Leviathan Mine Site Health and Safety, Security, and Environmental Program Document

May 27, 2008

Version 1.1

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HSSE Program Revision Record

Revision	Version #	Date	Author	Approver
Draft HSSE Program Document	Draft_v1	April 7, 2008	Jeremy Seibert/ Jessica Cassens	Anthony Brown, EBM
Leviathan Mine Site HSSE Program Document	_v1.1	May 27, 2008	Jeremy Seibert/ Jessica Cassens	Anthony Brown, EBM

This HSSE Program document contains information necessary for the day-to-day HSSE management at the Leviathan Site. This document must therefore be controlled using a document management process. The following is the responsibility of each individual and/ or organization relating to the development and management of this Program document:

- Document Development – Jeremy Seibert and Jessica Cassens of ENSR;
- Document Pier Review – Leviathan Mine Site Owner's Representative team, subcontractors, including Geomatrix;
- Final Document Approval – Anthony Brown of Atlantic Richfield Company;
- Document Revision – Don (Buck) Rice or Anthony Brown of Atlantic Richfield Company.

The on-Site Atlantic Richfield Coordinator will be responsible for coordinating with Jessica Cassens to make any necessary revisions to this Program Document after the final approval. Once revisions have been made to the document, an amendment record must be filled out for each revision and the document must be re-approved by Buck Rice or Anthony Brown.

1.0 Introduction

This Leviathan Site Health Safety Security and Environmental (HSSE) Program Document is the Site wide occupational health and safety guidance document for the Atlantic Richfield Company (a BP affiliated company) project team, which includes Atlantic Richfield Company, other Atlantic Richfield Company contractors, subcontractors, and visitor personnel, working at or visiting the Leviathan Mine Site (Site).

The HSSE Program document provides a description of the Remediation Management Atlantic Richfield Company safe work procedures, identifies the general potential physical and chemical hazards that may be encountered, outlines emergency response procedures, and specifies the requirements for the contractor specific Health and Safety Plans (HASPs) that will be developed by each contractor at the Site.

This HSSE Program has been designed to protect:

- Atlantic Richfield Company, Atlantic Richfield Company sub-contractors, and subcontractor personnel working on the project;
- The surrounding environment at all times during the project, and
- The general public.

This HSSE Program document has been complied from previous site HSSE documents and anticipated site conditions. This document is subject to revision as conditions change or new information becomes available. Document changes will be conducted utilizing the document control procedures found on page *iv*.

1.1. Site Location

The Leviathan Mine Site is located in a remote mountain area of northeastern Alpine County, California, on the eastern slope of the central Sierra Nevada range at an elevation of approximately 7,000 feet. The Site is located about 25 miles southeast of Lake Tahoe, six miles east of Markleeville, California as shown on Figure 1.

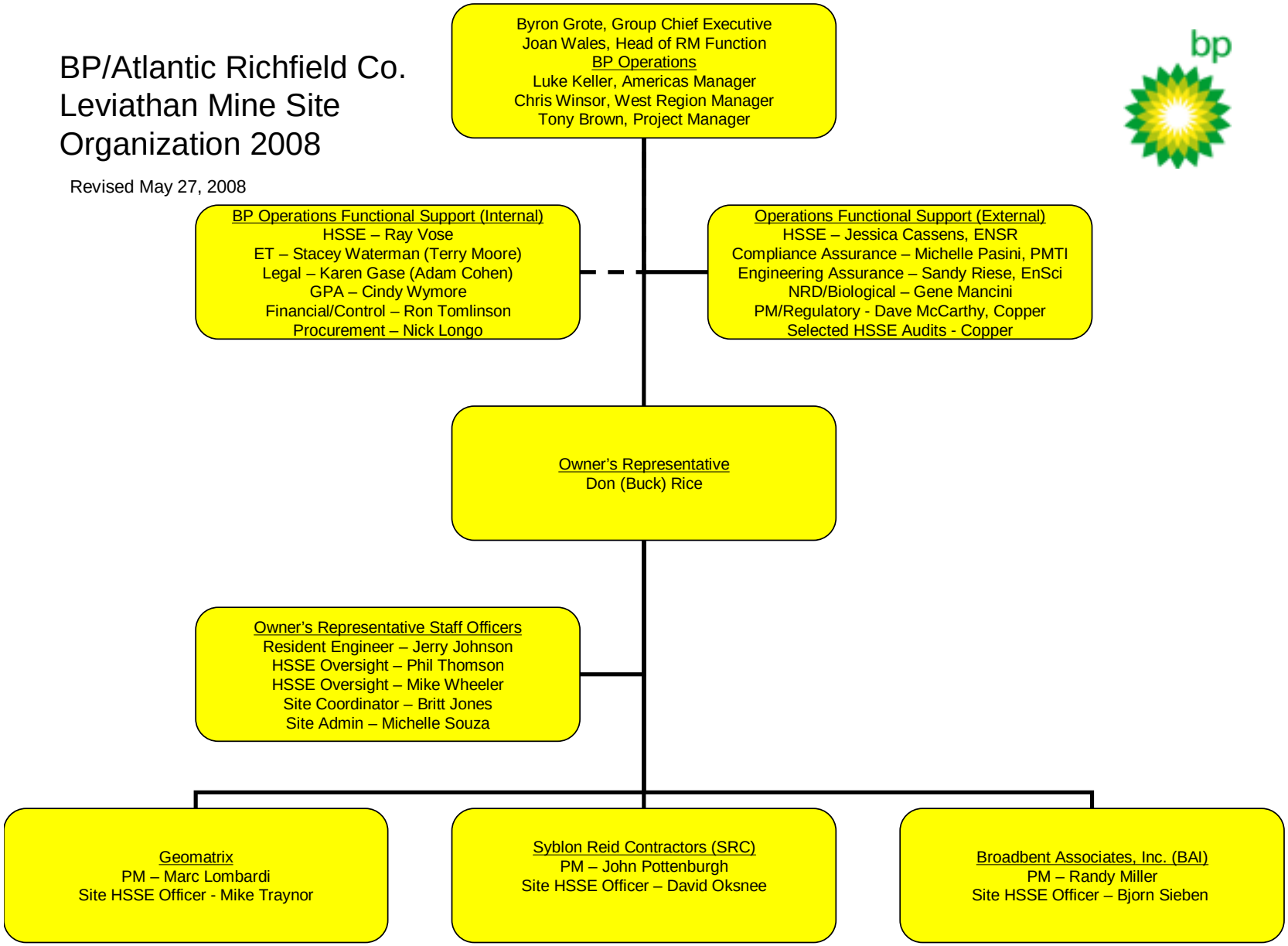
1.2. Site History

Historic mining activities at Leviathan Mine, including underground and open pit extraction of sulfur, resulted in the exposure of pyrite (iron sulfide [FeS2]), contained in the native soil and rock, to air and

water. Exposure of pyrite to air and water causes the generation of acid rock drainage, also referred to as ARD. As ARD travels through the ground, it dissolves and carries metals contained in the native soil and rock. If left unabated, the acidic and metal-rich ARD discharges to nearby creeks (Leviathan and Aspen Creeks) and may cause adverse impacts. According to the Environmental Protection Agency (EPA), and based on available data, four contaminant source areas contribute the majority of contaminant loading to surface water at the Site. These sources include:

- Adit and Pit Underdrain (PUD), and underdrain system located below the floor of the mine pit;
- Channel Underdrain (CUD);
- Delta Seep; and
- Aspen Seep (also known as the Overburden Seep).

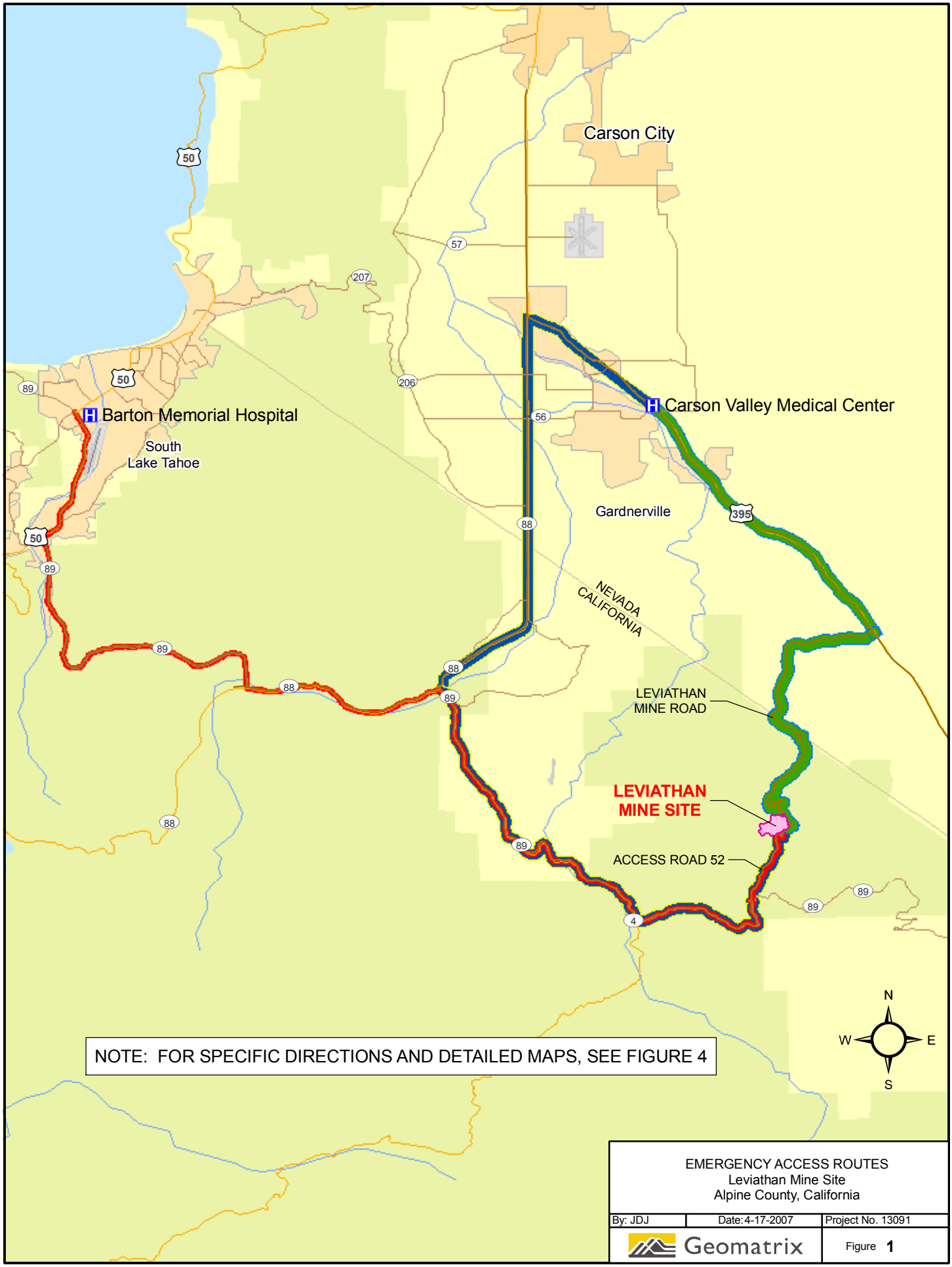
1.3. Site Personnel Reporting Organization



1.4. Plan Objectives

The Primary objective of this HSSE Program document is to provide guidance to the contractors and on-site personnel regarding the necessary procedures and protocols to comply with BP guidelines and prepare task specific Health and Safety Plans that enable their employees to complete their jobs safely and without incident. This document provides:

- Emergency Response Procedures
- General procedures that are applicable to all activities Site wide;
- BP Requirements;
- BP Safe Work Procedures;
- Requirements for Contractor Specific Health and Safety Plans (HASP).



EMERGENCY ACCESS ROUTES
Leviathan Mine Site
Alpine County, California

By: JDJ	Date: 4-17-2007	Project No. 13091
Geomatrix		Figure 1

K:\Projects\Leviathan_13091\GIS_Maps\MapDocuments\BG1081-B503_HSv2

2.0 Scope of Work

This section provides:

- A general description of activities that will be performed on the site;
- Classification of Site work areas;
- A general description of Site wide Constituents of Concern (COC);
- Lessons Learned from Remediation Management work in 2007; and
- Atlantic Richfield Company work place requirements.

