together or shuffling your feet you prevent electricity from traveling through you to the ground.
- Do not attempt to extinguish an electrical fire with water or foam until power has been shut-off.

FIRE PRECAUTIONS

- Engines, cell phones and hand held two-way radios must be shut off before refueling.
- No open flames or smoking within 35 feet of flammables or combustibles for exceptions consult the NAOM hot work policy.
- No open flames or smoking within 50 feet of explosives.
- Specific precautions must be taken when cutting, welding, or other spark- producing work is performed around SXEW plants. Consult pertinent SOPs before working in these areas.
- Open fires for warming purposes or for heating lubricants are prohibited. Only UL (Underwriters Laboratories) approved stoves and heaters may be used.
- Gasoline or fuel oil can only be carried or stored on vehicles in properly labeled approved Type I or Type II metal safety containers.
- Do not fill fuel containers in the bed of a truck with a plastic bed liner. Static electricity could cause gas vapors to ignite. Use of a ground bonding wire is acceptable.
- Materials subject to spontaneous combustion (such as oily rags) must be put in approved metal containers with a lid.
- Flammable liquids and aerosol cans may only be stored in approved storage cabinets.
- Never expose a battery to an open flame.
- Become familiar with floor plans and emergency evacuation routes posted in your area.
- Know the location of fire extinguishers and ensure they are the proper type for the flammable and combustible materials in the area.

HOT WORK

All hot work including cutting, welding, or applying heat to vessels or pipes must be done in compliance with the hot work policy. Consult the NAOM Hot Work Policy prior to conducting this type of work.

ENVIRONMENTAL AND HAZARDOUS SPILLS

- All hazardous material spills or chemical releases must be reported immediately to your supervisor. (A spill is defined as any unexpected or uncontrolled release of a substance or material.)
- The supervisor will immediately contact Security to dispatch the fire department (if necessary).
- The supervisor will contact the Environmental Services Department to report the spill immediately.

NATURAL GAS

- Discovered or suspected natural gas leak:
  1. Clear the danger area and move to a safe designated meeting point.
  2. Notify Security immediately, use emergency number and/or Mayday Procedures.
- Around or near the leak area:
  1. Do not smoke or allow open flames.
  2. Do not take radios or cell phones near or into the leak area.
  3. Do not turn off equipment, lights or machinery. Breaking the electrical connection could cause a spark.
  4. Do not re-enter until the area has been checked and verified to be safe for re-entry.

SECTION III

IN PIT TRAFFIC SAFETY

- All persons driving a vehicle in the pit area must be “Pit Driving” certified. Or must be escorted.
- Emergency vehicles always have the right-of-way above all.
- Haulage trucks and heavy equipment in the mine have the right-of-way over small vehicles.
- Always drive to the conditions of the roadway and environment; speed in excess of the posted speed limit is prohibited.
- Visibility from haulage equipment is very limited, if you can’t see the operator, he/she can’t see you. Approach all stopped equipment and haul trucks from the front or the operator’s side.
- Never park small vehicles in the blind areas in front of, behind, or on the right side of a haul truck. Park on the left side, and in all cases, in the operator’s view.
- Do not pass haulage trucks or other heavy equipment on pit roads without verbal verification with the operator. Do not pass at intersections, blind curves or “no passing zones” in the mine.
- Passing procedure:
  1. Make direct radio communication with the equipment you would like to pass using proper call numbers.

2. Make your request to pass.
3. The equipment operator must respond with their call number and give approval before they can be passed.

- Do not pass haulage trucks or equipment on the left side in left-hand traffic areas.
- All vehicles entering the mine must have a two-way radio and buggy whip with some form of working light at all times. Buggy whips will be required beyond given points that will be identified and marked.
- Buggy whips must be a minimum of 12' tall; measured from ground level to the top of the light.

PRE-OPERATION VEHICLE / EQUIPMENT INSPECTION

- Pre-shift inspections are required before operation. Defects that will limit the safe use are to be noted and the vehicle is not to be operated until repaired.
- Records of defects shall be retained until the defects are corrected.
- Place a "Do Not Operate" tag on the vehicle or equipment if a defect is found that makes it inoperable. List the defect(s) on the tag. Vehicles/equipment are not to be operated once the tag is in place except by authorized repair personnel.
- Defects that affect the safe operation of the equipment will not be placed in operation.

OPERATING VEHICLES / EQUIPMENT

- Seatbelts must be worn at all times by all passengers and operators.
- Operate with headlights on at all times.
- It is prohibited for anyone to ride in the back of any pickup or truck bed.
- Never allow anyone to stand on the running boards or hang onto the side of a moving vehicle.
- Before moving in a forward direction from a parked or stationary position sound the horn twice. This is not required if you have already been in motion or if you are on a roadway where moving vehicles are expected.
- Before backing up, sound the horn using three short blasts unless a working automatic backup alarm/horn is present.
- All vehicles must come to a complete stop and sound horn before entering or exiting any building.
- Always secure loads or equipment before transporting.
- No one is allowed under a parked vehicle for maintenance or inspection unless the vehicle is properly secured with wheel chocks and the emergency brake engaged.
- Vehicles/mobile equipment will not be left unattended and running unless the controls are placed in the park position and the parking brake is set with the wheels blocked. (refer to local SOP for rail/locomotive equipment)
- Service vehicles rated at one ton and above will have the wheels chocked and the brake set any time they are parked. All other equipment must have the brake set when parked and the wheels chocked when parked on a grade. Ditches or windrows may be used in lieu of wheel chocks. A grade is defined as an obvious change in elevation.

- Maintain a minimum of three vehicle lengths of distance between you and the vehicle being followed.
- When pulling/towing ensure hitch is securely fastened and use safety chains.
- If involved in a traffic incident, do the following:
  1. Stop immediately.
  2. Secure the area and immediately notify your supervisor.
  3. If an incident occurs when you are off the property, notify local law enforcement immediately and your supervisor as soon as possible.
  4. If any injuries have occurred see that the person(s) receive medical attention immediately.
  5. Do not discuss the incident with anyone outside of PD personnel or the law enforcement. Do not move the vehicle(s) from the scene until supervisor and/or law enforcement officials release the scene unless the location of the vehicle presents an additional hazard.
- Park no closer than 50 feet or the height of a high wall from high walls and benches.
- Lower all buckets, forks, rippers, grader blades or other suspended attachments on mobile equipment to the ground before leaving equipment unattended.

WORKING AROUND RAILROAD TRACKS

- **Do not** stop or park a machine or vehicle closer than 10 feet from the edge of the nearest rail track.
- **Do not** climb over/under/between or get on rail cars or locomotives unless authorized to do so.
- When work must be performed within 10 feet of the nearest rail, you must:
  1. Notify your supervisor and/or train crew of work on or around railroad tracks.
  2. Use the proper blue signs or blue signs with white lettering to notify oncoming trains to stop.

WORKING AROUND MACHINERY OR EQUIPMENT

- Do not get on belts, gears, conveyors or shafts unless they are properly locked and tagged out.
- Do not ride in the bucket or on the catwalks of any mine equipment.
- All moving belts, gears, or shafts must be properly guarded.
- Do not remove a machine guard without shutting the machine down and properly locking it out.
- Replace guards before starting machinery.
- Do not drive over welding leads, power cords, water hoses, air-lines, or oxygen/fuel gas hoses.
- Only trained and qualified employees shall operate or attempt to repair any piece of equipment.
- All employees shall strictly follow the Lockout / Tagout / Tryout Policy when repairing or inspecting equipment that could start up unexpectedly.

JUMP STARTING BATTERIES

- Eye protection must be worn. (Safety glasses with side shields at a minimum)
- Contact with battery acid to skin or eyes require immediate flushing with water for a minimum of 15 minutes and seek medical attention.
- Both vehicles should be out of traffic and not touching each other, with parking brakes set.
- Turn off ignition and any other electrical switches during hook-up.
- Do not smoke around open or charging batteries.
- Never intentionally create sparks on the terminals.
- Make the first connections between the positive post (+ or red) of each vehicle's batteries.
- Attach the ground lead to the negative post (- or black) on the donor battery. The last connection is to the frame or engine block of the disabled vehicle. To avoid a hydrogen explosion, make this connection at least 12 inches from the battery.
- After starting disabled vehicle, remove cables in reverse order.
- A whistling sound coming from a battery means the battery may explode. Evacuate the area immediately.

SECTION IV

PERSONAL PROTECTIVE EQUIPMENT (PPE)

- PPE must be worn at all times as required in all shop, mine and operational areas including vehicles, equipment, tailings dam and smelter areas. Because of limited headspace in some vehicle models, a supervisor may grant an employee the approval to remove their hard hat while inside of that particular vehicle if it is shown that wearing the hardhat is hazardous to the employee's safety.
- The minimum PPE requirement is hard hat, safety glasses with side shields and safety footwear. In some areas, gloves, ear plugs, respirators, reflective vests or other special equipment may be required. Personnel are not required to wear PPE while in offices, lunch rooms, meeting rooms, etc. Hard hats must meet ANSI Z 89.1 standard.
- Safety glasses including prescription eyewear must meet ANSI Z87.1 standards and have side shields.
- Hearing protection will be worn in posted areas, whenever noise levels reach or exceed 85 decibels or whenever normal conversation cannot be carried out at "arms length" due to noise.
- Hearing protection is required when operating pneumatic air tools.
- Double hearing protection (earplugs and muffs) will be worn in posted areas, and areas where noise levels reach or exceed 105 decibels.
- Safety footwear is defined as appropriate for the job and approved by ANSI with a hard protective toe, a 6" top and well-defined heel if your work requires any use of ladders.

- Personal protective equipment will not be modified in any way and will be maintained in a serviceable condition.
- Glove selection shall be based on performance characteristics of the gloves, conditions, duration of use, and hazards present.
- When respiratory protection is necessary make sure to use the correct cartridge.
- Respirator fit testing is required prior to use. If your job requires you to wear a respirator, you must be clean-shaven around the area where the respirator seals against the face.

FLAGGING

- Flagging is used as a warning to indicate that a hazard or unsafe condition exists. Flagging alone is not sufficient where there is potential for falls or other significant hazards, in these cases barricading must installed in addition to flagging.
- Employees identifying an area needing flagging must advise the area supervisor of the need.
- Flagged area must be tagged. Enough tags should be placed on the flagging so that they may be seen from all access points.
- There are two colors used for flagging:
  Yellow flagging – This flagging shall be used to identify areas where potential hazards exist with low energy sources. Employees shall not enter a yellow flagged area unless they have business (work in progress) that cannot be conducted elsewhere. If this is the case, the individuals seeking access will familiarize themselves with the hazards written on the tag. The employee(s) should then proceed with caution once they are aware of the hazards and/or work in progress.
- Red flagging – This flagging shall be used to identify areas that contain known hazards with medium or high energy sources. No one is to enter a RED flagged area except for those individuals responsible for controlling the hazard.
- Flagging can only be removed when the identified hazard has been eliminated.

BARRICADING

Barricading shall be used to keep persons out of a hazardous area where an immediate hazard exists. The barricade shall be tagged to describe the nature of the hazard. Floor openings shall be covered with appropriate material or otherwise barricaded in such a way that impedes travel into the area. Barricading material shall be of substantial strength to impede travel into the area.