2.1. General Site Activities

General work activities that will be conducted at the Site include:

- Biological treatment of acid rock drainage (ARD) at the Aspen Seep (AS)
- Construction and eventual operation of the Pond 4 Lime Treatment System to treat ARD from Pond 4;
- Construction and eventual operation of a High Density Sludge (HDS) Treatment System to treat ARD from the Channel Underdrain (CUD) and the Delta Seep (DS);
- Continuation of LRWQCB monitoring and lime neutralization of the water contained in the holding ponds at the Site,
- Site upkeep and access construction improvements and;
- Site wide monitoring activities.

The descriptions provided above are only general descriptions of broad Site wide tasks. A full description of the Site Activities performed by each contractor is included within each contractor specific HASP.

2.2. Site Layout

The Site consists of the previous Leviathan Mine Site and surrounding areas. The site contains the impacted ponds, the Delta and Aspen seeps, the Channel Under Drain, and the proposed water treatment building area. CA SR 89 runs through the Site and meets NV highway 385 at the former mine boundary. The Site layout is depicted in Figure 2.

2.2.1. HAZWOPER covered Work Areas

The Hazardous Waste Operations and Emergency Response Standard (HAZWOPER) covered work areas of the Site consist of any and all work areas that contain a potential constituent of concern (COC)

exposure hazard. The HAZWOPER regulations, defined by the Occupational Safety and Health administration, cover any employees who are exposed or potentially exposed to hazardous substances -- including hazardous waste -- and who are engaged in one of the following operations as specified by 1910.120(a)(1)(i-v) and 1926.65(a)(1)(i-v):

- clean-up operations -- required by a governmental body, whether federal, state, local, or other involving hazardous substances -- that are conducted at uncontrolled hazardous waste sites;
- corrective actions involving clean-up operations at sites covered by the **Resource Conservation and Recovery Act of 1976 (RCRA)** as amended (42 U.S.C. 6901 et seq.);
- voluntary clean-up operations at sites recognized by federal, state, local, or other governmental body as uncontrolled hazardous waste sites;
- operations involving hazardous wastes that are conducted at treatment, storage, and disposal facilities regulated by **Title 40 Code of Federal Regulations** Parts 264 and 265 pursuant to RCRA, or by agencies under agreement with U.S. Environmental Protection Agency to implement RCRA regulations; and
- emergency response operations for releases of, or substantial threats of releases of, hazardous substances regardless of the location of the hazard.

Therefore, at this Site, any work task that contains a potential for exposure to a Site COC is considered a HAZWOPER regulated task. The Site COCs are described in section 2.3 of this document. Individual Contractor HASPs should be consulted for a complete list of the other chemicals that may be utilized in the course of conducting the site activities. A complete MSDS book is located in the Project Site Office.

HAZWOPER regulated work tasks at the Site include, but are not limited to the following:

- Any use of Lime to neutralize ARD, such as the work performed at Pond 4;
- Any work task conducted in any area with potential exposure to ARD, These areas, depicted in Figure 2, include but are not limited to: AS, DS, all of the Ponds, and the CUD;
- Any work task conducted in close proximity to any of the Ponds, or the CUD that contain a slip/trip/or fall hazard that could potentially result in contact with impacted water;
- Any work task relating to the bioreactor at AS with potential exposure to Ethanol or Sodium Hydroxide;
- Any work task relating to fueling of Site vehicles or power generators, or refilling fuel storage tanks;
- Any work conducted in an area with potential exposure to the sludge resulting from ARD treatment such as Pond 4;

- Any work conducted in an area with potential for exposure to Hydrogen Sulfide gas, such as work performed at AS;
- Any work task related to handling of waste produced as a result of treatment activities, and;
- Any work activity that contains the potential for worker exposure to any of the COCs listed within this program document.

Each contractor must provide current HAZWOPER training documentation for all employees anticipated to work within a HAZWOPER covered area prior to arrival on-site. This documentation will be kept on file at the on-site at the Project Field Office Trailer. At no time are employees allowed into the HAZWOPER areas without the appropriate training records on file.

2.2.1.1. 40 hour HAZWOPER Exclusion Areas

- Pond 4 Treatment Plant Area
- Aspen Seep Bioreactor

Work in the vicinity of, and in association with, the Pond 4 operations (within the limits of the lined berm) require a minimum of 24 hour OSHA training and needs to be escorted by an individual with 40 hr. HAZWOPER Training regardless of the work to be performed. The reason for this is the potential exposure to the lime that is stored and used within this work area.

2.2.1.2. 24 hour HAZWOPER Exclusion Areas

- Delta seep
- Channel Underdrain (CUD)
- Sludge bins
- Pond 4 Treatment Plant Area – Only with approval and 40 hour trained employee supervision

Work in the vicinity of, and in association with, the CUD collection system and the Delta Seep - minimum of 24 hour OSHA training is required. As long as while performing the work there is not a potential of direct contact with the acid mine drainage water (i.e. repairing active piping, setting or doing maintenance on active pumps, etc. or otherwise doing work that would require PPE) then personnel do not need an escort that has 40 hr. HAZWOPER Training. By the way "active" means having or have had without cleaning, water within the component. In other words if one is doing clean work (i.e. installing new components) then a 40 hour trained escort is not necessary. Otherwise, an escort is required.

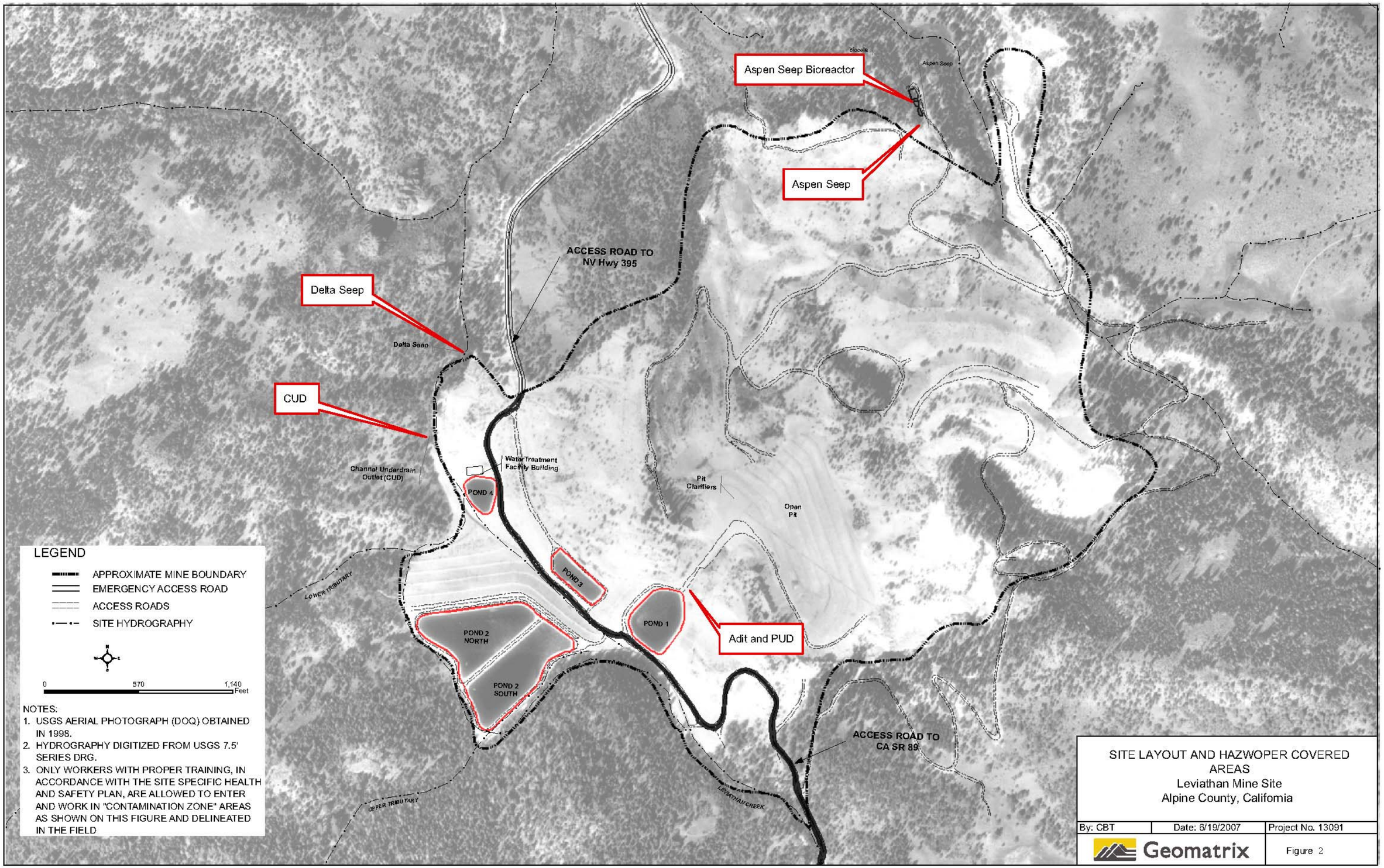
2.2.2. Non-HAZWOPER covered Work Areas

Personnel performing work within a non-HAZWOPER covered work area are not required to have taken 40-hour HAZWOPER training. For the purposes of this project, a non-HAZWOPER work area is defined as an area with no potential for exposure to Site COCs. These areas include:

- the construction area for the HDS;
- the Site Project Office Trailer and storage units;
- Supply truck delivery routes, and;
- Municipal Waste pick-up areas.

The construction area at Pond 4 is considered a Non-HAZWOPER work area, however, personnel that do not have the 40 hour HAZWOPER training and current 8 hour refresher must not leave the immediate construction area. The bermed around Pond 4 is a HAZWOPER covered area.

Please refer to Figure 2 for HAZWOPER covered work areas.



SITE LAYOUT AND HAZWOPER COVERED AREAS
Leviathan Mine Site
Alpine County, California

By: CBT	Date: 8/19/2007	Project No. 13091
Geomatrix		Figure 2

K:\Projects\Leviathan_13091\GIS_Maps\MapDocuments\BG1081-B112_SH&S SiteMap

2.3. Constituents and Concern

The following section will present general Site constituents of concern (COC) and the associated hazards and controls for each COC. Chemicals and action limits to protect from occupational exposure specific to individual contractor Site tasks will be included within each applicable contractor HASP.

The Site COCs consist of:

- Acid rock drainage (ARD),
- Calcium hydroxide (Lime Slurry),
- Diesel;
- Ethanol;
- Hydrogen Sulfide,
- Sodium Hydroxide; and
- Treatment sludge.

2.3.1. COC Hazards and Action Limits

The following table is presented as a guideline for contractors to utilize in developing their Company specific action limits included in Company specific HASPs and does not supersede Contractor specific requirements. The table includes each Site COC as listed in Section 2.3 and briefly describes exposure symptoms, regulatory action limits, and general procedures to use if employees are exposed. Each contractor HASP must conduct a hazard evaluation for task specific activities.

Table 2-1: COC Hazards and Action Limits

Chemical Hazard	Exposure Route	Exposure Symptoms	Exposure Limits And/Or Reportable Quantity (RQ)	If Exposed
Acid rock drainage	Absorption Dermal and eye contact Ingestion	Skin and eye irritation	N/A	Flush eyes or exposed skin thoroughly with water for 15 minutes. Do not reuse clothing without laundering. Unfrozen water must be available.
Calcium hydroxide (Lime Slurry)	Inhalation Skin irritation Eye irritation	Irritation of eyes, nose and throat Coughing, shortness of breath Skin irritation, dermatitis Eye irritation Conjunctivitis	OSHA PEL- 15 mg/m^3	Wash affected area with mild soap and water. In case of eye contact, flush eyes with large amounts of water for at least 15 minutes, while rolling eyeball and lifting eyelid. Get medical attention. Unfrozen water must be available.
Diesel	Inhalation Dermal and eye contact Absorption	Weakness Headache Nausea Confusion Blurred vision Drowsiness Irritation of eyes, skin, and lungs More exposure may cause Dizziness Slurred speech Flushed face Unconsciousness	TLV -100mg/m3 vapor as total hydrocarbons (Skin). (American Conference of Governmental Industrial Hygienists.) The State of California requires that all quantities of spilled or released petroleum products be reported immediately.	Wash hands thoroughly after handling diesel fuel and before eating or drinking. Launder clothing if contacted by diesel. Avoid heat, sparks, open flames, and strong oxidizing, acidic and basic conditions since this product is flammable. In case of eye contact, immediately irrigate with water for at least 15 minutes. Unfrozen water must be available.