CLOTHING AND ACCESSORIES

- Clothing requirements for operational areas: long pants, shirt or other top with sleeves.
- Loose clothing and long hair needs to be secured when working around moving machinery.
- Clothing shall fit well and be in reasonable condition.
- Sleeveless shirts, tank tops, sandals and shorts are not to be worn in operational areas.

- Jewelry including finger rings, chains, bracelets, nose, lip, eyebrow and other facial jewelry is prohibited where there is a hazard of contact with tools and machinery.
- Earrings cannot extend beyond the outer edge of the ear, and protective backs must be present.
- Only watches and bracelets (Medical Alert) that connect to the band with break away pin feature may be worn.

WORKING AROUND DAMS AND BODIES OF WATER

- Life vests are required to be worn when working or driving around open bodies of water where the possibility of falling into the water is present.
- Catwalks and floating pump stations that are completely surrounded by hand rails do not require a life vest as long as all of the work is done inside of the hand rails. If work takes you beyond the hand rail, a life vest must be worn.
- Areas requiring life vests will be posted.

BLASTING OPERATIONS

- No unauthorized personnel or equipment are permitted within 50 horizontal feet of any blasting material or operation.
- Smoking and open flames are not allowed within 50-foot of any blasting area or operation.
- Yellow cones will be set up to designate a loading zone. Only authorized personnel are the only ones allowed to enter or remove cones and signs.
- Guards protecting a blast or clearing an area prior to a blast are to be obeyed promptly and without question.
- Observe radio silence when requested prior to the blast.
- A siren will sound over the mine radio frequency during the blast as guards report their positions.
- All work in a blast area will immediately cease and employees will be cleared of the area without hesitation when notified by blasting personnel of impending lightning.
- Only authorized blasting personnel will perform handling of miss-fires.
- After a blast traffic will be cleared to enter a blast area only after authorization by blasting personnel.

WORKING AROUND ELECTRICAL EQUIPMENT AND INSTALLATIONS

- Never assume that an electrical circuit is de-energized.
- Only trained qualified personnel, with proper Personal Protective Equipment, may engage electrical switches between 240 and 600 volts or breakers with less than 100 amps, as marked with labels.
- Only use UL-Approved (Underwriters Laboratories) and MSHA/OSHA -acceptable electrical equipment tools, appliances and extension cords.
- Maintain clearances around electrical panels (18” on each side, 36” in front).
- Maintain 10 feet from un-insulated overhead power lines of 50,000V or less. See the ESST Guidance Document for higher voltage clearances.

- Never make a lift with any crane or boom equipment over or under an overhead power line without first de-energizing the line and following Lockout/Tagout/Tryout procedures.
- Always use approved insulated tools to move trailing power cable unless proper tag and lockout procedures have been followed to de-energize the trailing power cable.
- Do not drive over unprotected power cables.

INSPECTION OF WORK AREAS

Work areas must be inspected at least once every shift, defects must be noted and reported immediately. Records must be kept for a period of one year. The record must include the person performing the inspection, the area inspected, and the date of the inspection.

HOUSEKEEPING

- Designated walkways are to be kept clear of any tripping hazards.
- All waste containers in eating areas must have a lid.
- Before an employee considers a job complete, all debris must be cleaned up and all tools and materials returned to the proper storage place.

LIFTING HEAVY OBJECTS

- Size up the load. Tip/lift one corner, if it's too heavy get help or use mechanical assistance.
- Before lifting, check the item for nails, sharp corners, splinters or jagged edges. Remove or cover sharp or rough objects.
- Check all floors and walkways where you will pass with the load.
- Make sure there is adequate space for you and the load to pass.
- Use proper lifting method:
  1. Squat as close as possible to load. Keep the load inside your line of power.
  2. Draw the load close to your body and lift with your legs.
  3. Turn your feet so you don't twist while lifting the load.
  4. Reverse procedures to set load down.
- If it is necessary to tilt load to get a hand underneath, place a safety block underneath to prevent a pinch point.

PORTABLE LADDERS

- Wedge soled boots are not allowed to be worn while working on a ladder.
- When a ladder needs to be replaced, replace it with a Type 1A 300-lb. or above rated fiberglass ladder.
- Placement of a ladder should be one foot away from support for every four feet of height.
- The ladder must extend three feet beyond top of support to be used for access.
- Tie or secure ladders before performing work.
- Do not reach out from a ladder more than an arm's length.

- Face the ladder and maintain a minimum of three points of contact while climbing up or down.
- Do not climb higher than the third rung from the top on straight or extension ladders or higher than the second tread from the top on stepladders.
- If the ladder is being used as a workstation the area must be flagged off or other warning devices used to keep unauthorized personnel from entering the area.

FALL PROTECTION

- Where a fall hazard exists adequate fall protection shall be used.
- Fall protection anchors shall be adequate to withstand the forces of the fall
- Waist belts shall not be used as fall protection devices
- Employees shall use only approved fall protection devices
- Scaffolding shall be erected with handrails. The scaffolds should include toe boards if material is being loaded on or off the scaffold deck.
- Scaffolding shall be inspected by a competent person

HAND TOOLS

- Screwdrivers, hammers, or sharp-ended tools such as non-folding pocket knives, are not to be carried in clothing pockets.
- Use only grounded or UL-Approved, double insulated portable tools, with the case in good condition. Do not remove or bypass the ground prong on a three-prong plug.
- When using electric hand tools in wet conditions always use GFCI protection.
- Portable, powered, hand-held tools must not be used if they have a continuing action button. Tools must stop if the operator releases the trigger.

STACKING AND STORING MATERIALS

- Walkways between stacked or stored material must be at least three feet wide.
- Do not climb on stacked or stored material.
- Do not stack heavy loads on materials or racks that will not support their weight.
- Do not stack pipe any more than two pipes high (10” and above in diameter) or two feet high unless there are engineering controls in place to safely control the possibility of a stack collapsing.
- Supports must be used to keep round or cylindrical objects from rolling.
- Drums or barrels stacked on end must have cribbing between each layer, and the top layer must be stepped back or offset.

COMPRESSED AIR

- Do not direct a stream of compressed air at anyone.
- Compressed air used for cleaning must be reduced to 30 psi or less.
- Compressed air must not be used to clean clothing.
- Quick disconnects larger than ¾” inside diameter must have safety pins and whip cables attached to the hose, pipe connection and between connected hoses, unless automatic shutoff valves are used. Whip checks are required for air hoses ¾” or larger.

- Do not use compressed air to leak test unrated pressure vessels unless SOPs for such testing (eg, pipes, fuel tanks, etc) are reviewed and approved by a professional engineer (PE) or certified pressure vessel inspector. The review and approval process should include testing with properly calibrated regulators and gauges.
- Relief valve flow capacities must match those of the air pressure generating device, according to nationally recognized pressure vessel codes (ASME, API, NBIC, etc).

COMPRESSED GAS CYLINDERS

- Cylinders must be secured from falling at all times, whether in use or being stored.
- All compressed cylinders will be capped or protected from damage when not in use.
- Flammable and combustible cylinders shall not be stored with oxygen cylinders.
- No cylinder shall be lifted by the valve protector cover.
- No cylinders of any type shall be stored near combustible materials or sources of heat.
- Every precaution must be taken to prevent oil and grease from coming into contact with compressed oxygen systems.

WORKING WITH SUSPENDED LOADS

- If equipped, outriggers must be fully extended before any boom movement is performed.
- Check load charts for lifting capacity prior to lifting.
- Know and use hand signals appropriate to crane operations.
- Only one person will give hand signals to the crane operator.
- Anyone can give the signal for an emergency stop.
- Never guide a suspended load by hand. Use tag lines or a guide pole to guide a load into the desired position.
- All suspended loads must be securely cribbed or blocked before beginning any task under them.
- Never leave a suspended load unattended.

SECURING THE WORK AREA

- When working overhead make sure that all exposed areas underneath are properly flagged off, or barricaded, against entry of people or machinery.
- Guard and/or barricade off all open manholes, trenches, holes or floor openings which could create a fall hazard to people or vehicles. Never leave a hazardous condition unattended, post a guard as needed. (See Barricading and Flagging)
- Arc welding or cutting must be properly shielded to prevent others from being exposed to flashes.
- When using burning equipment protect personnel from sparks or metal splashes by setting up necessary barriers and guards.
- Do not pass through a guarded or flagged area or go around a welding curtain without authorization.
- Do not remove guards from machinery that is not locked out.
- Proper install all guards before releasing any equipment for use.

BERMS AND GUARDRAILS

- Berms along elevated roadways and stockpiles will be at least axle height of the largest piece of equipment traveling on the roadway.
- Do not remove berms without authorization.
- Do not drive through berms.
- Do not climb higher than 2/3rds towards the top of berms at stockpiles, on benches or wherever drop-offs exist.
- Employees will not get closer than 15' to the crest of an active shovel pit.

SEEKING SHELTER UNDER ROCKS, BANKS AND VEHICLES

- It is prohibited for employees to seek shelter from the sun, rain, lightning, wind, or any weather condition under any mobile equipment, railroad cars, rocks, or banks.
- During a lightning storm seek shelter inside a building or vehicle. While inside of a vehicle it is very important not to make contact with anything that is metal until the lightening has cleared.

SECTION V

CONFINED SPACE ENTRY

Work performed in confined spaces can create hazards not present under normal circumstances. Do not enter a confined space unless you are trained to do so. For additional information on confined spaces, refer to your local confined space entry policy.

A confined space is one that meets but may not be limited to one of the following criteria:

- An enclosed area large enough to enter.
- An area not meant for normal human occupancy.
- An area having limited means of entry and exit.

Title:	**Hot Work Permit and Policy**
Procedure No.:	HS-02-001
Area:	North America One Mine
Issue Date:	January 13, 2005
Revision Date:	**TBD**

Purpose

To ensure all safety precautions are taken before, during, and after hot work activities to prevent fires or explosions.

Definition

Hot work means work involving electrical or gas welding, cutting, brazing, heating, burning, grinding or similar flame or spark producing operations.

Required Areas

A hot work permit is required for hot work operations on or near operational processes.

Exceptions to the Hot Work Program may be allowed only in areas designated as “fire safe”. A fire safe designated area is an area specifically designed for hot work, such as welding or maintenance shops which are free of exposed combustibles. Department personnel may identify and document fire safe areas and tasks. Those areas, their identified tasks and associated SOP’s will be kept on file in the respective department.

Procedure

Job Origination Once a job is assigned, personnel who perform the work must determine if hot work will be present when performing the task. If so, the Hot Work Permit procedure must be initiated in addition to other applicable programs such as Lockout/Tagout/Tryout and Confined Space Entry.

Site Preparation Requirements

1. Inspect the area where the work is planned and determine the site preparation requirements. Use the Hot Work Permit checklist. Combustibles must be moved 35 feet away or covered with nonflammable material. All openings (cracks, vents) that could permit a spark to enter must be covered.
2. Test for the presence of flammable gases/vapors and excessive oxygen whenever there is a reasonable possibility they exist; all process vessels and pipelines (except potable and fresh water) must be tested. The following conditions must be met before work can proceed:
   - LEL must be below 10%
   - O2 measurement must be between 12 and 23%

3. A fire extinguisher of the appropriate size and type must be provided at the site.

Hot work on Containers Containers holding flammable or combustible liquids or gases must be purged, cleaned, and filled with inert liquid or gases and tested to ensure that LEL level is below 10%.

Alternative Means of Control In cases where combustibles cannot be removed to provide at least 35 ft. of separation, or if "no" is marked on the Work Area Evaluation section of the permit, a control method must be described in the Alternative Means of Control section of the permit. The alternative means of control must eliminate the risk of fire. Examples are: covering with fire proof tarps, sealing of cracks and vents, wetting down material, or the use of a fire watch.

Standard Operating Procedures should be developed for frequent tasks where an alternative means of control is required (Examples: welding on lined ducts, welding on haul truck). The approved SOP is considered an alternative means of control.

Complete and Display Permit Once the initial site preparation is complete the crew member(s) will complete every line on the permit and display the form at the job site. The permit will be signed by all persons conducting or assisting with the hot work and by an area supervisor or designee who understands the fuel sources in the work area. In remote areas, it is permissible that the area supervisor can designate one of the persons conducting the hot work to represent the area supervisor.

It is the responsibility for those conducting the work to ensure that all precautions have been taken.

The permit will remain at the work site until the work is complete and then sent to the planner for filing. Each permit is good for one shift only.

Designated Fire Watch The person(s) conducting the site preparation inspection will determine if a fire watch is required. A fire watch is required when uncovered combustible materials remain within 35 feet of the hot work and when wall or floor openings with 35 feet are present and have not been controlled to eliminate the possibility of ignition.

Each person assigned to fire watch will sign and date the permit.

Periodic Checks As the work progresses, periodic checks will be conducted observing for fire, dust accumulation, adequate ventilation, volatile gas accumulation, and any other hazardous condition which may endanger the safety of the workers. At a minimum, such checks will be made at least once each hour while the work continues. Personnel performing the work will conduct the checks. If conditions are found that require correcting, work will stop and corrections will be made prior to continuing work.

Job Completion In the event the work is not completed during the shift, the oncoming person must initiate a new hot work permit. The person(s) completing the job will en-

sure the area has been monitored for the absence of fire for thirty (30) minutes after the last hot work operation. Date and sign the permit.

File Permit The completed hot work permit form will be forwarded to the area planner. The permits will be kept on file for a period of one year or until an auditor has released them for disposal.

Contractors

Contractors must implement a hot work policy that meets or exceeds this policy.

Examples of Hot Work Permit Areas

Areas that require a *Hot Work Permit* include, but are not limited to:

- Within 100 feet of powder magazines or any explosive or blasting storage area
- Dust collectors, ductwork and any other areas where rubber linings or combustible dust exists
- All public commercial buildings, warehouses, assay labs
- Entire SX & EW plants and related work areas
- Above or adjacent to cable trays or electrical cables
- Inside vessels and confined spaces
- Work on vehicle fuel system or fuel tank regardless of location
- Heavy equipment including haul trucks, shovels, drills, graders, dozers regardless of location where sparks or hot metal could contact combustible materials (e.g., hydraulic tanks, fuel tanks, tires, etc).
- Within 35 feet of:
  - Fuel (gasoline, diesel, oil, natural gas) tanks, storage areas, service stations, and distribution lines
  - Battery storage or battery charging areas
  - Cooling towers
  - Acid and other reagent storage
  - Liquid oxygen storage areas
  - Sewer and septic systems

- Conveyor belting rubber bonding areas, rubber storage areas, tire storage areas
- Lubrication vehicles or flammable transporting vehicles

APPENDIX B

PHELPS DODGE PROPERTY ENTRY POLICY

Property Entry

Purpose
The purpose of this property entry document is to standardize and clarify property entry requirements among the Phelps Dodge NAOM mining properties.

Scope
These policies apply to the surface areas of Phelps Dodge Copper Mining Companies in North America. The requirements apply to all Phelps Dodge and contract personnel.

Responsibilities
It is the responsibility of every person entering the mine property to understand and comply with the requirements set forth.

Procedure

[B]Training Requirements for Persons Entering Property
1) Hazard recognition is required for everyone traveling beyond the front office and entering the mine or process areas. All visitors, vendors, and contractors must view site specific Hazard Recognition video at least annually.
2) All contractors are required to have comprehensive MSHA compliant training when they are to perform work on the property.
   - All contract personnel scheduled to perform work activities on NAOM properties are required to have current MSHA training as specified by 30 CFR Part 48.22(b) or 48.22(c) prior to beginning work on Phelps Dodge property.
   - All contract personnel will be required to have site specific hazard training initially and annually thereafter according to 30 CFR Part 48.31. This training will consist of a review of the site hazard video. Contractor employees will receive this training prior to performing any work activities.
   - Upon completion of the hazard training the contract personnel will receive a Hazard Recognition Training card which the contract personnel will have in his or her possession at all times while on property. Security will also keep a log of contract personnel on site.
3) Corporate personnel who intend to work or travel unescorted in the NAOM sites must maintain comprehensive MSHA compliant training.
4) The five day training exemption will only apply for technical experts performing emergency work.

[M]Pit Driver Training
Pit driver training is required at all NAOM properties for all unescorted visitors, vendors, contractors, and employees when their travel is such that any haul truck traffic routes will be encountered.

[B]Escort Required for Vendors/Contractors
An escort will be required for persons untrained in pit driving and for vehicles not properly equipped. An escort may also be required in processing areas depending on the destination.

[B]Signing In and Signing Out with Security
All visitors, vendors, and contractors will sign-in and out with Security. Appointments will be confirmed by Security before an individual will be allowed to enter the property.

[B]Personal Protective Equipment (PPE)
The following PPE requirements will be standard for all NAOM sites:

- Hard hats are required to be worn in mobile equipment, including light vehicles. Control points will be defined by each branch.
- Wherever safety glasses are required they must be equipped with side shields – this requirement includes prescription safety glasses.
- Reflective vests must be worn by all personnel when outside a vehicle in production areas or near roadways where vehicles or equipment may be in motion.

[M]Buggy Whips
Buggy whips shall be a minimum of 12 feet in height measured from the ground and are required on all light vehicles that travel in the mine area. They must have a brightly colored (orange with reflective stripes) flag. Lights and whips will be made available at the gates for contractors and vendors that enter the mine areas.

Some sites may require buggy whips in the processing areas if large equipment interacts with small vehicle traffic.

[M]Properly Equipped Vehicle for Pit Driving
Vehicles entering the mine must be properly equipped with a radio with appropriate channels once inside the designated control point. A buggy whip with the light on is required at all times when entering the pit.

[M]Flashing Lights for Pit Entry
NAOM properties have adopted the following color assignments for flashing lights on vehicles:

1. Blue - Do not pass without direct verbal permission to do so.
2. Amber – Caution used for disabled equipment. This is also required for man vans.
3. Red – Do not pass at any time. This applies to blasting and emergency vehicles.

[B]Wheel Chocks
On NAOM properties vehicles rated at one ton and above will have the wheels chocked and the brake set any time they are parked. All other equipment must have the brake

set when parked and the wheels chocked when parked on a grade. Ditches or windrows may be used in lieu of wheel chocks.

[B]Horn Signals for Movement of Equipment

All NAOM vehicles will be equipped with a backup alarm or will use the horn to signal when backing up. Standard NAOM horn signals will be:

- One blast - start
- Two blast - move forward
- Three blast – move in reverse

Blasting patterns may be exempt due to the congested but controlled environment.

[B]Headlight Usage

On NAOM properties vehicles will be operated with their headlights on at all times.

[M]Left Hand Traffic

The large haulage trucks utilized in the mine area have an extremely large “blind area” to the front and right side of their vehicle. Placing these haulage trucks on the left side of the road, not only separates the operator’s cabs, it places the driver on the edge of the road where there is better visibility. Left hand traffic is required at all NAOM sites in the mine areas. This requirement is optional in other parts of the property (i.e., processing areas) dependent upon interaction with mine traffic.

[B] Denotes those activities that are required for the entire branch/property.
[M] Denotes those activities that are only required in the mine area of the property.

Definitions

Control Points – boundaries designated by the branch
Grade - an obvious change in elevation
NAOM – North America One Mine

Process Review

This process will be reviewed annually or as changes occur.

APPENDIX C

PHELPS DODGE PRODUCT APPROVAL FORM

Global Supply (initials)_____

Date_____

PRODUCT APPROVAL - CHEMICAL MANAGEMENT FORM

A MATERIAL SAFETY DATA SHEET and a STANDARD OPERATING PROCEDURE (SOP) (if required by Health and Safety) **MUST BE SUBMITTED WITH THIS DOCUMENT FOR APPROVAL**

REQUESTOR INFORMATION ***(Process Description and Proposed Safe Handling sections must be completed by the requestor)***

Name: _____ Phone_____ Date: _____

Department: _____ Immediate Supervisor: _____

Product Name:_____ Manufacturer Name: _____

PROCESS DESCRIPTION **(*To be filled out by the Requestor)***

Fully describe the work activity and process in which this material will be used (include any waste generated; rags, absorbent, waste product, etc.) and attach the H&S required Standard Operating Procedure (SOP)_____

_____

Check all that apply: ☐ One Time Use ☐ Trial Use ☐ Continuous Use ☐ Contractor ☐ Direct Charge or ☐ Stock Item #_____

Quantity used at one time _____Quantity stored _____or No. of Containers _____Container size & type:_____

Location product will be used _____ Location where product will be stored _____

PROPOSED SAFE HANDLING AND USE - Refer to MSDS ***(To be completed by the Requestor)***

What personal protective equipment will be worn? Check all that apply

Eye ☐ side shields ☐ goggles ☐ other (specify) _____ ☐ N/A

Face ☐ face shield ☐ other (specify) _____ ☐ N/A

Body ☐ cloth coveralls ☐ impermeable suit ☐ tyvek suit ☐ other (specify)_____ ☐ N/A

Hand ☐ chemical resistant gloves: type:_____ ☐ other (specify)_____ ☐ N/A

☐ need IH assistance to determine type of glove

Respirator ☐ type: _____ ☐ Need IH assistance to determine type of respirator

Is the container labeled per HazCom Standard? ☐ Yes ☐ No

Is the product regulated as a hazard to human health (e.g. reproductive, carcinogen)? ☐Yes ☐ No Is substitute available? ☐Yes ☐ No

If a safer substitute is available, state reasons for not using: _____

_____

HEALTH AND SAFETY RECOMMENDATION ***(To be completed by Health & Safety)***

Is Product Approved? ☐**Yes** ☐ **No** If yes, ☑ appropriate box: ☐ One Time Use ☐Trial Use ☐Continuous Use ☐ Restricted Use

Comments: _____

_____

Storage requirements (MSDS)_____

NFPA Rating: H: _____ F: _____ R: _____Special: _____ HMIS H:_____ F:_____ R: _____ P:_____

IH/Safety Signature: _____ Date: _____

ENVIRONMENTAL RECOMMENDATION ***(To be completed by Environmental)***

Is Product Approved? ☐**Yes** ☐**No** If yes, ☑ appropriate box(s): ☐ One Time Use ☐Trial Use ☐Continuous Use ☐ Restricted Use ☐ Hazardous Waste

Comments: _____

_____

SARA Section 313: _____/_____/_____/_____ EHS TPQ: _____ CAA: _____Section 112r: _____

CERCLA RQ: _____ / _____/_____/_____ RCRA: Listed:_____ / _____ Potential Characteristic: _____ / _____

Flashpoint: _____ pH: _____ Date of MSDS: _____ Database Line Item #.: _____

Environmental Signature: _____ Date: _____

I fully understand that I must use this product only for its intended purpose and strictly in accordance with all manufacturer's guidelines. I understand that any failure to do so could result in serious harm to myself, others or the environment.