Table 2-1: COC Hazards and Action Limits

Chemical Hazard	Exposure Route	Exposure Symptoms	Exposure Limits And/Or Reportable Quantity (RQ)	If Exposed
Ethanol	Inhalation Dermal and eye contact Absorption Note: hazards associated with flammability are located in Section 5.0	Headache Irritation of eyes, nose, and throat Drowsiness and lassitude Loss of appetite Lack of ability to concentrate	Cal/OSHA PEL Ethanol -1,000 ppm Methyl isobutyl ketone (5% of the ethanol mixture) Cal/OSHA PEL 50ppm The State of California requires that all quantities of spilled or released petroleum products be reported immediately.	In case of skin contact, remove contaminated clothing immediately, flush skin thoroughly with water for at least 15 minutes and do not reuse clothing without laundering. In case of eye contact, flush eyes with large amounts of water for at least 15 minutes Unfrozen water must be available.
Hydrogen Sulfide Gas	Inhalation	Dizziness, headache, nausea, respiratory arrest, coma, unconsciousness, and/or death. Over exposure of H_2S, in addition to the above symptoms, may also cause olfactory fatigue, eye irritation, dryness and irritation of the nose and throat, and temporary loss of smell. Greater exposure may cause vomiting and lung damage	Cal/OSHA PEL- 10 ppm Cal/OSHA Ceiling 50 ppm IDLH- 100 ppm RQ – 100 pounds	Hydrogen sulfide monitors should be worn at all times where hydrogen sulfide gas is probable, this includes all areas around the Aspen Bioreactors, any confined space at the site, the area immediately around the CUD capture system, and the area immediately around the Delta Seep capture tank. In case of inhalation, move to fresh air and provide CPR or oxygen if needed. Seek immediate medical attention.
Sodium Hydroxide	Inhalation Dermal and eye contact Absorption Ingestion	Skin exposure can cause burns or deep ulcers Inhalation can cause upper respiratory tract irritation and burns If swallowed Severe burns of mouth, throat, and stomach Bleeding Vomiting Diarrhea Fall in blood pressure Severe scarring of tissue, death may result	Cal/OSHA Ceiling Limit 2 mg/m3 RQ – 1,000 pounds	In case of skin contact, remove contaminated clothing immediately, flush skin thoroughly with water for at least 15 minutes. Dispose of clothing using extreme caution. In case of eye contact, immediately irrigate with water for at least 15 minutes. In case of inhalation, move to fresh air and provide CPR or oxygen if needed. If ingestion occurs, do not induce vomiting and if conscious, drink 2-4 cups of water or milk. Get immediate medical help for all cases of exposure. Unfrozen water must be available.

Table 2-1: COC Hazards and Action Limits

Chemical Hazard	Exposure Route	Exposure Symptoms	Exposure Limits And/Or Reportable Quantity (RQ)	If Exposed
Sludge	Inhalation Dermal and eye contact Absorption	Skin exposure to sludge can cause minor burns due to low pH Inhalation can cause upper respiratory tract irritation and burns	N/A	In case of skin contact, remove contaminated clothing immediately, flush skin thoroughly with water for at least 15 minutes. Dispose of clothing. In case of eye contact, immediately irrigate with water for at least 15 minutes. If ingestion occurs, do not induce vomiting.

2.3.2. MSDS for COCs

2.3.2.1. Lime Hydrate (Slurry)

BOC GASES

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: LIME-HYDRATE (Slurry)

1. Chemical Product and Company Identification

BOC Gases,
Division of
The BOC Group, Inc.
575 Mountain Avenue
Murray Hill, NJ 07974

TELEPHONE NUMBER: (908) 464-8100
24-HOUR EMERGENCY TELEPHONE NUMBER:
CHEMTREC (800) 424-9300

BOC Gases
Division of
BOC Canada Limited
5975 Falbourne Street, Unit 2
Mississauga, Ontario L5R 3W6

TELEPHONE NUMBER: (905) 501-1700
24-HOUR EMERGENCY TELEPHONE NUMBER:
(905) 501-0802
EMERGENCY RESPONSE PLAN NO: 20101

PRODUCT NAME: LIME-HYDRATE (Slurry)
CHEMICAL NAME: Calcium Hydroxide
COMMON NAMES/SYNONYMS: Calcium Dihydroxide, Calcium Hydrate, Carbide Lime
TDG (Canada) CLASSIFICATION: Not regulated
WHMIS CLASSIFICATION: E, D2B

PREPARED BY: Loss Control (908)464-8100/(905)501-1700
PREPARATION DATE: 6/1/95
REVIEW DATE: 6/7/96

2. Composition, Information on Ingredients

INGREDIENT	% VOLUME	PEL-OSHA[1]	TLV-ACGIH[2]	LD_{50} or LC_{50} Route/Species
Calcium Hydroxide FORMULA: CaH_2O_2 CAS: 1305-62-0 RTECS #: EW2800000	30 to 50	15 mg/m^3 TWA	5 mg/m^3 TWA	LD 50 7340 mg/kg (rat)
Water FORMULA: H_2O CAS: 7732-18-5 RTECS #: ZC0110000	50-70	Not Applicable	Not Applicable	Not Applicable

[1] As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)
[2] As stated in the ACGIH 1994-95 Threshold Limit Values for Chemical Substances and Physical Agents

3. Hazards Identification

EMERGENCY OVERVIEW

Irritating to the eyes, mucous membranes and respiratory system. Contact of the dried, odorless, white powder with the respiratory system, skin, and eyes may be irritating. Prolonged or excessive contact may cause burns. Avoid inhalation and contact with airborne dust.

ROUTE OF ENTRY:

Skin Contact	Skin Absorption	Eye Contact	Inhalation	Ingestion
Yes	No	Yes	Yes	Yes

HEALTH EFFECTS:

Exposure Limits	Irritant	Sensitization
Yes	Yes	No
Teratogen	Reproductive Hazard	Mutagen
No	No	No
Synergistic Effects		
None Reported		

Carcinogenicity: -- NTP: No IARC: No OSHA: No

EYE EFFECTS:
Contact with eyes will cause irritation or characteristic alkaline burns. Very irritating to mucous membranes and moist tissue. The cornea of severely burned eyes may be anesthetic for several days after the injury, presumably due to damage to the corneal nerves.

Clumps of moist material may form and be difficult to remove by normal irrigation. Clumps tend to lodge deep in the cul-de-sacs and act as reservoirs for liberation of calcium hydroxide over long periods of time. Blindness can result.

SKIN EFFECTS:
May be severely irritating to the skin and moist tissue. Prolonged contact may cause dermatitis and burns. Calcium hydroxide penetrates the skin slowly, so that the extent of damage depends on the duration of contact.

INGESTION EFFECTS:
Ingestion usually results in burns to the lips, tongue, and mucous membranes of the mouth and throat, followed by severe abdominal pain. Burns may appear in the throat without being present in the mouth. Spontaneous vomiting, abdominal pain, dysphagia, and drooling may be noted.

In severe cases, if death does not occur in the first 24 hours, the person may improve in 2 to 4 days, followed by the onset of severe abdominal pain and rapid fall of blood pressure. These conditions indicate delayed gastric or esophageal perforation. Esophageal stricture can occur within weeks to months later, making swallowing difficult.

INHALATION EFFECTS:
Inhalation of dust may be severely irritating and cause burns to the nose and throat. Repeated or prolonged inhalation may inflame respiratory passages and produce ulcerations and perforation of the nasal septum.

Stridor, tightness of the chest, and pulmonary edema may occur following excessive inhalation of dust.

NFPA HAZARD CODES	HMIS HAZARD CODES	RATINGS SYSTEM
Health: 3	Health: 3	0 = No Hazard
Flammability: 0	Flammability: 0	1 = Slight Hazard
Reactivity: 1	Reactivity: 1	2 = Moderate Hazard
		3 = Serious Hazard
		4 = Severe Hazard

4. First Aid Measures

EYES:
In case of eye contact, immediately flush with low pressure, cool water for at least 30 minutes, opening eyelids to ensure flushing. Get immediate medical (ophthalmologic) attention. Speed in treatment can prevent serious eye damage.

Clumps of moist material may lodge deeply in cul-de-sacs inferiorly and superiorly, and may be difficult to remove by normal irrigation. Ensure adequate flushing by opening eyelids and removing clumps of material.

SKIN:
Remove contaminated clothing immediately. Flush affected areas immediately with large quantities of water for at least 15 minutes or longer. Dilute vinegar may be used to neutralize alkali effects. Then wash thoroughly with soap and water.

INGESTION:
DO NOT INDUCE VOMITING! GET IMMEDIATE MEDICAL ATTENTION!
Give person water or milk to drink. Rinse residual material from the mouth and throat. Do NOT give neutralizing agents or activated charcoal. Never give anything by mouth to an unconscious person. If spontaneous vomiting occurs, ensure that the airway is clear and rinse mouth with water.

INHALATION:
PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE!
Quick removal from the contaminated area is most important. Persons should be assisted to an uncontaminated area and inhale fresh air. Further treatment should be symptomatic and supportive.

NOTE TO PHYSICIAN:
INGESTION - Esophagoscopy should be performed within 12 to 24 hours after ingestion. Second and third degree burns have been reported in 9 to 22% of asymptomatic patients. Do not pass esophagoscope beyond the first circumferential burn for fear of perforation. Antibiotics should be used only for specific indications of infection. Pharmacologic doses of steroids (1 mg/kg prednisone) may be considered with caution where deep or circumferential esophageal burns are detected.

INHALATION - Administer oxygen, determine blood gases, and obtain a chest x-ray. If pulmonary edema is present, consider positive and expiratory pressure ventilation and steroids.

5. Fire Fighting Measures

Conditions of Flammability: Nonflammable		
Flash point: None	Method: Not Applicable	Autoignition Temperature: None
LEL(%): None	UEL(%): None	
Hazardous combustion products: None		
Sensitivity to mechanical shock: None		
Sensitivity to static discharge: None		

Non-flammable solid. When heated above 1076°F (580°C), calcium hydroxide can decompose to produce calcium oxide (CaO) and water vapor. Calcium oxide is irritating and corrosive and is incompatible with organic materials. Calcium oxide also reacts with water to form calcium hydroxide, which liberates heat during formation.

EXTINGUISHING MEDIA:
Use extinguishing media suitable for the combustible materials involved in the fire. Use water in flooding quantities as a fog, and apply from as far a distance as possible.

Small fires: Dry chemical, carbon dioxide, halon, foam. Large fires: Water spray, fog, or standard foam.

Do not allow run-off to enter waterways or sewers.

FIRE FIGHTING INSTRUCTIONS:
Fire fighters should wear full turnout gear with corrosive resistant clothing, if available. Do not allow run-off to enter waterways or sewers.

6. Accidental Release Measures

Evacuate all personnel from affected area. Use appropriate protective equipment when responding to spill. Contain leak/spill if possible.

Small spills: Carefully scoop or shovel into clean, dry containers for disposal or recovery. For lime that has dried, avoid creating dust. Recovered lime may be collected for reuse. Small amounts may be diluted with water, and flushed to sewer if appropriate approvals are obtained.

Large spills: Keep unnecessary people away. Isolate hazard area. Stay upwind in event of dried material present, and uphill in the event of a slurry spill. Protective clothing and equipment may be necessary to prevent exposure to lime. Personnel responding to large spills should have training in lime characteristics and spill response. Avoid creating dust if material has dried. Keep material away from waterways and sewers.

Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs. If leak is in container or container valve, contact the appropriate emergency telephone number listed in Section 1 or call your closest BOC location.

7. Handling and Storage

HANDLING AND STORAGE PRECAUTIONS:
Store in a clean ventilated area. Isolate incompatible materials.

WORK/HYGIENIC PRACTICES:
Consumption of food or beverages in the work area should be prohibited. Wash contaminated skin with soap and water immediately. Use good personal hygiene.

8. Exposure Controls, Personal Protection

EXPOSURE LIMITS[1]:

INGREDIENT	% VOLUME	PEL-OSHA[2]	TLV-ACGIH[3]	LD_{60} or LC_{60} Route/Species
Calcium Hydroxide FORMULA: CaH_2O_2 CAS: 1305-62-0 RTECS #: EW2800000	30 to 50	15 mg/m3 TWA	5 mg/m3 TWA	LD 50 7340 mg/kg (rat)
Water FORMULA: H20 CAS: 7732-18-5 RTECS #: ZC0110000	50-70	Not Applicable	Not Applicable	Not Applicable

[1] Refer to individual state of provincial regulations, as applicable, for limits which may be more stringent than those listed here.
[2] As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)
[3] As stated in the ACGIH 1994-1995 Threshold Limit Values for Chemical Substances and Physical Agents.

ENGINEERING CONTROLS:
Use local exhaust and general ventilation to reduce dust concentrations, if any, to below the exposure limit.

EYE/FACE PROTECTION:
Safety glasses with side shields, goggles, or full-facepiece required.

SKIN PROTECTION:
Use long protective gloves of any material to prevent contact of dried material with the skin. Use long rubber gloves when handling slurries.

RESPIRATORY PROTECTION:
Respiratory protection is normally not necessary with adequate ventilation. A NIOSH/MSHA-approved respirator with HEPA cartridge may be used in dusty conditions.

OTHER/GENERAL PROTECTION:
An emergency eyewash and safety shower should be available in the immediate area. Long-sleeve shirts or another skin covering may be necessary to reduce exposure.

9. Physical and Chemical Properties

PARAMETER	VALUE	UNITS
Physical state (gas, liquid, solid)	: Solid/or Slurry	
Vapor pressure	: N/A	
Vapor density (Air = 1)	: Not Available	
Evaporation point	: Not Available	
Boiling point	: Not Available	
Freezing point	: 4658	°F
	: 2570(Calcium Oxide)	°C
pH @ 25 °C	: 12.4	
Specific gravity	: 2.24	
Oil/water partition coefficient	: Not Available	
Solubility @ 0 °C (H20)	: 0.185 G/100 cc	
Odor threshold	: Not Available	
Odor and appearance	: Odorless - Dust inhalation may be irritating. Slightly bitter, alkaline taste. There may be a slight garlic like odor present in fresh carbide lime-hydrate due to minute amounts of dissolved acetylene. Dry: White/grey soft granules or powder. Slurry: Greyish/white thick liquid suspension in water.	

10. Stability and Reactivity

STABILITY:
Stable

CONDITIONS TO AVOID:
Keep dust and lime hydrate away from incompatible materials.

INCOMPATIBLE MATERIALS:
Causes explosive decomposition of maleic anhydride. Forms explosive products with nitroethane and water. Phosphorus boiled alkaline oxides yield mixed phosphines which may ignite spontaneously in air.

HAZARDOUS DECOMPOSITION PRODUCTS:
Liberates ammonia (NH_3) from ammonium salts. When heated above 1076°F (580°C), calcium hydroxide decomposes to produce calcium oxide.

HAZARDOUS POLYMERIZATION:
Will not occur.

11. Toxicological Information

LD_{50} (Rat) - Ingestion of 7340 mg/kg.

Some data indicates this compound may produce mutagenic effects.

12. Ecological Information

ECOTOXICOLOGICAL INFORMATION:

Acute and Long-Term Toxicity to Fish and Invertebrates
TLm Mosquito Fish: 240 ppm/24 hr; 220 ppm/48 hr; 160 ppm/96 hr @ 21-23 °C

13. Disposal Considerations

Dispose in accordance with federal, state, and local government regulations. Consult environmental regulatory agencies for guidance on acceptable disposal practices.

14. Transport Information

PARAMETER	United States DOT	Canada TDG
PROPER SHIPPING NAME:	Calcium hydroxide	Calcium hydroxide
HAZARD CLASS:	Not Applicable	Not Applicable
IDENTIFICATION NUMBER:	Not Applicable	Not Applicable
SHIPPING LABEL:	Not Applicable	Not Applicable

15. Regulatory Information

SARA TITLE III NOTIFICATIONS AND INFORMATION

SARA TITLE III - HAZARD CLASSES:
Acute Health Hazard

SARA TITLE III - SECTION 313 SUPPLIER NOTIFICATION:
This product does NOT contain any ingredients which are regulated on the U.S. EPA List of Toxic Chemicals (40 CFR 372), and is therefore not subject to release reporting under Section 313 of EPCRA/SARA Title III.

INGREDIENT: Calcium Hydroxide (Lime Hydrate Slurry)
CAS NUMBER: 1305-62-0 PERCENT BY VOLUME: Typical 30-50%

16. Other Information

Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES:
Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).

2.3.2.2. Diesel

MATERIAL SAFETY DATA SHEET

========== CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ==========

TRADE NAME: #2 DIESEL FUEL
CAS NUMBER: 68476-34-6
SYNONYM(S): PROCESS STREAM; NO. 2 DIESEL FUEL; FUEL OIL;
MIDDLE DISTILLATE; AB0/AA9-1; AG7; AG8
MSDS NUMBER: 1354
PRODUCT CODE: NA
HIERARCHY: NA
MANUFACTURER/SUPPLIER: BP Oil Company
ADDRESS: 200 Public Square, Cleveland, OH 44114-2375
TELEPHONE NUMBERS - 24 HOUR EMERGENCY ASSISTANCE:
BP America: 800-321-8642
CHEMTREC Assistance (In U.S.): 800-424-9300
CHEMTREC Assistance (Elsewhere): 703-527-3887
TELEPHONE NUMBERS - GENERAL ASSISTANCE: (Normal Office Hours):
(8:00-4:30 M-F, EST):
Technical: 216-586-6184
MSDS Contact: 216-586-8023

========== COMPOSITION/INFORMATION ON INGREDIENTS ==========

COMPONENT:Diesel Fuel No. 2, A distillate having a minimum viscosity of 32.6
SUS at 100 degrees F to a maximum of 40.1 SUS at 100 degrees F
CAS NO.: 68476-34-6
% BY WT.: 99.9 - 100
EXPOSURE LIMITS: None Established

========== HAZARDS IDENTIFICATION ==========

EMERGENCY OVERVIEW:

Clear Liquid With Hydrocarbon Odor. May Be Dyed For Identification.
Danger! Harmful or Fatal If Swallowed. Aspiration Hazard If
Swallowed--Can Enter Lungs and Cause Damage. May Be Irritating To the
Eyes and Respiratory Tract. Causes Skin Irritation. Vapors May Be
Harmful. Possible Cancer Hazard - Contains Material Which May Cause
Cancer Based On Animal Data. Combustible Liquid & Vapor.

POTENTIAL HEALTH EFFECTS:

SKIN:

Repeated or prolonged contact may result in defatting, redness, itching, inflammation, cracking and possible secondary infection. May cause allergic reactions in some individuals. Absorption from prolonged or massive skin contact may cause poisoning. High pressure skin injections are Serious Medical Emergencies. Injury may not appear serious at first; within a few hours, tissue will become swollen, discolored and extremely painful (see Notes to Physician section).

EYE:

Exposure to vapors, fumes or mists may cause irritation.

INHALATION:

May cause respiratory tract irritation. Exposure may cause central nervous system symptoms similar to those listed under "Ingestion" (see Ingestion section). Degenerative changes in the liver, kidneys and bone marrow may occur with prolonged, high concentrations. Repeated or prolonged exposures may cause behavioral changes.

INGESTION:

Aspiration into lungs may cause pneumonitis. May cause gastrointestinal disturbances. Symptoms may include irritation, nausea, vomiting and diarrhea. May cause harmful central nervous system effects. Effects may include excitation, euphoria, headache, dizziness, drowsiness, blurred vision, fatigue, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death.

SPECIAL TOXIC EFFECTS:

Based on animal studies, repeated overexposure may produce skin tumors upon repeated and prolonged skin contact in the absence of good personal hygiene. However, long-term dermal application studies of similar materials, i.e. middle distillates, in animals have shown that skin tumors are produced only when marked and prolonged skin irritation takes place during the study. Therefore, this product should not present a significant hazard of skin tumor formation when the "Skin Protection" recommendations are followed. IARC has determined that diesel engine exhaust is probably carcinogenic to humans. (IARC Class- 2A). Lifetime exposure to whole diesel exhaust has been shown to cause cancer in laboratory animals. NIOSH recommends that whole diesel exhaust be regarded as a potential occupational carcinogen. Warning: The use of any hydrocarbon fuel in an area without adequate ventilation may result in hazardous levels of combustion products and inadequate oxygen levels. IARC has determined that occupational exposures in petroleum refining are probably carcinogenic to humans.

========== FIRST AID MEASURES ==========

SKIN:

Remove contaminated clothing immediately. Wash area of contact

thoroughly with soap and water. Get medical attention if irritation persists. High pressure skin injections are serious medical emergencies. Thermal burns require immediate medical attention. Get immediate medical attention.

EYE:

Flush immediately with large amounts of water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Get medical attention if irritation persists. Thermal burns require immediate medical attention.

INHALATION:

Remove affected person from source of exposure. If not breathing, ensure clear airway and institute cardiopulmonary resuscitation (CPR). If breathing is difficult, administer oxygen if available. After administration of oxygen, continue to monitor closely. Get medical attention.

INGESTION:

Do not induce vomiting because of danger of aspirating liquid into lungs. Get immediate medical attention. If spontaneous vomiting occurs, monitor for breathing difficulty.

NOTES TO PHYSICIAN:

In case of ingestion, gastric lavage with activated charcoal can be used promptly to prevent absorption. Consideration should be given to the use of an endotracheal tube, to prevent aspiration. Individuals intoxicated by Diesel Fuel No. 2 should be hospitalized immediately, with acute and continuing attention to neurologic and cardiopulmonary function. Positive pressure ventilation may be necessary. After the initial episode, individuals should be followed for changes in blood variables and the delayed appearance of pulmonary edema and chemical pneumonitis. Such patients should be followed for several days or weeks for delayed effects, including bone marrow toxicity, hepatic and renal impairment. Individuals with chronic pulmonary disease will be more seriously impaired, and recovery from inhalation exposure may be complicated. In case of skin injection, prompt debridement of the wound is necessary to minimize necrosis and tissue loss.

========== FIREFIGHTING MEASURES ==========

FLASH POINT:	51.7 C (125.06 F)
AUTOIGNITION TEMPERATURE:	ND
FLAMMABILITY LIMITS IN AIR (% BY VOL.) LOWER:	> 0.7
FLAMMABILITY LIMITS IN AIR (% BY VOL.) UPPER:	< 5

HAZARDOUS COMBUSTION PRODUCTS:

Combustion may produce CO, CO2 and reactive hydrocarbons.

BASIC FIRE FIGHTING PROCEDURES:

Use water spray, dry chemical, foam or carbon dioxide to extinguish

fire. Use water spray to cool fire-exposed containers, structures and to protect personnel. If leak or spill has not ignited, ventilate area and use water spray to disperse gas or vapor and to protect personnel attempting to stop leak. Use water to flush spills away from sources of ignition. Do not flush down public sewers or other drainage systems. Exposed firefighters must wear MSHA/NIOSH approved positive pressure self-contained breathing apparatus with full face mask and full protective clothing.

UNUSUAL FIRE & EXPLOSION HAZARDS:

Irritating and/or toxic substances may be emitted upon thermal decomposition. Dangerous when exposed to heat or flame. Runoff to sewer may cause fire or explosion hazard. Containers may explode in heat of fire.

========== ACCIDENTAL RELEASE MEASURES ==========

If your facility or operation has an "Oil or Hazardous Substance Contingency Plan", activate its procedures. Take immediate steps to stop and contain the spill. Caution should be exercised regarding personnel safety and exposure to the spilled material. For technical advice and assistance related to chemicals, contact CHEMTREC (800/424-9300) and your local fire department. Notify the National Response Center, if required. Also notify appropriate state and local regulatory agencies, the LEPC and the SERC. Contact the local Coast Guard if the release is into a waterway. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. (Also see Personal Protection Information section.) Shut off ignition sources; no flares, smoking or flames in hazard area. Stop leak if you can do it without risk. Water spray may reduce vapor; but it may not prevent ignition in closed spaces. Small Spills: Take up with sand or other noncombustible absorbent material and place into containers for later disposal. Large Spills: Dike far ahead of liquid spill for later disposal.

When reporting a spill to the National Response Center or the Coast Guard, you may need to supply the Coast Guard Chemical Hazard Response Information System (CHRIS) code:

Group Number: 33
CHRIS Code: OTD

Additional spill related information may be found in the U.S. Coast Guard Chemical Hazard Response Information System (CHRIS) Manual.

During an accidental release, personal protection equipment may be required (see Section EXPOSURE CONTROLS/PERSONAL PROTECTION). Additional regulatory requirements may apply (see Section REGULATORY INFORMATION).

========== HANDLING AND STORAGE ==========

HANDLING:

Use non-sparking tools. Ground lines and equipment used during transfer to reduce the possibility of static spark-initiated fire or

explosion.