Requestor Signature: _____ Date: _____

NO CHEMICAL SHALL BE BROUGHT ON SITE WITHOUT PRIOR APPROVAL!

APPENDIX D

MATERIAL SAFETY DATA SHEET RECORDS

MATERIAL SAFETY DATA SHEET

SECTION I: IDENTIFICATION OF PRODUCT

COMPANY:	**Diversity Technologies Corp.**	DATE:	May 19, 2005
	8750 – 53rd Ave.	PHONE:	780-468-4064
	Edmonton, AB T6E 5G2	FAX:	780-469-1899
PRODUCT NAME:	**ENVIROPLUG #8, #16 & #20**		
PRODUCT USE:	Oil well drilling fluid additive.		
CHEMICAL FAMILY:	Natural mineral, Montmorillonite	CAS#:	1302-78-9

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)

WHMIS CLASSIFICATION:	D2A
WORKPLACE HAZARD:	Potential carcinogen; contains free silica.

TRANSPORTATION OF DANGEROUS GOODS (TDG)

PROPER SHIPPING NAME:	Not regulated under TDG
TDG CLASSIFICATION:	Not applicable
UN NUMBER (PIN):	Not applicable
PACKING GROUP:	Not applicable

SECTION II: HAZARDOUS INGREDIENTS

INGREDIENT	% (w/w)	CAS NUMBER	LD_{50} Oral-Rat	LC_{50} Inhal-Rat	ACGIH-TLV
Silica, crystalline quartz	2 – 6	14808-60-7	Not available	Not available	0.05 mg/m^3 (respirable)

SECTION III: HEALTH HAZARDS

ROUTE OF ENTRY:	[ ]EYE CONTACT [ ]SKIN [XX]INHALATION [ ]INGESTION
EYE CONTACT:	May cause mechanical irritation.
SKIN CONTACT:	Possible drying resulting in dermatitis.
INGESTION:	No adverse effects expected.

INHALATION:	May cause irritation of the upper respiratory tract. This product contains crystalline silica. Breathing silica containing dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Chronic inhalation may cause silicosis, a progressive, disabling and sometimes fatal lung disease. Chronic inhalation exposure to crystalline silica quartz has been observed to cause lymph node effects, kidney effects and auto-immune disease.
CARCINOGENICTY:	Bentonite is not listed by ACGIH, IARC, NTP or OSHA. Crystalline silica, when inhaled from occupational sources, is considered as a human carcinogen by IARC (Class 1) and by NTP. ACGIH classifies crystalline silica, quartz, as a suspected human carcinogen (A2).
TERATOGENICITY:	No information available.
REPRODUCTIVE TOXICITY:	No information available.
MUTAGENICTY:	Crystalline silica has been shown to cause mutagenic effects in human cells in-vitro.
SYNERGISTIC PRODUCTS:	No information available.

SECTION IV: FIRST AID MEASURES

SKIN CONTACT:	If irritation occurs, or when shift ends, wash with soap and water until clean.
EYE CONTACT:	Flush with water until irritation ceases. If irritation persists, contact a physician.
INGESTION:	No first aid required; material is non-toxic.
INHALATION:	Move to area free from dust. If symptoms or irritation persist contact a physician. Inhalation may aggravate existing respiratory illness.

SECTION V: PHYSICAL DATA

APPEARANCE AND ODOUR:	Pale grey to buff powder or granules; odourless		
SPECIFIC GRAVITY:	2.5		
BOILING POINT (°C):	Not applicable		
MELTING POINT (°C):	1450		
SOLUBILITY IN WATER:	Insoluble	pH:	8-10 (5% suspension)
PERCENT VOLATILE BY VOLUME:	Not applicable		
EVAPORATION RATE:	Not applicable		
VAPOUR PRESSURE (mmHg):	Not applicable		
VAPOUR DENSITY (air = 1):	Not applicable		
BULK DENSITY:	See Product Data Sheet for specific product.		

SECTION VI: FIRE AND EXPLOSION HAZARD DATA

FLASH POINT:	Not applicable
FLAMMABLE LIMITS:	Not applicable
EXTINGUISHING MEDIA:	Use media suitable for surrounding fire and packaging.
SPECIAL FIRE FIGHTING PRODCEDURES:	Self-contained breathing apparatus required for fire fighting personnel.
UNUSUAL FIRE AND EXPLOSION HAZARDS:	Product becomes very slippery when wet, avoid using water as fire fighting agent.

SECTION VII: REACTIVITY DATA

STABILITY:	STABLE [XX]	UNSTABLE [ ]
INCOMPATIBILITY (CONDITIONS TO AVOID):	None known.	
CONDITIONS OF REACTIVITY:	Not available.	
HAZARDOUS DECOMPOSITION PRODUCTS:	None known.	
HAZARDOUS POLYMERIZATION:	WILL NOT OCCUR [XX]	MAY OCCUR [ ]

SECTION VIII: PREVENTATIVE MEASURES

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION:	NIOSH/MESA approved respirators for silica bearing dust.
VENTILATION:	Use local exhaust ventilation, process enclosure or other engineering controls to maintain concentration of airborne dust below TLV.
PROTECTIVE GLOVES:	Generally not necessary; personal preference.
EYE PROTECTION:	Suggest goggles or safety glasses.
OTHER PROTECTIVE EQUIPMENT (Specify):	Ensure emergency eye wash station and safety shower are available.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Avoid creating dust. Avoid breathing dust; wear an approved respirator. Practice reasonable caution and personal cleanliness. Avoid eye contact. Store in cool, dry area. Empty packages contain residual hazardous material; handle as if full.

STEPS TO BE TAKEN IN CASE THE MATERIAL IS SPILLED OR RELEASED

Wear an approved respirator. Vacuum if possible to avoid generating airborne dust. Collect uncontaminated material for repackaging. Collect contaminated material in an approved container for disposal. Avoid adding water; the product will become slippery when wet.

WASTE DISPOSAL METHOD

Dispose in accordance with federal, provincial and local regulations. It is the responsibility of the end-user to determine if material meets the criteria of hazardous waste at the time of disposal. Empty packaging must be disposed of, or recycled, in accordance with local regulations.

SECTION IX: PREPARATION

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

DATE ISSUED:	May 19, 2005	BY:	Product safety committee
SUPERSEDES:	May 21, 2002	PHONE:	780-440-4923

Diversity Technologies Corp. is the parent company of
Canamara-United Supply, Hollimex Products and Canamara SDS.

MSDS Number: **H3886** * * * * * *Effective Date:* ***02/16/06*** * * * * * *Supercedes:* ***05/07/03***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

HYDROCHLORIC ACID (10%-33%)

1. Product Identification

Synonyms: This MSDS applies to the concentrated standard used to make laboratory solutions and any solution that contains more than 10% but less than 33% Hydrochloric acid. For diluted product, see MSDS for Hydrochloric Acid (less than 10%).
CAS No.: 7647-01-0
Molecular Weight: 36.46
Chemical Formula: HCl in H2O
Product Codes:
J.T. Baker: 0323, 0327, 0365, 4654, 4657, 5618, 5619
Mallinckrodt: 2608, 2625, H151, H168, V035

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Hydrogen Chloride	7647-01-0	10 - 33%	Yes
Water	7732-18-5	67 - 90%	No

3. Hazards Identification

Emergency Overview

POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 2 - Moderate
Contact Rating: 4 - Extreme (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

Potential Health Effects

Inhalation:
Corrosive! Inhalation of vapors can cause coughing, choking, inflammation of the nose, throat, and upper respiratory tract, and in severe cases, pulmonary edema, circulatory failure, and death.
Ingestion:
Corrosive! Swallowing hydrochloric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract. May cause nausea, vomiting, and diarrhea, and in severe cases, death.
Skin Contact:
Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and discolor skin.
Eye Contact:
Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.
Chronic Exposure:
Long-term exposure to concentrated vapors may cause erosion of teeth. Long term exposures seldom occur due to the corrosive properties of the acid.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye disease may be more susceptible to the effects of this substance.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion:
DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard. May react with metals or heat to release flammable hydrogen gas.
Explosion:
Not considered to be an explosion hazard.
Fire Extinguishing Media:
Water or water spray. Neutralize with soda ash or slaked lime.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Structural firefighter's protective clothing is ineffective for fires involving hydrochloric acid. Stay away from ends of tanks. Cool tanks with water spray until well after fire is out.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker NEUTRASORB® acid neutralizers are recommended for spills of this product.

---

7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When

diluting, the acid should always be added slowly to water and in small amounts. Never use hot water and never add water to the acid. Water added to acid can cause uncontrolled boiling and splashing. When opening metal containers, use non-sparking tools because of the possibility of hydrogen gas being present. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
For Hydrochloric acid:
- OSHA Permissible Exposure Limit (PEL):
5 ppm (Ceiling)
- ACGIH Threshold Limit Value (TLV):
2 ppm (Ceiling), A4 Not classifiable as a human carcinogen

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a full facepiece respirator with an acid gas cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Pungent odor.
Solubility:
Infinitely soluble.
Density:

1.05 @ 15C (59F)
pH:
For HCL solutions: 0.1 (1.0 N), 1.1 (0.1 N), 2.02 (0.01 N)
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
101 - 103C (214 - 217F)
Melting Point:
No information found.
Vapor Density (Air=1):
No information found.
Vapor Pressure (mm Hg):
No information found.
Evaporation Rate (BuAc=1):
No information found.

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
When heated to decomposition, emits toxic hydrogen chloride fumes and will react with water or steam to produce heat and toxic and corrosive fumes. Thermal oxidative decomposition produces toxic chlorine fumes and explosive hydrogen gas.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
A strong mineral acid, concentrated hydrochloric acid is highly reactive with strong bases, metals, metal oxides, hydroxides, amines, carbonates and other alkaline materials. Incompatible with materials such as cyanides, sulfides, sulfites, and formaldehyde.
Conditions to Avoid:
Heat, direct sunlight.

---

11. Toxicological Information

Hydrochloric acid: Inhalation rat LC50: 3124 ppm/1H; Oral rabbit LD50: 900 mg/kg. Investigated as a tumorigen, mutagen, reproductive effector.