Empty containers may contain toxic, flammable/combustible or explosive residue or vapors. Do not cut, grind, drill, weld, reuse or dispose containers unless adequate precautions are taken against these hazards.

STORAGE:

Store in tightly closed containers in cool, dry, isolated, well-ventilated area away from heat, sources of ignition and incompatibles.

========== EXPOSURE CONTROLS / PERSONAL PROTECTION ==========

ENGINEERING CONTROLS:

Ventilation may be used to control or reduce airborne concentrations.

PERSONAL PROTECTION EQUIPMENT (PPE):

EYE PROTECTION:

Wear safety glasses or chemical goggles to prevent eye contact. Do not wear contact lenses when working with this substance. Have eye washing facilities readily available where eye contact can occur.
SKIN PROTECTION:

Wear impervious gloves and protective clothing to prevent skin contact.
RESPIRATORY PROTECTION:

NIOSH/MSHA approved breathing equipment may be required for non-routine and emergency use.

See Section COMPOSITION/INFORMATION ON INGREDIENTS For Exposure Guidelines.

========== PHYSICAL AND CHEMICAL PROPERTIES ==========

BOILING POINT:	160 C (320 F)
SP. GRAVITY (Water=1):	0.84 - 0.88 @ 15.56 C (60.008 F)
MELTING POINT:	NA
% VOLATILE:	Negligible
VAPOR PRESSURE:	0.4 MM HG @ 20 C (68 F)
EVAPORATION RATE:	Slower
VAPOR DENSITY (Air=1):	4.7
VISCOSITY:	1.2 - 4.6 CST @ 37.8 C (100.04 F)
% SOLUBILITY IN WATER:	Negligible
POUR POINT:	-12.22 C (10.004 F)
pH:	NEUTRAL
MOLECULAR WEIGHT:	NA
MOLECULAR FORMULA:	Mixture

ODOR/APPEARANCE:
Clear Liquid With Hydrocarbon Odor. May Be Dyed For Identification.

STABILITY AND REACTIVITY

STABILITY/INCOMPATIBILITY:

Stable. Avoid contact with strong oxidizers.

HAZARDOUS REACTIONS/DECOMPOSITION PRODUCTS:

Thermal decomposition or combustion may produce CO, CO2 and reactive hydrocarbons.

TOXICOLOGICAL INFORMATION

OTHER:

An extensive profile which characterizes adverse health effects information for this material has been prepared by the Agency for Toxic Substances Disease Registry (ATSDR). Individuals interested in a summary of the toxicology of this material should reference this document. This profile can be obtained from the National Technical Information Services (NTIS).

DISPOSAL CONSIDERATIONS

WASTE DISPOSAL (Resource Conservation & Recovery Act - RCRA):

This material, when discarded or disposed of, is a characteristic hazardous waste according to Federal regulations (40 CFR 261). This material exhibits the characteristic of ignitability and is assigned the EPA Hazardous Waste Number of D001. The discarding or disposal of this material must be done at a properly permitted facility in accordance with the regulations of 40 CFR 262, 263, 264, and 268. Additionally, the discarding or disposal of this material may be further regulated by state, regional, or local regulations. Chemical additions, processing or otherwise altering this material may make the waste management information presented in this MSDS incomplete, inaccurate, or otherwise inappropriate. The transportation, storage, treatment and disposal of this waste material must be conducted in compliance with all applicable Federal, state, and local regulations.

There may be specific current regulations at the local, regional, or state level that pertain to this information. Chemical additions, processing, or otherwise altering this material may make the waste management information presented in this MSDS, incomplete, inaccurate, or otherwise inappropriate.

TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION (D.O.T.):

Proper Shipping Name (49 CFR 172.101):	Fuel Oil (No. 2)
Hazard Class (49 CFR 172.101):	3
UN/NA Code (49 CFR 172.101):	NA 1993
Packing Group (49 CFR 179.101):	PG III
Bill Of Lading Desc. (49 CFR 172.101):	Fuel Oil (No. 2), 3, NA 1993, PG III

Labels Required (49 CFR 172.101):	Not Regulated
Placards Required (49 CFR 172.101):	Combustible

INTERNATIONAL AND DOMESTIC AIR TRANSPORTATION:

IATA Proper Shipping Name:	Diesel Fuel
Hazard Class:	3
Subsidiary Risk:	NA
UN Code:	UN 1202
Package Specification:	309, 310
Labels Required:	Flammable Liquid, Orientation Arrows

INTERNATIONAL WATER TRANSPORTATION:

IMDG Proper Shipping Name:	Diesel Fuel
Hazard Class:	3.3
UN Code:	UN 1202
IMDG Page Number:	3375
Labels Required:	Flammable Liquid
Placards Required:	Flammable

CANADIAN TRANSPORTATION OF DANGEROUS GOODS (T.D.G.):

Shipping Name:	Fuel Oil, No. 2
PIN (UN/NA):	UN 1202
Regulated Class:	3
Division:	NA
Packaging Group:	PG III
Labels Required:	Flammable Liquid
Placards Required:	Flammable

========== REGULATORY INFORMATION ==========

NOTIFICATION:

Any spill or release, or substantial threat of release, of this material to navigable water (virtually any surface water) sufficient to cause a visible sheen upon the water must be reported immediately to the National Response Center (800/424-8802), as required by U.S. Federal Law. Failure to report may result in substantial civil and criminal penalties. Also contact the Coast Guard and appropriate state and local regulatory agencies.

US EPA TOXIC SUBSTANCE CONTROL ACT (TSCA):

All components of this product are listed on the TSCA inventory.

US EPA SUPERFUND AMENDMENTS & REAUTHORIZATION ACT (SARA) TITLE III INFORMATION:

Listed below are the hazard catagories for SARA Section 311/312 (40 CFR 370):

Immediate Hazard:	X

```
Delayed Hazard:                     X
Fire Hazard:                        X
Pressure Hazard:                    -
Reactivity Hazard:                  -


CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA):
---------------------------------------------
All components of this product are listed on the Canadian DSL or
NDSL inventories.

CANADIAN WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)
CATEGORIES:
The following WHMIS categories apply to this product:
Compressed Gas:             -       Other Toxic Effects:        X
Flammable/Combustible:      X       Bio Hazardous:              -
Oxidizer:                   -       Corrosive:                  -
Acutely Toxic:              X       Dangerously Reactive:       -


========================  OTHER INFORMATION  ==========================

NFPA RATINGS:                   HMIS RATINGS:
    Health:                 0       Health:                     0
    Flammability:           2       Flammability:               2
    Reactivity:             0       Reactivity:                 0
    Special Hazards:        -       Personal Protective Equipment:H

REVISION DATE:                      27-sep-1996
REPLACES SHEET DATED:               17-feb-1995
COMPLETED BY:                       BP OIL HSEQ DEPARTMENT
REVISION SUMMARY: The following section(s) have been revised since
the previous issue of this MSDS:
    HAZARDS IDENTIFICATION
    FIRST AID MEASURES
    EXPOSURE CONTROLS / PERSONAL PROTECTION
    STABILITY AND REACTIVITY
    TOXICOLOGICAL INFORMATION
    DISPOSAL CONSIDERATIONS
    TRANSPORT INFORMATION
    REGULATORY INFORMATION
    OTHER INFORMATION


NOTICE:  The information presented herein is based on data
considered to be accurate as of the date of preparation of this
Material Safety Data Sheet.  However, no warranty or representation,
express or implied, is made as to the accuracy or completeness of
the foregoing data and safety information, nor is any authorization
given or implied to practice any patented invention without a
license.  In addition, no responsibility can be assumed by vendor
for any damage or injury resulting from abnormal use, from any
failure to adhere to recommended practices, or from any hazards
inherent in the nature of the product.

ND: No Data  NA: Not Applicable     *See specific note or section
```

2.3.2.3. Ethanol

Material Safety Data Sheet

Ethyl Alcohol, 70%

ACC# 91791

Section 1 - Chemical Product and Company Identification

MSDS Name: Ethyl Alcohol, 70%
Catalog Numbers: S75119, S75120, S556CA4
Synonyms: Ethyl Alcohol; Ethyl Hydrate; Ethyl Hydroxide; Fermentation Alcohol; Grain Alcohol; Methylcarbinol; Molasses Alcohol; Spirits of Wine.
Company Identification:
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
64-17-5	Ethyl alcohol	70	200-578-6
7732-18-5	Water	30	231-791-2

Hazard Symbols: F
Risk Phrases: 11

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: colorless clear liquid. Flash Point: 16.6 deg C. **Flammable liquid and vapor.** May cause central nervous system depression. Causes severe eye irritation. Causes respiratory tract irritation. Causes moderate skin irritation. This substance has caused adverse reproductive and fetal effects in humans. **Warning!** May cause liver, kidney and heart damage.
Target Organs: Kidneys, heart, central nervous system, liver.

Potential Health Effects

Eye: Causes severe eye irritation. May cause painful sensitization to light. May cause chemical conjunctivitis and corneal damage.
Skin: Causes moderate skin irritation. May cause cyanosis of the extremities.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause systemic toxicity with acidosis. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness, and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure.
Inhalation: Inhalation of high concentrations may cause central nervous system effects characterized by nausea, headache, dizziness, unconsciousness and coma. Causes respiratory tract irritation. May cause narcotic effects in high concentration. Vapors may cause dizziness or suffocation.
Chronic: May cause reproductive and fetal effects. Laboratory experiments have resulted in mutagenic effects. Animal studies have reported the development of tumors. Prolonged exposure may cause liver, kidney, and heart damage.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid. Gently lift eyelids and flush continuously with water.
Skin: Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Flush skin with plenty of soap and water.
Ingestion: Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If

breathing is difficult, give oxygen. Get medical aid. Do NOT use mouth-to-mouth resuscitation.
Notes to Physician: Treat symptomatically and supportively. Persons with skin or eye disorders or liver, kidney, chronic respiratory diseases, or central and peripheral nervous sytem diseases may be at increased risk from exposure to this substance.
Antidote: Replace fluid and electrolytes.

Section 5 - Fire Fighting Measures

General Information: Containers can build up pressure if exposed to heat and/or fire. As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Vapors can travel to a source of ignition and flash back. Will burn if involved in a fire. Flammable Liquid. Can release vapors that form explosive mixtures at temperatures above the flashpoint. Use water spray to keep fire-exposed containers cool. Containers may explode in the heat of a fire.
Extinguishing Media: For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam. For large fires, use water spray, fog, or alcohol-resistant foam. Use water spray to cool fire-exposed containers. Water may be ineffective. Do NOT use straight streams of water.
Flash Point: 16.6 deg C (61.88 deg F)
Autoignition Temperature: 363 deg C (685.40 deg F)
Explosion Limits, Lower: 3.3 vol %
Upper: 19.0 vol %
NFPA Rating: (estimated) Health: 2; Flammability: 3; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation. A vapor suppressing foam may be used to reduce vapors.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Use only in a well-ventilated area. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Avoid contact with heat, sparks and flame. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.
Storage: Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances. Flammables-area. Do not store near perchlorates, peroxides, chromic acid or nitric acid.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Ethyl alcohol	1000 ppm TWA	1000 ppm TWA; 1900 mg/m3 TWA 3300 ppm IDLH	1000 ppm TWA; 1900 mg/m3 TWA
Water	none listed	none listed	none listed

OSHA Vacated PELs: Ethyl alcohol: 1000 ppm TWA; 1900 mg/m3 TWA Water: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

Section 9 - Physical and Chemical Properties

Physical State: Clear liquid
Appearance: colorless
Odor: Mild, rather pleasant, like wine or whis
pH: Not available.
Vapor Pressure: 59.3 mm Hg @ 20 deg C
Vapor Density: 1.59
Evaporation Rate: Not available.
Viscosity: 1.200 cP @ 20 deg C
Boiling Point: 78 deg C
Freezing/Melting Point: -114.1 deg C
Decomposition Temperature Not available.
Solubility: Miscible.
Specific Gravity/Density: 0.790 @ 20°C
Molecular Formula C2H5OH
Molecular Weight: 46.0414