--------\Cancer Lists\--

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Hydrogen Chloride (7647-01-0)	No	No	3
Water (7732-18-5)	No	No	None

---

12. Ecological Information

Environmental Fate:
When released into the soil, this material is not expected to biodegrade. When released into the soil, this material may leach into groundwater.
Environmental Toxicity:
This material is expected to be toxic to aquatic life.

---

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

---

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: HYDROCHLORIC ACID
Hazard Class: 8
UN/NA: UN1789
Packing Group: II
Information reported for product/size: 200L

International (Water, I.M.O.)

Proper Shipping Name: HYDROCHLORIC ACID
Hazard Class: 8
UN/NA: UN1789
Packing Group: II
Information reported for product/size: 200L

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15. Regulatory Information

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--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                    TSCA  EC   Japan  Australia
-------------------------------------------  ----  ---  -----  ---------
Hydrogen Chloride (7647-01-0)                 Yes  Yes   Yes      Yes
Water (7732-18-5)                             Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                    --Canada--
```

Ingredient	Korea	DSL	NDSL	Phil.
Hydrogen Chloride (7647-01-0)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

\-------\Federal, State & International Regulations - Part 1\----------

Ingredient	-SARA 302- RQ	TPQ	-----SARA 313----- List	Chemical Catg.
Hydrogen Chloride (7647-01-0)	5000	500*	Yes	No
Water (7732-18-5)	No	No	No	No

\-------\Federal, State & International Regulations - Part 2\----------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Hydrogen Chloride (7647-01-0)	5000	No	No
Water (7732-18-5)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: Yes
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Mixture / Liquid)

Australian Hazchem Code: 2R
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Avoid breathing vapor or mist.
Keep container closed.
Use with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.
Product Use:
Laboratory Reagent.

Revision Information:
No Changes.
Disclaimer:
****

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****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **S5022** * * * * * *Effective Date:* ***03/26/04*** * * * * * *Supercedes:* ***10/29/01***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

SODIUM SULFATE

1. Product Identification

Synonyms: Sodium sulfate decahydrate; disodium sulfate decahydrate; glauber's salt; sulfuric acid, sodium salt, decahydrate; sodium sulfate, 10-hydrate
CAS No.: 7757-82-6 (Anhydrous) 7727-73-3 (Decahydrate)
Molecular Weight: 322.20
Chemical Formula: Na2SO4.10H2O
Product Codes:
J.T. Baker: 3889, 3890
Mallinckrodt: 8012, 8027

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Sodium Sulfate	7757-82-6	98 - 100%	Yes

3. Hazards Identification

Emergency Overview

As part of good industrial and personal hygiene and safety procedure, avoid all unnecessary exposure to the chemical substance and ensure prompt removal from skin, eyes and clothing.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 1 - Slight
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES; LAB COAT
Storage Color Code: Green (General Storage)

Potential Health Effects

Inhalation:
Not expected to be a health hazard.
Ingestion:
Mildly toxic by ingestion. Systemic toxicity is unlikely unless massive amounts have been swallowed. Drinking water with > 500 mg/L may result in gastrointestinal irritation.
Skin Contact:
No adverse effects expected.
Eye Contact:
No adverse effects expected but dust may cause mechanical irritation.
Chronic Exposure:
No information found.
Aggravation of Pre-existing Conditions:
No information found.

4. First Aid Measures

Inhalation:
Not expected to require first aid measures.
Ingestion:
Give several glasses of water to drink to dilute. If large amounts were swallowed, get medical advice.
Skin Contact:
Wash exposed area with soap and water. Get medical advice if irritation develops.
Eye Contact:
Wash thoroughly with running water. Get medical advice if irritation develops.

5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard.
Explosion:
Not considered an explosion hazard, but violent explosions occur when potassium sulfate and sodium sulfate are melted with aluminum.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire.
Special Information:
Use protective clothing and breathing equipment appropriate for the surrounding fire.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal.

---

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
None established.
Ventilation System:
In general, dilution ventilation is a satisfactory health hazard control for this substance. However, if conditions of use create discomfort to the worker, a local exhaust system should be considered.
Personal Respirators (NIOSH Approved):
For conditions of use where exposure to dust or mist is apparent and engineering controls are not feasible, a particulate respirator (NIOSH type N95 or better filters) may be worn. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-face positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear protective gloves and clean body-covering clothing.

Eye Protection:
Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
White efflorescent crystals or granules.
Odor:
Odorless.
Solubility:
Soluble in 1.5 parts of water @ 25C (77F).
Specific Gravity:
1.46
pH:
Aqueous solution is neutral.
% Volatiles by volume @ 21C (70F):
0
Boiling Point:
No information found.
Melting Point:
32C (90F) Loses water at 100C (212F). Anhydrous melts ca. 844C (1551F)
Vapor Density (Air=1):
No information found.
Vapor Pressure (mm Hg):
No information found.
Evaporation Rate (BuAc=1):
No information found.

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Effloresces in dry air.
Hazardous Decomposition Products:
Oxides of sulfur and sodium may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
In combination with sodium sulfate, aluminum and magnesium will explode @ 800C (1472F); strong mineral acids and bases.
Conditions to Avoid:
Air, incompatibles.

---

11. Toxicological Information

Investigated as a tumorigen, mutagen, reproductive effector. No LD50/LC50 information found relating to normal routes of occupational exposure.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Sodium Sulfate (7757-82-6)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to leach into groundwater. This material is not expected to significantly bioaccumulate.
Environmental Toxicity:
This material is not expected to be toxic to aquatic life. The LC50/96-hour values for fish are over 100 mg/l. The EC50/48-hour values for daphnia are over 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\----------

Ingredient	TSCA	EC	Japan	Australia
Sodium Sulfate (7757-82-6)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\----------

	--Canada--

Ingredient	Korea	DSL	NDSL	Phil.
Sodium Sulfate (7757-82-6)	Yes	Yes	No	Yes

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Sodium Sulfate (7757-82-6)	No	No	No	No

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Sodium Sulfate (7757-82-6)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: No Chronic: No Fire: No Pressure: No
Reactivity: No (Pure / Solid)

Australian Hazchem Code: None allocated.
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **1** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
As part of good industrial and personal hygiene and safety procedure, avoid all unnecessary exposure to the chemical substance and ensure prompt removal from skin, eyes and clothing.
Label Precautions:
None.
Label First Aid:
Not applicable.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 3.
Disclaimer:
****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information

must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

LEHIGH PORTLAND CEMENT COMPANY

MATERIAL SAFETY DATA SHEET

FOR

PORTLAND CEMENT

MSDS NUMBER: **EFFECTIVE DATE: OCTOBER 1997**

1. PRODUCT/COMPANY IDENTIFICATION

Manufacturer's Name & Address:

Lehigh Portland Cement Company
7660 Imperial Way
Allentown, PA 18195

Chemical Family:

Calcium Compounds

Chemical Name and Synonyms:

Portland Cement (CAS # 65997-15-1), Hydraulic Cement

Telephone Number for Information:
800-523-5488

Trade Name and Synonyms:

Lehigh Portland Cement Types I, II, III, V
Lehigh White Cement Types I, III, V
Lehigh Colored Portland Cement
Lehigh Portland/Lime Cement Types N, S

2. EMERGENCY AND FIRST AID

EMERGENCY INFORMATION: Portland cement is a light gray or white powder. When in contact with moisture in eyes or on skin, or when mixed with water, portland cement becomes highly caustic (pH > 12) and will damage or burn (as severely as third-degree) the eyes or skin. Inhalation may cause irritation to the moist mucous membranes of the nose, throat and upper respiratory system or may cause or may aggravate certain lung diseases or conditions. Use exposure controls or personal protection methods described in Section 10.

EYES: Immediately flush eye thoroughly with water. Continue flushing eye for at least 15 minutes, including under lids, to remove all particles. Call physician immediately.

SKIN: Wash skin with cool water and pH-neutral soap or a mild detergent. Seek medical treatment if irritation or inflammation develops or persists. Seek immediate medical treatment in the event of burns.

INHALATION: Remove person to fresh air. If breathing is difficult, administer oxygen. If not breathing, give artificial respiration. Seek medical help if coughing and other symptoms do not subside. Inhalation of large amounts of portland cement require immediate medical attention.

INGESTION: Do not induce vomiting. If conscious, have the victim drink plenty of water and call a physician immediately.

3. COMPOSITION INFORMATION

DESCRIPTION: This product consists of finely ground portland cement clinker mixed with a small amount of gypsum (calcium sulfate dihydrate). The portland cement clinker is made by heating to a high temperature a mixture of substances such as limestone, sand, clay and shale. Portland cement is essentially hydraulic calcium silicates contained in a crystalline mass, not separable into individual components. Major compounds are:

$3CaO•SiO_2$	Tricalcium Silicate	CAS #12168-85-3
$2CaO•SiO_2$	Dicalcium Silicate	CAS #10034-77-2
$3CaO•Al_2O_3$	Tricalcium Aluminate	CAS #12042-78-3
$4CaO•Al_2O_3•Fe_2O_3$	Tetracalcium aluminoferrite	CAS #12068-35-8
$CaSO_4•2H_2O$	Calcium Sulfate dihydrate (Gypsum)	CAS #7778-18-9 (CAS #13397-24-5)

4. HAZARDOUS INGREDIENTS

COMPONENT	OSHA PEL (8-Hour TWA)	ACGIH TLV-TWA (1995-1996)	NIOSH REL (8-Hour TWA)
Portland Cement (CAS #65997-15-1) 50 to 95% by weight	5 mg respirable dust/m^3 15 mg total dust/m^3	10 mg total dust/m^3	
Calcium sulfate (CAS #7778-18-9) [Gypsum (CAS #13397-24-5)] 0 to 10% by weight	5 mg respirable dust/m^3 15 mg total dust/m^3	10 mg total dust/m^3	
Iron oxide (CAS #1309-37-1) 0 to 15% by weight	10 mg/m^3	5 mg/m^3	
Calcium carbonate (CAS #1317-65-3) 0 to 5% by weight	5 mg respirable dust/m^3 15 mg total	10 mg total dust/m^3	

	dust/m^3		
Magnesium oxide (CAS #1309-48-4) 0 to 5% by weight	15 mg total dust/m^3	10 mg total dust/m^3	
Calcium oxide (CAS #1306-78-8) 0 to 5% by weight	5 mg/m^3	2 mg/m^3	
Crystalline silica (CAS #14808-60-7) 0 to 0.1% by weight	10 mg of respirable dust/m^3	0.10 mg respirable quartz/m^3	0.05 mg respirable quartz dust/m^3