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Incompatible materials, ignition sources, excess heat, oxidizers.
Incompatibilities with Other Materials: Strong oxidizing agents, acids, alkali metals, ammonia, hydrazine, peroxides, sodium, acid anhydrides, calcium hypochlorite, chromyl chloride, nitrosyl perchlorate, bromine pentafluoride, perchloric acid, silver nitrate, mercuric nitrate, potassium-tert-butoxide, magnesium perchlorate, acid chlorides, platinum, uranium hexafluoride, silver oxide, iodine heptafluoride, acetyl bromide, disulfuryl difluoride, tetrachlorosilane + water, acetyl chloride, permanganic acid, ruthenium (VIII) oxide, uranyl perchlorate, potassium dioxide.
Hazardous Decomposition Products: Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 64-17-5: KQ6300000
CAS# 7732-18-5: ZC0110000
LD50/LC50:
CAS# 64-17-5:
Draize test, rabbit, eye: 500 mg Severe;
Draize test, rabbit, eye: 500 mg/24H Mild;
Draize test, rabbit, skin: 20 mg/24H Moderate;
Inhalation, mouse: LC50 = 39 gm/m3/4H;
Inhalation, rat: LC50 = 20000 ppm/10H;
Oral, mouse: LD50 = 3450 mg/kg;
Oral, rabbit: LD50 = 6300 mg/kg;
Oral, rat: LD50 = 9000 mg/kg;
Oral, rat: LD50 = 7060 mg/kg;

CAS# 7732-18-5:
Oral, rat: LD50 = >90 mL/kg;

Carcinogenicity:
CAS# 64-17-5:
ACGIH: A4 - Not Classifiable as a Human Carcinogen CAS# 7732-18-5: Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Epidemiology: Ethanol has been shown to produce fetotoxicity in the embry o or fetus of laboratory animals. Prenatal exposure to ethanol is associated with a distinct pattern of co ngenital malformations that have collecetively been termed the "fetal alcohol syndrome".
Teratogenicity: Oral, Human - woman: TDLo = 41 gm/kg (female 41 week(s) after conception) Effects on Newborn - Apgar score (human only) and Effects on Newborn - other neonatal measures or effects and Effects on Newborn - drug dependence.
Reproductive Effects: Intrauterine, Human - woman: TDLo = 200 mg/kg (female 5 day(s) pre-mating) Fertility - female fertility index (e.g. # females pregnant per # sperm positive females; # females pregnant per # females mated).
Neurotoxicity: No information available.
Mutagenicity: DNA Inhibition: Human, Lymphocyte = 220 mmol/L.; Cytogenetic Analysis: Human, Lymphocyte = 1160

gm/L.; Cytogenetic Analysis: Human, Fibroblast = 12000 ppm.; Cytogenetic Analysis: Human, Leukocyte = 1 pph/72H (Continuous).; Sister Chromatid Exchange: Human, Lymphocyte = 500 ppm/72H (Continuous).
Other Studies: Standard Draize Test(Skin, rabbit) = 20 mg/24H (Moderate) S tandard Draize Test: Administration into the eye (rabbit) = 500 mg (Severe).

Section 12 - Ecological Information

Ecotoxicity: Fish: Rainbow trout: LC50 = 12900-15300 mg/L; 96 Hr; Flow-through @ 24-24.3°C Rainbow trout: LC50 = 11200 mg/L; 24 Hr; Fingerling (Unspecified) ria: Phytobacterium phosphoreum: EC50 = 34900 mg/L; 5-30 min; Microtox test When spilled on land it is apt to volatilize, biodegrade, and leach into the ground water, but no data on the rates of these processes could be found. Its fate in ground water is unknown. When released into water it will volatilize and probably biodegrade. It would not be expected to adsorb to sediment or bioconcentrate in fish.
Environmental: When released to the atmosphere it will photodegrade in hours (polluted urban atmosphere) to an estimated range of 4 to 6 days in less polluted areas. Rainout should be significant.
Physical: No information available.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	IATA	RID/ADR	IMO	Canada TDG
Shipping Name:	ETHANOL				No information available.
Hazard Class:	3				
UN Number:	UN1170				
Packing Group:	II				

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 64-17-5 is listed on the TSCA inventory.
CAS# 7732-18-5 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA

CERCLA Hazardous Substances and corresponding RQs
None of the chemicals in this material have an RQ.
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 64-17-5: acute, chronic, flammable.
Section 313
No chemicals are reportable under Section 313.
Clean Air Act:
This material does not contain any hazardous air pollutants. This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA. None of the chemicals in this product are listed as Priority Pollutants under the CWA. None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 64-17-5 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
WARNING: This product contains Ethyl alcohol, a chemical known to the state of California to cause birth defects or other reproductive harm. California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives
Hazard Symbols:
F
Risk Phrases:
R 11 Highly flammable.

Safety Phrases:
S 16 Keep away from sources of ignition - No smoking.
S 33 Take precautionary measures against static discharges.
S 7 Keep container tightly closed.
S 9 Keep container in a well-ventilated place.

WGK (Water Danger/Protection)
CAS# 64-17-5: 0
CAS# 7732-18-5: No information available.
Canada - DSL/NDSL
CAS# 64-17-5 is listed on Canada's DSL List.
CAS# 7732-18-5 is listed on Canada's DSL List.
Canada - WHMIS
This product has a WHMIS classification of B2, D2A, D2B.
Canadian Ingredient Disclosure List
CAS# 64-17-5 is listed on the Canadian Ingredient Disclosure List.
Exposure Limits
CAS# 64-17-5: OEL-AUSTRALIA:TWA 1000 ppm (1900 mg/m3) OEL-BELGIUM:TWA 1000 ppm (1880 mg/m3) OEL-CZECHOSLOVAKIA:TWA 1000 mg/m3;STEL 5000 mg/m3 OEL-DENMARK:TWA 1000 ppm (1900 mg/m3) OEL-FINLAND:TWA 1000 ppm (1900 mg/m3);STEL 1250 ppm (2400 mg/m3) OEL-FRANCE:TWA 1000 ppm (1900 mg/m3);STEL 5000 pp OEL-GERMANY:TWA 1000 ppm (1900 mg/m3) OEL-HUNGARY:TWA 1000 mg/m3;STEL 3000 mg/m3 OEL-THE NETHERLANDS:TWA 1000 ppm (1900 mg/m3) OEL-THE PHILIPPINES:TWA 1000 ppm (1900 mg/m3) OEL-POLAND:TWA 1000 mg/m3 OEL-RUSSIA:STEL 1000 mg/m3 OEL-SWEDEN:TWA 1000 ppm (1900 mg/m3) OEL-SWITZERLAND:TWA 1000 ppm (1900 mg/m3) OEL-THAILAND:TWA 1000 ppm (1900 mg/m3) OEL-TURKEY:TWA 1000 ppm (1900 mg/m3) OEL-UNITED KINGDOM:TWA 1000 ppm (1900 mg/m3) JAN9 OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

Section 16 - Additional Information

MSDS Creation Date: 4/17/2001
Revision #1 Date: 4/17/2001

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

2.3.2.4. Hydrogen Sulfide Gas

BOC GASES

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: HYDROGEN SULFIDE

1. Chemical Product and Company Identification

BOC Gases,
Division of
The BOC Group, Inc.
575 Mountain Avenue
Murray Hill, NJ 07974

TELEPHONE NUMBER: (908) 464-8100
24-HOUR EMERGENCY TELEPHONE NUMBER:
CHEMTREC (800) 424-9300

BOC Gases
Division of
BOC Canada Limited
5975 Falbourne Street, Unit 2
Mississauga, Ontario L5R 3W6

TELEPHONE NUMBER: (905) 501-1700
24-HOUR EMERGENCY TELEPHONE NUMBER:
(905) 501-0802
EMERGENCY RESPONSE PLAN NO: 20101

PRODUCT NAME: HYDROGEN SULFIDE
CHEMICAL NAME: Hydrogen Sulfide
COMMON NAMES/SYNONYMS: Dihydrogen Sulfide, Sulfur Hydride
TDG (Canada) CLASSIFICATION: 2.3 (2.1)
WHMIS CLASSIFICATION: A, B1, D1A, D2A, D2B

PREPARED BY: Loss Control (908)464-8100/(905)501-1700
PREPARATION DATE: 6/1/95
REVIEW DATES: 6/7/96

2. Composition, Information on Ingredients

INGREDIENT	% VOLUME	PEL-OSHA[1]	TLV-ACGIH[2]	LD_{50} or LC_{50} Route/Species
Hydrogen Sulfide FORMULA: H_2S CAS: 7783-06-4 RTECS #: MX1225000	> 99.0	20 ppm Ceiling	10 ppm TWA 15 ppm STEL	LC_{50} 444 ppm (rat)

[1] As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)
[2] As stated in the ACGIH 1994-95 Threshold Limit Values for Chemical Substances and Physical Agents

3. Hazards Identification

EMERGENCY OVERVIEW

Irritating to the eyes, mucous membranes and respiratory system. Inhaled gas inhibits cellular respiration resulting in pulmonary paralysis, sudden collapse and death. Extremely flammable.

PRODUCT NAME: HYDROGEN SULFIDE

ROUTE OF ENTRY:

Skin Contact	Skin Absorption	Eye Contact	Inhalation	Ingestion
Yes	No	Yes	Yes	Yes

HEALTH EFFECTS:

Exposure Limits	Irritant	Sensitization
Yes	Yes	No
Teratogen	Reproductive Hazard	Mutagen
Yes	Yes	No
Synergistic Effects None Reported		

Carcinogenicity: -- NTP: No IARC: No OSHA: No

EYE EFFECTS:
Low concentrations will generally cause irritation to the conjunctiva. Repeated exposure to low concentrations is reported to cause conjunctivitis, photo phobia, corneal bullae, tearing, pain and blurred vision.

SKIN EFFECTS:
May irritate the skin upon contact.

INGESTION EFFECTS:
Ingestion is unlikely. Hydrogen sulfide will irritate the mucous membranes causing a burning feeling with excess salivation likely. Irritation of the gastrointestinal tract may also occur.

INHALATION EFFECTS:
Hydrogen sulfide reacts with enzymes in the bloodstream and inhibits cellular respiration resulting in pulmonary paralysis, sudden collapse and death. Continuous exposure to low (15-50 ppm) concentrations will generally cause irritation to mucous membranes, and may also cause headache, dizziness or nausea. Higher concentrations (200-300 ppm) may result in respiratory arrest leading to coma or unconsciousness. Exposures for more than 30 minutes at concentrations greater than 700 ppm have been fatal.

Continuous inhalation of low concentrations may cause olfactory fatigue or paralysis of the sense of smell. Thus, detection of hydrogen sulfide by its odor is not effective.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:
Blood disorders.

NFPA HAZARD CODES

Health: 4
Flammability: 4
Reactivity: 0

HMIS HAZARD CODES

Health: 4
Flammability: 4
Reactivity: 0

RATINGS SYSTEM

0 = No Hazard
1 = Slight Hazard
2 = Moderate Hazard
3 = Serious Hazard
4 = Severe Hazard

PRODUCT NAME: HYDROGEN SULFIDE

ROUTE OF ENTRY:

Skin Contact	Skin Absorption	Eye Contact	Inhalation	Ingestion
Yes	No	Yes	Yes	Yes

HEALTH EFFECTS:

Exposure Limits	Irritant	Sensitization
Yes	Yes	No
Teratogen	Reproductive Hazard	Mutagen
Yes	Yes	No
Synergistic Effects None Reported		

Carcinogenicity: -- NTP: No IARC: No OSHA: No

EYE EFFECTS:
Low concentrations will generally cause irritation to the conjunctiva. Repeated exposure to low concentrations is reported to cause conjunctivitis, photo phobia, corneal bullae, tearing, pain and blurred vision.

SKIN EFFECTS:
May irritate the skin upon contact.

INGESTION EFFECTS:
Ingestion is unlikely. Hydrogen sulfide will irritate the mucous membranes causing a burning feeling with excess salivation likely. Irritation of the gastrointestinal tract may also occur.

INHALATION EFFECTS:
Hydrogen sulfide reacts with enzymes in the bloodstream and inhibits cellular respiration resulting in pulmonary paralysis, sudden collapse and death. Continuous exposure to low (15-50 ppm) concentrations will generally cause irritation to mucous membranes, and may also cause headache, dizziness or nausea. Higher concentrations (200-300 ppm) may result in respiratory arrest leading to coma or unconsciousness. Exposures for more than 30 minutes at concentrations greater than 700 ppm have been fatal.

Continuous inhalation of low concentrations may cause olfactory fatigue or paralysis of the sense of smell. Thus, detection of hydrogen sulfide by its odor is not effective.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:
Blood disorders.

NFPA HAZARD CODES		HMIS HAZARD CODES		RATINGS SYSTEM
Health:	4	Health:	4	0 = No Hazard
Flammability:	4	Flammability:	4	1 = Slight Hazard
Reactivity:	0	Reactivity:	0	2 = Moderate Hazard
				3 = Serious Hazard
				4 = Severe Hazard

4. First Aid Measures

EYES:
PERSONS WITH POTENTIAL EXPOSURE TO HYDROGEN SULFIDE SHOULD NOT WEAR CONTACT LENSES. Flush contaminated eyes with large amounts of water for at least 15 minutes. Part eyelids with fingers to ensure complete flushing. If irritation persists, seek medical attention immediately.

SKIN:
Flush affected area with water. If irritation persists, consult a physician.

INGESTION:
Treat in a manner similar to inhalation exposure. Seek medical attention as soon as possible.

INHALATION:
PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS AND SHOULD RECOGNIZE THE HAZARDS OF OVEREXPOSURE DUE TO OLFACTORY FATIGUE. An extreme fire hazard exists when rescuing semiconscious or unconscious persons due to the flammability hazard. Avoid use of rescue equipment which may contain ignition sources or cause static discharge. Victims should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. If breathing has stopped administer artificial resuscitation and supplemental oxygen or a mixture of 5% carbon dioxide in oxygen. Keep victim calm and warm. Further treatment should be symptomatic and supportive. Seek medical assistance immediately.

5. Fire Fighting Measures

Conditions of Flammability: Flammable		
Flash point: Not Available	Method: Not Applicable	Autoignition Temperature: 554°F (290°C)
LEL(%): 4.0	UEL(%): 44.0	
Hazardous combustion products: Sulfur Compounds		
Sensitivity to mechanical shock: None		
Sensitivity to static discharge: None		

FIRE AND EXPLOSION HAZARDS:
Hydrogen sulfide is heavier than air and may accumulate in low areas and may travel a considerable distance to a source of ignition. Should flame be extinguished and flow of gas continue, increase ventilation to prevent flammable mixture formation in low areas or pockets. Product may explode or burn over a wide range of mixtures in air.

EXTINGUISHING MEDIA:
Water, carbon dioxide, dry chemicals.

FIRE FIGHTING INSTRUCTIONS:
If possible, stop the flow of hydrogen sulfide. Use water spray to cool surrounding containers. Fire fighters should use self-contained breathing apparatus.

6. Accidental Release Measures

Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs. If leak is in container or container valve, contact the appropriate emergency telephone number listed in Section 1 or call your closest BOC location.

7. Handling and Storage

Earth-ground and bond all lines and equipment associated with the Hydrogen Sulfide system. All electrical equipment should be non-sparking or explosion proof.

Do not rely on the olfactory sense to detect the presence of hydrogen sulfide. Analytical devices and instrumentation are readily available for this purpose. Perform frequent analytical tests to be certain that the TWA is not exceeded. Many metals corrode rapidly with wet hydrogen sulfide. Anhydrous hydrogen sulfide can be handled in carbon steel, aluminum Inconel ®, Stellite ® and 304 and 316 stainless steels. Avoid hard steels which are highly stressed since they may be susceptible to hydrogen embrittlement from hydrogen sulfide.

Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (<750 psig) piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the system.

Protect cylinders from physical damage. Store in cool, dry, well-ventilated area away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 130°F (54°C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders being stored for excessive periods of time. Post "NO SMOKING OR OPEN FLAMES" signs in the storage area or use area. There should be no sources of ignition in the storage or use area.

For additional storage recommendations, consult Compressed Gas Association Pamphlets P-1 and G-12.

Never carry a compressed gas cylinder or a container of a gas in cryogenic liquid form in an enclosed space such as a car trunk, van or station wagon. A leak can result in a fire, explosion, asphyxiation or a toxic exposure.

8. Exposure Controls, Personal Protection

EXPOSURE LIMITS[1]:

INGREDIENT	% VOLUME	PEL-OSHA[2]	TLV-ACGIH[3]	LD_{60} or LC_{60} Route/Species
Hydrogen Sulfide FORMULA: H_2S CAS: 7783-06-4 RTECS #: MX1225000	> 99.0	20 ppm Ceiling	10 ppm TWA 15 ppm STEL	LC_{50} 444 ppm (rat)

[1] Refer to individual state of provincial regulations, as applicable, for limits which may be more stringent than those listed here.
[2] As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)
[3] As stated in the ACGIH 1994-1995 Threshold Limit Values for Chemical Substances and Physical Agents.

ENGINEERING CONTROLS:
Hood with forced ventilation. Use local exhaust to prevent accumulation above exposure limit.

EYE/FACE PROTECTION:

Gas tight chemical goggles or full-face piece respirator.

SKIN PROTECTION:
Protective gloves: Neoprene, butyl rubber, PVC, polyethylene.

RESPIRATORY PROTECTION:
Positive pressure air line with full-face mask and escape bottle or self-contained breathing apparatus should be available for emergency use.

OTHER/GENERAL PROTECTION:
Safety shoes, safety shower, eyewash "fountain".

9. Physical and Chemical Properties

PARAMETER	VALUE	UNITS
Physical state (gas, liquid, solid)	: Vapor	
Vapor pressure	: 267 (1840 kPa)	psia
Vapor density at STP (Air = 1)	: 1.21	
Evaporation point	: Not Available	
Boiling point	: -76	°F
	: -60	°C
Freezing point	: -117.8	°F
	: -82.2	°C
pH	: Not Available	
Specific gravity	: Not Available	
Oil/water partition coefficient	: Not Available	
Solubility (H20)	: Soluble	
Odor threshold	: Not Available	
Odor and appearance	: Colorless vapor with rotten egg odor.	

10. Stability and Reactivity

STABILITY:
Stable

INCOMPATIBLE MATERIALS:
Dangerously reactive when mixed with concentrated nitric acid or other strong oxidizing agents. Vapors will ignite spontaneously when mixed with vapors of chlorine, oxygen difluoride or nitrogen trifluoride.

HAZARDOUS DECOMPOSITION PRODUCTS:
Oxides of sulfur.

HAZARDOUS POLYMERIZATION:
Will not occur.

11. Toxicological Information

REPRODUCTIVE:
Toxic effects observed in newborn rats after exposure of pregnant female to 20 ppm Hydrogen Sulfide.

12. Ecological Information

No data given.

13. Disposal Considerations

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to BOC Gases or authorized distributor for proper disposal.

14. Transport Information

PARAMETER	United States DOT	Canada TDG
PROPER SHIPPING NAME:	Hydrogen Sulfide, liquefied	Hydrogen Sulfide, liquefied
HAZARD CLASS:	2.3	2.3 (2.1)
IDENTIFICATION NUMBER:	UN 1053	UN 1053
SHIPPING LABEL:	POISON GAS, FLAMMABLE GAS	POISON GAS, FLAMMABLE GAS

Additional Marking Requirement: "Inhalation Hazard"
If net weight of product $\geq$ 100 pounds, the container must be also marked with the letters "RQ".

Additional Shipping Paper Description Requirement: "Poison-Inhalation Hazard, Zone B"
If net weight of product $\geq$ 100 pounds, the shipping papers must be also marked with the letters "RQ".

15. Regulatory Information

Hydrogen sulfide is listed under the accident prevention provisions of section 112(r) of the Clean Air Act (CAA) with a threshold quantity (TQ) of 10,000 pounds.

SARA TITLE III NOTIFICATIONS AND INFORMATION

Hydrogen sulfide is listed as an extremely hazardous substance (EHS) subject to state and local reporting under Section 304 of SARA Title III (EPCRA).

The presence of hydrogen sulfide in quantities in excess of the threshold planning quantity (TPQ) of 100 pounds requires certain emergency planning activities to be conducted.

Releases of hydrogen sulfide in quantities equal to or greater than the reportable quantity (RQ) of 100 pounds are subject to reporting to the National Response Center under CERCLA, Section 304 SARA Title III.

SARA TITLE III - HAZARD CLASSES:
Acute Health Hazard
Chronic Health Hazard
Fire Hazard
Sudden Release of Pressure Hazard

SARA TITLE III - SECTION 313 SUPPLIER NOTIFICATION:
This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

CAS NUMBER	INGREDIENT NAME	PERCENT BY VOLUME
7783-06-4	Hydrogen sulfide	> 99.0

This information must be included on all MSDSs that are copied and distributed for this material.

16. Other Information

Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES:
Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).

2.3.2.5. Sodium Hydroxide

ScienceLab.com
Chemicals & Laboratory Equipment

Health	3
Fire	0
Reactivity	2
Personal Protection	J

Material Safety Data Sheet
Sodium hydroxide MSDS

Section 1: Chemical Product and Company Identification

Product Name: Sodium hydroxide

Catalog Codes: SLS3298, SLS1081, SLS2503, SLS3925, SLS1705

CAS#: 1310-73-2

RTECS: WB4900000

TSCA: TSCA 8(b) inventory: Sodium hydroxide

CI#: Not available.

Synonym: Caustic Soda

Chemical Name: Sodium Hydroxide

Chemical Formula: NaOH

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Sodium hydroxide	1310-73-2	100

Toxicological Data on Ingredients: Sodium hydroxide LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (irritant, corrosive), of ingestion, of inhalation. The amount of tissue damage depends on length of contact. Eye contact can result in corneal damage or blindness. Skin contact can produce inflammation and blistering. Inhalation of dust will produce irritation to gastro-intestinal or respiratory tract, characterized by burning, sneezing and coughing. Severe over-exposure can produce lung damage, choking, unconsciousness or death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.

The substance may be toxic to mucous membranes, upper respiratory tract, skin, eyes.
Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure of the eyes to a low level of dust can produce eye irritation. Repeated skin exposure can produce local skin destruction, or dermatitis. Repeated inhalation of dust can produce varying degree of respiratory irritation or lung damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. 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. Cover the irritated skin with an emollient. Cold water may be used.Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: metals

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.
Slightly explosive in presence of heat.

Fire Fighting Media and Instructions: Not available

Special Remarks on Fire Hazards:
sodium hydroxide + zinc metal dust causes ignition of the latter.

Under proper conditions of temperature, pressure and state of division, it can ignite or react violently with acetaldehyde, ally alcohol, allyl chloride, benzene-1,4-diol, chlorine trifluoride, 1,2 dichlorethylene, nitroethane, nitromethane, nitroparaffins, nitropropane, cinnamaldehyde, 2,2-dichloro-3,3-dimethylbutane.
Sodium hydroxide in contact with water may generate enough heat to ignite adjacent combustible materials.
Phosphorous boiled with NaOH yields mixed phosphines which may ignite spontanously in air.
sodium hydroxide and cinnamaldehyde + heat may cause ignition.
Reaction with certain metals releases flammable and explosive hydrogen gas.

Special Remarks on Explosion Hazards:
Sodium hydroxide reacts to form explosive products with ammonia + silver nitrate.
Benzene extract of allyl benzenesulfonate prepared from allyl alcohol, and benzene sulfonyl chloride in presence of aquesous sodium hydroxide, under vacuum distillation, residue darkened and exploded.
Sodium Hydroxde + impure tetrahydrofuran, which can contain peroxides, can cause serious explosions.
Dry mixtures of sodium hydroxide and sodium tetrahydroborate liberate hydrogen explosively at 230-270 deg. C.
Sodium Hydroxide reacts with sodium salt of trichlorophenol + methyl alcohol + trichlorobenzene + heat to cause an explosion.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. If necessary: Neutralize the residue with a dilute solution of acetic acid.

Large Spill:
Corrosive solid.
Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of acetic acid. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep container dry. Do not breathe dust. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, reducing agents, metals, acids, alkalis, moisture.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Hygroscopic. Deliquescent.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Synthetic apron. Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor and dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
STEL: 2 (mg/m3) from ACGIH (TLV) [United States]

TWA: 2 CEIL: 2 (mg/m3) from OSHA (PEL) [United States]
CEIL: 2 (mg/m3) from NIOSHConsult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Deliquescent solid.)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 40 g/mole

Color: White.

pH (1% soln/water): 13.5 [Basic.]

Boiling Point: 1388°C (2530.4°F)

Melting Point: 323°C (613.4°F)

Critical Temperature: Not available.

Specific Gravity: 2.13 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (In Water): Not available.

Dispersion Properties: See solubility in water.

Solubility: Easily soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, moisture, moist air

Incompatibility with various substances:
Highly reactive with metals.
Reactive with oxidizing agents, reducing agents, acids, alkalis, moisture.

Corrosivity: Not available.

Special Remarks on Reactivity:
Hygroscopic. Much heat is evolved when solid material is dissolved in water. Therefore cold water and caution must be used for this process.
Sodium hydroxide solution and octanol + diborane during a work-up of a reaction mixture of oxime and diborane in tetrahyrofuran is very exothermic, a mild explosion being noted on one occassion.