	% SiO_2 + 2		
	30 mg of total dust/m^3		
	% SiO_2 + 2		
	250 million particles/ft^3		
	% SiO_2 + 5		

TRACE INGREDIENTS:

Due to the use of substances mined from the earth's crust, trace amounts of naturally occurring, potentially harmful constituents may be detected during chemical analysis. Portland cement may contain up to 0.75% insoluble residue. A small amount of this residue includes free crystalline silica. Portland cement also may contain trace (<0.05%) amounts of chromium salts or compounds (including hexavalent chromium) or other metals (including nickel compounds) found to be hazardous or toxic in some chemical forms. These metals are present mostly as trace substitutions within the principal minerals. Other trace constituents may include potassium and sodium sulfate compounds.

5. HAZARD IDENTIFICATION

POTENTIAL HEALTH EFFECTS:	NOTE: Potential health effects may vary depending upon the duration and degree of exposure. To reduce or eliminate health hazards associated with this product, use exposure controls or personal protection methods as described in Section 10.
EYE CONTACT:	(Acute/Chronic) Exposure to airborne dust may cause immediate or delayed irritation or inflammation of the cornea. Eye contact by larger amounts of dry powder or splashes of wet portland cement may cause effects ranging from moderate eye irritation to chemical burns and blindness.
SKIN CONTACT:	(Acute) Exposure to dry portland cement may cause drying of the skin with consequent mild irritation or more significant effects attributable to aggravation of other

conditions. Discomfort or pain cannot be relied upon to alert a person to a hazardous skin exposure.

(Chronic) Dry portland cement coming in contact with wet skin or exposure to wet portland cement may cause more severe skin effects, including thickening, cracking or fissuring of the skin. Prolonged exposure can cause severe skin damage in the form of chemical (caustic) burns.

(Acute/Chronic) Some individuals may exhibit an allergic response upon exposure to portland cement. The response may appear in a variety of forms ranging from a mild rash to severe skin ulcers.

INHALATION:

(Acute) Exposure to portland cement may cause irritation to the moist mucous membranes of the nose, throat and upper respiratory system. Pre-existing upper respiratory and lung diseases may be aggravated by inhalation of portland cement.

(Chronic) Inhalation exposure to free crystalline silica may cause delayed lung injury including silicosis, a disabling and potentially fatal lung disease, and/or cause or aggravate other lung diseases or conditions.

INGESTION:

(Acute/Chronic) Internal discomfort or ill effects are possible if large quantities are swallowed.

CARCINOGENIC POTENTIAL:

Portland cement is not recognized as a carcinogen by NTP, OSHA, or IARC. However, it may contain trace amounts of heavy metals recognized as carcinogens by these organizations. In addition, IARC classifies crystalline silica, a trace constituent, as a known human carcinogen (Group I). NTP has characterized respirable silica as "reasonably anticipated to be a carcinogen." (See also Section 13.)

6. PHYSICAL/CHEMICAL DATA

APPEARANCE/ODOR:	Gray, white or colored powder, odorless	PHYSICAL STATE:	Solid (Powder)
BOILING POINT:	> 1000ƒC	MELTING POINT:	Not applicable
VAPOR PRESSURE:	Not applicable	VAPOR DENSITY:	Not applicable
pH (IN WATER) (ASTM D 1293-95)	12 to 13	SOLUBILITY IN WATER:	Slightly soluble (0.1% to 1.0%)
SPECIFIC GRAVITY (H_2O = 1.0):	3.15	EVAPORATION RATE:	Not applicable

7. FIRE AND EXPLOSION

FLASH POINT:	None	LOWER EXPLOSIVE LIMIT:	None
AUTO IGNITION TEMPERATURE:	Not combustible	UPPER EXPLOSIVE LIMIT:	None
FLAMMABLE LIMITS	Not applicable	SPECIAL FIRE FIGHTING PROCEDURES:	None

EXTINGUISHING MEDIA:	Not combustible	UNUSUAL FIRE AND EXPLOSION HAZARDS:	None
HAZARDOUS COMBUSTION PRODUCTS:	None		

8. STABILITY AND REACTIVITY DATA

STABILITY:	Product is stable. Keep dry until used.
CONDITIONS TO AVOID:	Unintentional contact with water. Contact with water will result in hydration and produces (caustic) calcium hydroxide.
INCOMPATIBILITY:	Wet portland cement is alkaline. As such, it is incompatible with acids, ammonium salts and aluminum metal.
HAZARDOUS DECOMPOSITION:	Will not occur.
HAZARDOUS POLYMERIZATION:	Will not occur.

9. PRECAUTIONS FOR HANDLING, STORAGE AND DISPOSAL

HANDLING AND STORAGE	Keep dry until used. Handle and store in a manner so that airborne dust does not exceed applicable exposure limits. Use adequate ventilation and dust collection. Use exposure control and personal protection methods as described in Section 10.
SPILL:	Use dry clean-up methods that do not disperse dust into the air or entry into surface water. Material can be used if not contaminated. Place in an appropriate container for disposal or use. Avoid inhalation of dust and contact with skin and eyes. Use exposure control and personal protection methods as described in Section 10.
DISPOSAL:	Comply with all applicable local, state and federal regulations for disposal of unusable or contaminated materials. Dispose of packaging/containers according to local, state and federal regulations.

10. EXPOSURE CONTROLS/PERSONAL PROTECTION

RESPIRATORY PROTECTION:	Use local exhaust or general dilution ventilation to control dust levels below applicable exposure limits. Minimize dispersal of dust into the air. If local or general ventilation is not adequate to control dust levels below applicable exposure limits or when dust causes irritation or discomfort, use MSHA/NIOSH approved respirators.
EYE PROTECTION:	Wear safety glasses with side shields or goggles to avoid contact with the eyes. In extremely dusty environments and unpredictable environments, wear tight-fitting unvented or indirectly vented goggles to avoid eye irritation or injury. Contact lenses should not be worn when handling cement or cement containing products.

SKIN PROTECTION:	Wear impervious abrasion- and alkali-resistant gloves, boots, long-sleeved shirt, long pants or other protective clothing to prevent skin contact. Promptly remove clothing dusty with dry portland cement or clothing dampened with moisture mixed with portland cement, and launder before re-use. If contact occurs, wash areas contacted by material with pH neutral soap and water.

11. TRANSPORTATION DATA

Portland cement is not hazardous under U.S. DOT or TDG regulations.

12. TOXICOLOGICAL AND ECOLOGICAL INFORMATION

For a description of available, more detailed toxicological and ecological information, contact Lehigh Portland Cement Company.

13. OTHER REGULATORY INFORMATION

Status under US OSHA Hazard Communication Rule 29 CFR 1910.1200:	Portland cement is considered a hazardous chemical under this regulation and should be included in the employer's hazard communication program.
Status under CERCLA/Superfund, 40 CFR 117 and 302:	Not listed.
Hazard Category under SARA (Title III), Sections 311 and 312:	Portland cement qualifies as a hazardous substance with delayed health effects.
Status under SARA (Title III), Section 313:	Not subject to reporting requirements under Section 313.
Status under TSCA (as of May 1997):	Some substances in portland cement are on the TSCA inventory list.
Status under the Federal Hazardous Substances Act:	Portland cement is a hazardous substance subject to statutes promulgated under the subject act.
Status under California Proposition 65:	This product contains crystalline silica, a substance known to the State of California to cause cancer. This product also may contain trace amounts of heavy metals known to the State of California to cause cancer, birth defects or other reproductive harm.
Status under Canadian Environmental Protection Act:	Not listed.
Status under Canadian WHMIS:	Portland cement is considered to be a hazardous material under the Hazardous Products Act as defined by the Controlled Products Regulations (Class D2A, E - Corrosive Material) and subject to the requirements of WHMIS.

14. OTHER INFORMATION

This MSDS provides information on various types of portland cement products. A particular product's composition may vary from sample to sample. The information provided herein is believed by Lehigh Portland Cement Company to be accurate at the time of preparation or prepared from sources believed to be reliable. Health and safety precautions in this data sheet may not be adequate for all individuals or situations. Users have the responsibility to comply with all laws and procedures applicable to the safe

handling and use of the product, to determine the suitability of the product for its intended use, and to understand possible hazards associated with mixing portland cement with other materials. SELLER MAKES NO WARRANTY, EXPRESS OR IMPLIED, CONCERNING THE PRODUCT OR THE MERCHANTABILITY OR FITNESS THEREOF FOR ANY PURPOSE OR CONCERNING THE ACCURACY OF ANY INFORMATION PROVIDED BY LEHIGH PORTLAND CEMENT COMPANY.

ABBREVIATIONS

ACGIH American Conference of Governmental Industrial Hygienists

ASTM American Society for Testing and Materials

CAS Chemical Abstract Service

CERCLA Comprehensive Environmental Response, Compensation and Liability Act

CFR Code of Federal Regulations

ft^3 Cubic foot

IARC International Agency for Research on Cancer

m^3 Cubic meter

mg Milligram

MSHA Mine Safety and Health Administration

NIOSH National Institute for Occupational Safety and Health

NTP National Toxicology Program

OSHA Occupational Safety and Health Administration

PEL Permissible Exposure Limit

REL Recommended Exposure Limit

SARA Superfund Amendments and Reauthorization Act

TDG Transportation of Dangerous Goods

TLV Threshold Limit Value

TSCA Toxic Substance Control Act

TWA Time Weighted Average

WHMIS Workplace Hazardous Materials Information System

Look up other LEHIGH MSDS Sheets

MSDS Number: **N3660** * * * * * *Effective Date:* ***05/06/05*** * * * * * *Supercedes:* ***07/02/02***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

NITRIC ACID, 50-70%

1. Product Identification

Synonyms: Aqua Fortis; Azotic Acid; Nitric Acid 50%; Nitric Acid 65%; nitric acid 69-70%
CAS No.: 7697-37-2
Molecular Weight: 63.01
Chemical Formula: HNO3
Product Codes:
J.T. Baker: 411D, 412D, 5371, 5796, 5801, 5826, 5856, 5876, 5896, 9597, 9598, 9600, 9601, 9602, 9603, 9604, 9606, 9607, 9608, 9610, 9616, 9617, 9670
Mallinckrodt: 1409, 2704, 2705, 2716, 6623, H862, H988, H993, H998, V077, V650

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Nitric Acid	7697-37-2	50 - 70%	Yes
Water	7732-18-5	30 - 50%	No

3. Hazards Identification

Emergency Overview

POISON! DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 4 - Extreme (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 3 - Severe (Oxidizer)
Contact Rating: 4 - Extreme (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

Potential Health Effects

Nitric acid is extremely hazardous; it is corrosive, reactive, an oxidizer, and a poison.

Inhalation:
Corrosive! Inhalation of vapors can cause breathing difficulties and lead to pneumonia and pulmonary edema, which may be fatal. Other symptoms may include coughing, choking, and irritation of the nose, throat, and respiratory tract.
Ingestion:
Corrosive! Swallowing nitric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract.
Skin Contact:
Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and stain skin a yellow or yellow-brown color.
Eye Contact:
Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.
Chronic Exposure:
Long-term exposure to concentrated vapors may cause erosion of teeth and lung damage. Long-term exposures seldom occur due to the corrosive properties of the acid.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, eye disease, or cardiopulmonary diseases may be more susceptible to the effects of this substance.

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4. First Aid Measures

Immediate first aid treatment reduces the health effects of this substance.
Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give

oxygen. Call a physician.
Ingestion:
DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

5. Fire Fighting Measures

Fire:
Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. Can react with metals to release flammable hydrogen gas.
Explosion:
Reacts explosively with combustible organic or readily oxidizable materials such as: alcohols, turpentine, charcoal, organic refuse, metal powder, hydrogen sulfide, etc. Reacts with most metals to release hydrogen gas which can form explosive mixtures with air.
Fire Extinguishing Media:
Water spray may be used to keep fire exposed containers cool. Do not get water inside container.
Special Information:
Increases the flammability of combustible, organic and readily oxidizable materials. In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

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6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker NEUTRASORB® acid neutralizers are recommended for spills of this product.

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7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, the acid should always be added slowly to water and in small amounts. Never use hot water and never add water to the acid. Water added to acid can cause uncontrolled boiling and splashing. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
2 ppm (TWA), 4 ppm (STEL)
-ACGIH Threshold Limit Value (TLV):
2 ppm (TWA); 4 ppm (STEL)

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Nitric acid is an oxidizer and should not come in contact with cartridges and canisters that contain oxidizable materials, such as activated charcoal. Canister-type respirators using sorbents are ineffective.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Colorless to yellowish liquid.
Odor:
Suffocating, acrid.
Solubility:
Infinitely soluble.

Specific Gravity:
1.41
pH:
1.0 (0.1M solution)
% Volatiles by volume @ 21C (70F):
100 (as water and acid)
Boiling Point:
122C (252F)
Melting Point:
-42C (-44F)
Vapor Density (Air=1):
2-3
Vapor Pressure (mm Hg):
48 @ 20C (68F)
Evaporation Rate (BuAc=1):
No information found.

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Containers may burst when heated.
Hazardous Decomposition Products:
When heated to decomposition, emits toxic nitrogen oxides fumes and hydrogen nitrate. Will react with water or steam to produce heat and toxic and corrosive fumes.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
A dangerously powerful oxidizing agent, concentrated nitric acid is incompatible with most substances, especially strong bases, metallic powders, carbides, hydrogen sulfide, turpentine, and combustible organics.
Conditions to Avoid:
Light and heat.

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11. Toxicological Information

Nitric acid: Inhalation rat LC50: 244 ppm (NO2)/30M; Investigated as a mutagen, reproductive effector. Oral (human) LDLo: 430 mg/kg.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Nitric Acid (7697-37-2)	No	No	None
Water (7732-18-5)	No	No	None

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12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

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13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

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14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: NITRIC ACID
Hazard Class: 8
UN/NA: UN2031
Packing Group: II
Information reported for product/size: 6.5GL

International (Water, I.M.O.)

Proper Shipping Name: NITRIC ACID (WITH NOT MORE THAN 70% NITRIC ACID)

Hazard Class: 8
UN/NA: UN2031
Packing Group: II
Information reported for product/size: 6.5GL

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15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Nitric Acid (7697-37-2)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\----------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Nitric Acid (7697-37-2)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Nitric Acid (7697-37-2)	1000	1000	Yes	No
Water (7732-18-5)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Nitric Acid (7697-37-2)	1000	No	No
Water (7732-18-5)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: No (Mixture / Liquid)

Australian Hazchem Code: 2PE
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **0** Other: **Oxidizer**
Label Hazard Warning:
POISON! DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor or mist.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep from contact with clothing and other combustible materials.
Do not store near combustible materials.
Store in a tightly closed container.
Remove and wash contaminated clothing promptly.

Label First Aid:
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases get medical attention immediately.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
****

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

BRIGHT DYES™ MATERIAL SAFETY DATA SHEET
FWT RED™ 50 LIQUID

MSDS PREPARATION INFORMATION

PREPARED BY:	T. P. MULDOON (937) 886-9100
DATE PREPARED:	1/1/05

PRODUCT INFORMATION

MAUNFACTURED BY:	KINGSCOTE CHEMICALS 3334 S. TECH BLVD. MIAMISBURG, OHIO 45342
CHEMICAL NAME	NOT APPLICABLE
CHEMICAL FORMULA	NOT APPLICABLE
CHEMICAL FAMILY	XANTHENE DYE FORM

HAZARDOUS INGREDIENTS

DESCRIPTION	%	T.L.V.	C.A.S. #
TRIMELLITIC ACID	~1.25	NONE	528-44-9
	LD/50, SPECIES		LC/50, SPECIES
ORAL (MOUSE)	2500 MG/KG		NONE AVAILABLE
DERMAL (RABBIT)	NOT AVAILABLE		NOT AVAILABLE

PHYSICAL DATA

PHYSICAL STATE	LIQUID
ODOR AND APPEARANCE	DARK RED LIQUID WITH MILD ODOR
SPECIFIC GRAVITY	~1.03
VAPOR DENSITY (mm Hg @ 25 ° C)	NOT APPLICABLE
VAPOR DENSITY (AIR =1)	NOT APPLICABLE
EVAPORATION RATE (Butyl Acetate = 1)	NOT APPLICABLE
BOILING POINT	~ 100 degrees. C (212 degrees. F)
FREEZING POINT	~ 0 degrees C (32 degrees F)
pH	8.6 TO 8.8
SOLUBILITY IN WATER	VERY SOLUBLE

FIRE HAZARD

CONDITION OF FLAMMABILITY	NON-FLAMABLE
MEANS OF EXTINCTION	WATER FOG, CARBON DIOXIDE, DRY CHEMICAL, WEAR SCBA
FLASH POINT AND METHOD	NOT APPLICABLE
UPPER FLAMABLE LIMIT	NOT APPLICABLE
LOWER FLAMABLE LIMIT	NOT APPLICABLE
AUTO-IGNITION TEMPERATURE	NOT APPLICABLE
HAZARDOUS COMBUSTION PRODUCTS	BURNING MAY PRODUCE OXIDES OF CARBON & NITROGEN
UNUSUAL FIRE HAZARD	NOT APPLICABLE

EXPLOSION HAZARD

SENSITIVITY TO STATIC DISCHARGE	NOT APPLICABLE
SENSITIVITY TO MECHANICAL IMPACT	NOT APPLICABLE

REACTIVITY DATA

PRODUCT STABILITY	STABLE
PRODUCT INCOMPATIBILITY	DO NOT MIX WITH ACIDS
CONDITIONS OF REACTIVITY	NOT APPLICABLE
HAZARDOUS DECOMPOSITION PRODUCTS	SEE HAZARDOUS COMBUSTION PRODUCTS

TOXICOLOGICAL PROPERTIES

SYMPTOMS OF OVER EXPOSURE FOR EACH POTENTIAL ROUTE OF ENTRY:

INHALLATION, ACUTE	NOT KNOWN
INHALATION, CHRONIC	NOT KNOWN
SKIN CONTACT	MAY BE IRRITATING TO THE SKIN. WILL CAUSE TEMPORARY STAINING OF THE SKIN ON CONTACT.
EYE CONTACT	MAY CAUSE IRRITATION
INGESTION	URINE MAY BE A RED COLOR UNTIL THE DYE HAS BEEN WASHED THROUGH THE SYSTEM.
EFFECTS OF ACUTE EXPOSURE	DIRECT CONTACT MAY CAUSE IRRITATION TO THE EYES, SKIN, AND RESPIRATORY TRACT.
EFFECTS OF CHRONIC EXPOSURE	NOT KNOWN
THRESHOLD OF LIMIT VALUE	NOT APPLICABLE
CARCINOGENICITY	NOT LISTED AS A KINOWN OR SUSPECTED CARCINOGEN BY IARC, NTP OR OSHA.
TERATOGENICITY	NONE KNOWN
MUTAGENICITY	CONFLICTING EVIDENCE AS TO MUTAGENICITY OF THE DYE CONTAINED IN THIS PRODUCT.
TOXICOLOGY SYNERGISTIC PRODUCTS	NONE KNOWN

PREVENTATIVE MEASURES

PERSONAL PROTECTIVE EQUIPMENT

GLOVES	RUBBER
RESPIRATORY	NONE REQUIRED UNDER NORMAL CONDITIONS
EYE PROTECTION	GOGGLES
CLOTHING	PROTECTIVE CLOTHING SHOULD BE WORN WHERE CONTACT IS UNAVOIDABLE.
OTHER	HAVE ACCESS TO EMERGENCY EYEWASH.

PREVENTATIVE MEASURES (CONT.)

ENGINEERING CONTROLS	NOT NECESSARY UNDER NORMAL CONDITIONS, USE LOCAL VENTILATION IF DUSTY CONDITIONS EXIST.
SPILL OR LEAK RESPONSE	CONTAIN AND CLEAN UP SPILL IMMEDIATELY, PREVENT FROM ENTERING FLOOR DRAINS. SWEEP POWDERS AND PLACE IN WASTE DISPOSAL CONTAINER, FLUSH AFFECTED AREA WITH WATER.
WASTE DISPOSAL	INCINERATE OR REMOVE TO A SUITABLE SOLID WASTE DISPOSAL SITE, DISPOSE OF ALL WASTES IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS.
HANDELING PROCEDURES AND EQUIPMENT	NO SPECIAL REQUIREMENTS.
STORAGE REQUIREMENTS	STORE AT ROOM TEMPERATURE BUT ABOVE THE FREEZING POINT OF WATER
SHIPPING INFORMATION	KEEP FROM FREEZING

FIRST AID MEASURES

FIRST AID EMERGENGY PROCEDURES

EYE CONTACT	FLUSH EYES WITH WATER FOR AT LEAST 15 MINUTES. GET MEDICAL ATTENTION IF IRRITATION PERSISTS.
SKIN CONTACT	WASH SKIN THOROUGHLY WITH SOAP AND WATER. GET MEDICAL ATTENTION IF IRRITATION DEVELOPS.
INHALATION	IF DUST IS INHALED, MOVE TO FRESH AIR. IF BREATHING IS DIFFICULT GIVE OXYGEN AND GET IMMEDIATE MEDICAL ATTENTION.
INGESTION	DRINK PLENTY OF WATER AND INDUCE VOMITING. GET MEDICAL ATTENTION IF LARGE QUANTITIES WERE INGESTED OR IF NAUSEA OCCURS. NEVER GIVE FLUIDS OR INDUCE VOMITING IF THE PERSON IS UNCONSCIOUS OR HAS CONVULSIONS.

SPECIAL NOTICE

ALL INFORMATION, RECOMMENDATIONS AND SUGGESTIONS APPEARING HEREIN CONCERNING THIS PRODUCT ARE BASED UPON DATA OBTAINED FROM MANUFACTURER AND/OR RECOGNIZED TECHNICAL SOURCES; HOWEVER, KINGSCOTE CHEMICALS MAKES NO WARRANTY, REPRESENTATION OR GUARANTEE AS TO THE ACCURACY, SUFFICIENCY OR COMPLETENESS OF THE MATERIAL SET FORTH HEREIN. IT IS THE USER'S RESPONSIBILITY TO DETERMINE THE SAFETY, TOXICITY AND SUITABILITY OF HIS OWN USE, HANDLING, AND DISPOSAL OF THE PRODUCT. ADDITIONAL PRODUCT LITERATURE MAY BE AVAILABLE UPON REQUEST. SINCE ACTUAL USE BY OTHERS IS BEYOND OUR CONTROL, NO WARRANTY, EXPRESS OR IMPLIED, IS MADE BY KINGSCOTE CHEMICALS AS TO THE EFFECTS OF SUCH USE, THE RESULTS TO BE OBTAINED OR THE SAFETY AND TOXICITY OF THE PRODUCT, NOR DOES KINGSCOTE CHEMICALS ASSUME ANY LIABILITY ARISING OUT OF USE BY OTHERS OF THE PRODUCT REFERRED TO HEREIN. THE DATA IN THE MSDS RELATES ONLY TO SPECIFIC MATERIAL DESIGNATED HEREIN AND DOES NOT RELATE TO USE IN COMBINATION WITH ANY OTHER MATERIAL OR IN ANY PROCESS.

END OF MATERIAL SAFETY DATA SHEET

APPENDIX E

PDSI BLUESTAKE POLICY

Title: Blue Stake Policy
Procedure No: NAOM HS – 005-01
Area: North America One Mine
Issue Date: September 17, 2005
Revision Date: TBD

Purpose

Due to the high level of risk during excavations and penetrations of building surfaces, this policy has been developed to minimize risks for injuries, harm to the environment and production losses during such work.

Scope

All Phelps Dodge employees and contractors shall follow this policy.

Definitions

Blue Staking is the act of marking facilities such as electric, gas, water, telephone, cable or other facilities so that these networks are not damaged during penetration, excavation, trenching or digging activities.

General Procedure

1) If at anytime unsafe conditions arise that pose an unacceptable risk, work must stop until the hazard has been corrected or controlled.
2) The Blue Stake Representative(s) must be contacted, minimum of 48 hours prior to any penetration of the earth's surface, berms, floors and wall and ceiling penetrations greater than one inch. Exemptions are:

   A. Emergency Procedure – In the event that an excavation must commence due to a safety, environmental or facility operation emergency, the area supervisor shall visit the site and determine if the problem is an immediate hazard. If determined to be an emergency, a Blue Stake Representative(s) or area manager or manager on call must be notified. These persons may authorize the area supervisor to proceed with the emergency excavation. If there is any doubt, the job must be stopped immediately.
   B. Native ground, top surface of active leach and waste stock piles, active mining areas where utilities have never been present.
   C. Residential and commercial lessees of Phelps Dodge owned town sites will not be issued a Phelps Dodge Blue Stake Permit. These individuals must contact the appropriate entities as per the lease agreement in accordance with State Blue Stake Laws.

3) Only a Blue Stake Representative(s) can issue a Blue Stake Permit. Each Blue Stake permit shall be uniquely numbered. The Blue Stake Representative(s) will determine the necessity for a permit.

4) A permit may not be required upon consensus of the Blue Stake Representative(s), the requestor, the area General Supervisor/Superintendent, and/or the person(s) performing the excavating (i.e. hand digging to expose a valve or pipeline for repair, etc.). The completed permit signifies that, to the best of their knowledge, inspection and information available, all known utilities have been identified and marked in the designated area.
5) The permit requestor is responsible for initiating and properly completing the permit. Each excavation area in a project scope must have an individual permit for that location. (see permit)
6) When installing, rerouting or repairing an underground utility the work must comply with "The Buried Utility/New Installation Requirements".
7) Once approved, the Blue Stake Permit will be valid for 30 days from the date of issue. If the duration of the excavation requires more than 30 days, it is the responsibility of the requestor to contact the Blue Stake Representative(s) for an additional 30 day extension. If a Blue Stake Permit expires before the renewal is granted, the work must stop until a new blue stake permit is issued or renewed. The Blue Stake Representative(s) may require the area to be re-surveyed if an extension of the permit is requested. This does not apply to Long Term Agreements. (i.e. road grading). The Blue Stake Permit, with any attached drawing/documents, will stay on file for 2 years.
8) Any deviations, additions or changes to the Blue Stake Permit must be approved by the Blue Stake Representative(s).
9) The approved Blue Stake Permit must stay on site while the work is being performed. Once the work is completed, the permit must be returned to the Blue Stake Representative(s).
10) A Blue Stake Representative(s) must review the Blue Stake Permit on site with the permit requestor and/or individual performing the work. The supervisor and Blue Stake Representative(s) will determine the need for additional site visits if conditions or the operator performing the excavation changes.
11) If the conditions or the scope of the excavation expands a new permit must be requested.
12) Hand digging/pot-holing will be done when working within 24 inches of known utilities.
13) All excavations must comply with the NAOM Excavation and Trenching Policy.
14) If a utility is ruptured or broken during an excavation, the requestor or party performing the excavation must notify a Blue Stake representative and project manager immediately. If an unidentified utility is discovered, the requestor or party performing the excavation must immediately notify a Blue Stake Representative(s) and the Project Manager and stop work immediately.
15) If at any time during the process of digging a safety and/or environmental concern arises, the work must stop. The individual(s) recognizing the concern will immediately contact their supervisor. The concern must be addressed prior to continuing with the excavation.
16) Long Term Blue Stake Permits may be issued for one year. Excavations in these areas are unlimited based on the restrictions of the permit, but must be performed by the designated operator(s). These operator(s) must be listed on the Long Term Permit at the time of initial request or renewal and a copy of the permit must be with the operator while the work is being performed

Procedure for Floor, Roof, Ceiling and Wall Penetrations

1) If the penetration is one inch or less, a Blue Stake Permit is not required. At no time are these guidelines presented to allow anyone to execute floor or wall penetrations when they are not comfortable in doing so without a full investigation by the Blue Stake Process. Sawing into floors requires a permit at all times.
2) Perform a review of all known utilities, gas, water, air, sewer, or communications lines.
3) Contact the Environmental Services Department prior to penetration greater than one inch in any surface or if materials are uncovered that are suspected to contain asbestos. All renovation or demolition projects require coordination with Environmental Services at least 30 days in advance of the start of the project.
4) Drawings or prints applicable to the work areas will be obtained when doubt exists concerning the location of utilities within structures. The use of drawings or prints does not take the place of a reasonable and personal assessment by all employees.
5) Examine both sides of wall surfaces and ceilings, when possible, to see if there are any utilities that have been installed in the wall joists or studs without making wall penetrations.
6) The following color-coded marking of underground utilities and proposed excavations have been adopted. This policy applies to the use of ground marking paint, whiskers and flags.

RED	→	Electrical Power
YELLOW	→	Gas-Oil-Product, and Air Lines
ORANGE	→	Communication Cable
BLUE	→	Water Systems
GREEN	→	Sanitary Sewer Systems, Drains, Slurry Pipelines
PURPLE	→	All Solvent Extraction, Electrowinning Lines & Process Water
WHITE	→	Perimeter of Excavation/Boundary

7) Persons requesting a digging permit will outline the area of proposed excavation with white paint prior to scheduling representative(s) to check the area.
8) All underground utilities, in use or abandoned, will be marked
9) The name of the identified utility or content, if known, will be written along the painted lines.
10) If it is determined there are no utilities in the proposed area of excavation, the word “OK” will be written in white paint inside the area. A color other than white paint shall be used and typically the color will be relative to the utilities in the area such as blue for water or red for electric. White denotes area to be excavated.

N^{O}

NAOM Blue Stake Permit

Date issued: _____ Expiration Date: _____

Requester: _____Phone: _____

Division/Department: _____Location_____W.O. No: _____

Short Description of the Project:

_____

_____

Permit issued by (print name): _____
Signature_____

THE REQUESTER IS RESPONSIBLE FOR ALL PROPERLY COMPLETED PERMITS NEEDED TO SAFELY COMPLETE JOB.

Detailed Scope of Work: (use added sheet if needed):
Cautions/Markings
Site Visit Schedule

	Check one	**Yes**	**No**
Is this excavation for a new Installation?			
Is this excavation to repair an existing buried line?			
Is a site investigation required?			
Do outside utilities need to be contacted?			
Are copies of applicable drawings and prints attached?			
Is a Confined Space Entry Permit Required? (If yes, attach signed copy) **To be determined by Requestor**			
Is a Hot Work Permit Required? (If yes, attach signed copy) **To be determined by Requestor**			
Is a LOTOTO procedure required?			

Approval	**Name**	**Signature**	**Date**
Project Supervisor			
Responsible Area Supervisor			
Supervisor of equipment operator			
Equipment Operator (s)			
Contractor representative			
Others:			
NAOM Blue Stake representative			

When work is completed, return permit and attachments to the Blue Stake Team.

Underground Utility Requirements

These specifications apply to all repaired, rerouted and newly installed underground utilities.
(Note: A Blue Stake Team member may waive the requirement for these standards. Explain below :)

UG Requirements shall be completed by the persons installing the line unless otherwise specified by Requestor:
Location:
Type of Utility to Be Installed:

Circle items that must be accomplished to complete this job;

1. **Survey:** Location by Surveyor for mapping and future location references.
2. **Visual markers for Buried Utilities**
   - Buried or covered pipelines running along or under a roadway may require visible pipe location markers at the time of installation.
   - Pipe location markers may consist of 4"hdpe, or commercial markers**.** Markers will be approx. 10' tall in large equipment traffic areas.
   - Enter and exit points for buried lines under roadways shall be at least 6 ft. outside designated roadway to allow for required depth under roadway.
3. **Tracer wire installation**
   - All new U.G. utilities must have a tracer wire buried with utility line during installation.
   - Tracer wire must be an 18 gauge or greater insulated wire.
   - If a tracer wire must be spliced, the splice *must* assure an uninterrupted circuit along the entire length of the tracer wire. The wire must be properly insulated from the ground by being wrapped or sealed to make it water tight.
   - Tracer wire shall extend at least three feet beyond the exit point of line and be attached vertically, to the pipe location marker, or the utility line itself, if exposed, to assure future accessibility.
4. **Underground Caution tapes** (Caution tapes may be normal flagging tape unless otherwise specified)
   - All gas lines will have yellow caution tape laid in three inches of sand, twelve inches above line.
   - All communication/fiber optic lines will have an orange caution tape twelve inches above line.
   - Buried acid lines will have yellow caution tape installed twelve inches above line.
5. **Depth requirements: Specific burial depths according to the pipe diameter may be obtained from the Mine or Plant Engineering Department**
   - Three foot from top of pipe for normal vehicular traffic and six to eight foot from top of pipe for heavy equipment or haul truck traffic.
   - Gas lines must have a *minimum* of 28" of fill from top of pipe to grade
   - Communications cables shall be a *minimum* of 28" of fill from cable to grade.
   - Gas lines and communication /fiber optic lines will be bedded within 12 inches of washed sand, or other approved fines material.
6. **All U.G. electrical installations** are to be encased in red dyed concrete and a red 6" foil backed caution tape will be installed above the installation according to the specific site instructions. For instruction on any buried electrical lines, contact an Electrical Engineer in the Plant Engineering Dept.

***PLEASE NOTE:**

Please be advised that these specifications do not alleviate compliance with any State, Federal or site specific regulations. If minimum requirements *cannot* be met, clear with a Blue Stake team member.

All excavations for underground utility installations/repairs must be left open until line has been inspected and located. (Which may include activation of line) **This form *must* be signed by a Surveyor from Plant Engineering, Mine Engineering, or a Blue Stake Team member *before* excavation is covered.**	
Specifications meet:	**Date:**