Reactive with water, acids (mineral, non-oxidizing, e.g. hydrochloric, hydrofluoric acid, muriatic acid, phosphoric), acids (mineral, oxidizing e.g. chromic acid, hypochlorous acid, nitric acid, sulfuric acid), acids (organic e.g. acetic acid, benzoic acid, formic acid, methanoic acid, oxalic acid), aldehydes (e.g. acetaldehyde, acrolein, chloral hydrate, foraldehyde), carbamates (e.g. carbanolate, carbofuran), esters (e.g. butyl acetate, ethyl acetate, propyl formate), halogenated organics (dibromoethane, hexachlorobenzene, methyl chloride, trichloroethylene), isocyanates (e.g. methyl isocyanate), ketones (acetone, acetophenone, MEK, MIBK), acid chlorides, strong bases, strong oxidizing agents, strong reducing agents, flammable liquids, powdered metals and metals (i.e aluminum, tin, zinc, hafnium, raney nickel), metals (alkali and alkaline e.g. cesium, potassium, sodium), metal compounds (toxic e.g. berylium, lead acetate, nickel carbonyl, tetraethyl lead), mitrides (e.g. potassium nitride, sodium nitride), nitriles (e.g. acetonitrile, methyl cyanide), nitro compounds (organic e.g. nitrobenzene, nitromethane), acetic anhydride, chlorohydrin, chlorosulfonic acid, ethylene cyanohydrin, glyoxal, hydrosulfuric acid, oleum, propiolactone, acylonitrile, phorosous pentoxide, chloroethanol, chloroform-methanol, tetrahydroborate, cyanogen azide, 1,2,4,5 tetrachlorobenzene, cinnamaldehyde.
Reacts with formaldehyde hydroxide to yield formic acid, and hydrogen.

Special Remarks on Corrosivity: Very caustic to aluminum and other metals in presence of moisture.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available.
LC50: Not available.

Chronic Effects on Humans:
MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells.
May cause damage to the following organs: mucous membranes, upper respiratory tract, skin, eyes.

Other Toxic Effects on Humans:
Extremely hazardous in case of inhalation (lung corrosive).
Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (corrosive), of ingestion, .

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Dose:
LDL [Rabbit] - Route: Oral; Dose: 500 mg/kg

Special Remarks on Chronic Effects on Humans: May affect genetic material. Investigation as a mutagen (cytogenetic analysis)

Special Remarks on other Toxic Effects on Humans:

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

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

Section 14: Transport Information

DOT Classification: Class 8: Corrosive material

Identification: : Sodium hydroxide, solid UNNA: 1823 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Illinois toxic substances disclosure to employee act: Sodium hydroxide
Illinois chemical safety act: Sodium hydroxide
New York release reporting list: Sodium hydroxide
Rhode Island RTK hazardous substances: Sodium hydroxide
Pennsylvania RTK: Sodium hydroxide
Minnesota: Sodium hydroxide
Massachusetts RTK: Sodium hydroxide
New Jersey: Sodium hydroxide
Louisiana spill reporting: Sodium hydroxide
California Director's List of Hazardous Substances: Sodium hydroxide
TSCA 8(b) inventory: Sodium hydroxide
CERCLA: Hazardous substances.: Sodium hydroxide: 1000 lbs. (453.6 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada): CLASS E: Corrosive solid.

DSCL (EEC):
R35- Causes severe burns.
S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S37/39- Wear suitable gloves and eye/face protection.
S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 0

Reactivity: 2

Personal Protection: j

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 0

Reactivity: 1

Specific hazard:

Protective Equipment:
Gloves.
Synthetic apron.
Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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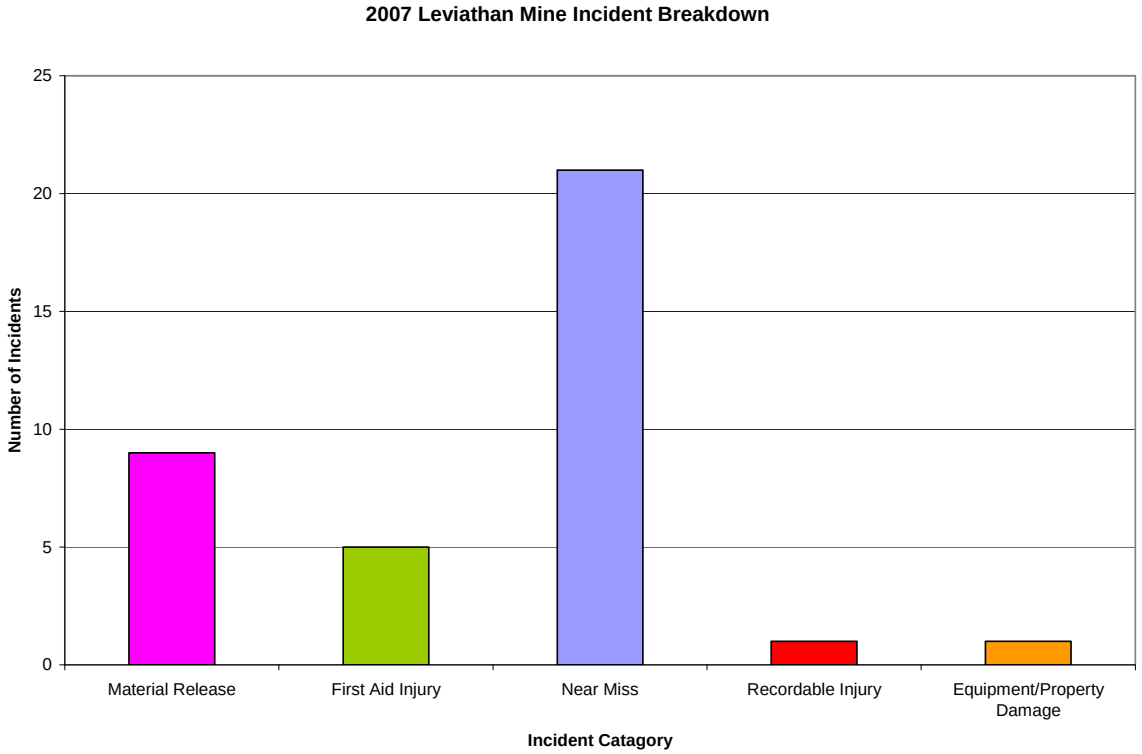
Last Updated: 10/09/2005 06:32 PM

2.4. 2007 BP Remediation Management Lessons Learned Summary

The following charts and data provide a summary of the 2007 near misses recorded on Remediation Management work sites in the Americas. Almost all of the near misses discussed below have the potential to happen at the Site. The data below should be reviewed by each Contractor while assessing work task hazards and preparing JSAs for work at the Site. All personnel that will be performing work at the Site should review the following data. Each topic area has information related to the Leviathan Mine Site and RM Americas.

2.4.1. Leviathan Site Near Miss and Incident Data (2007)

The following chart provides a summary of the health, safety, security, and environmental incidents recorded at the Leviathan Site in 2007. In total, 21 near misses, 1 property damage incident, 9 material releases, 5 first aid incidents, and 1 recordable injury were recorded at the Leviathan site in 2007.

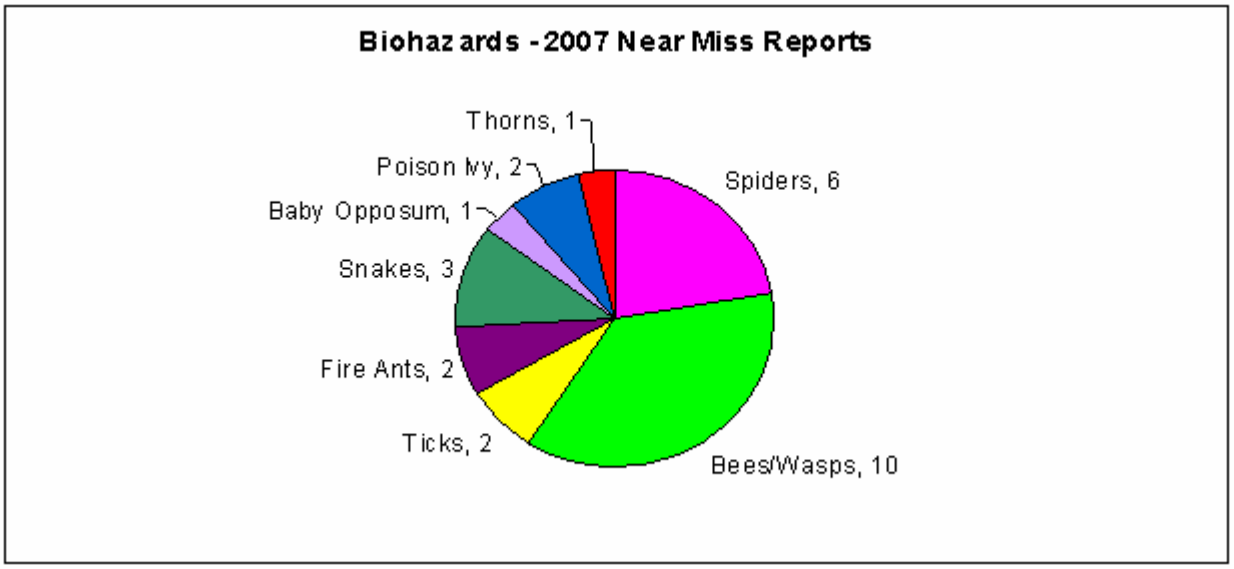


Nine of the 21 recorded near misses involved vehicles, outlining the importance of hazard awareness while traveling to, from, and around the Site. Five of the material releases were due to spills, the other four were a result of leaks. Five of the near misses recorded occurred because Site procedures were not followed properly.

2.4.2. Remediation Management Near Miss Data (2007)

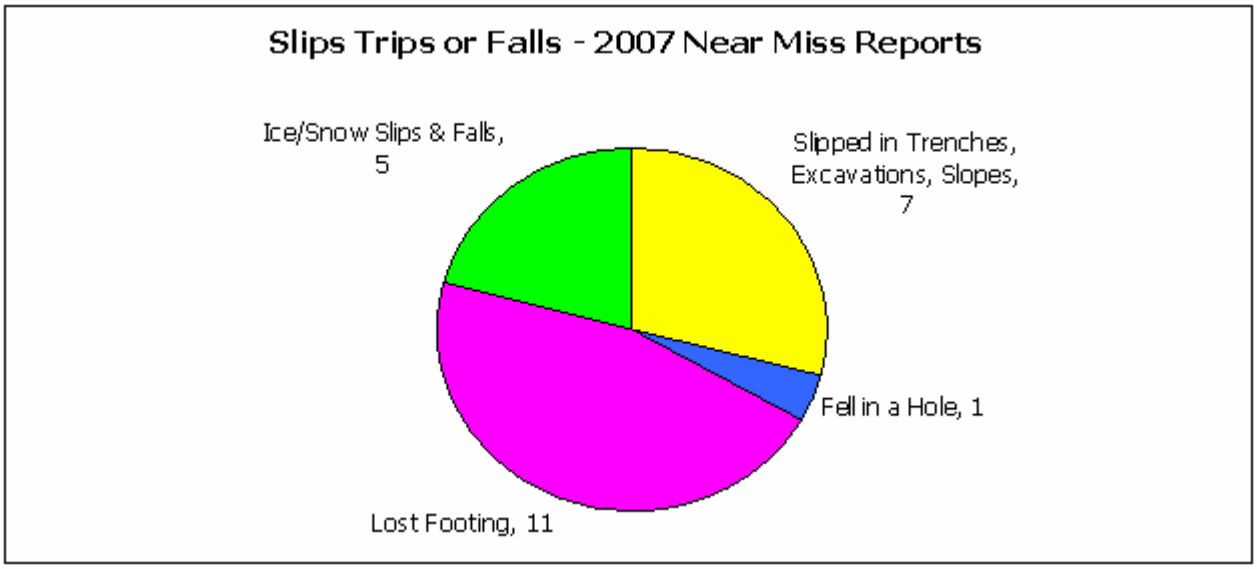
Biohazards – (27 Near Misses in 2007)

The Site contains several biological hazards from insects such as spiders and bees to wildcats and bears. The 2007 RM near miss data indicate that Bees, Wasps and Spiders posed the greatest risks, making up over half of the near misses recorded. There was one near miss due to a snake at the Leviathan Site in 2007.



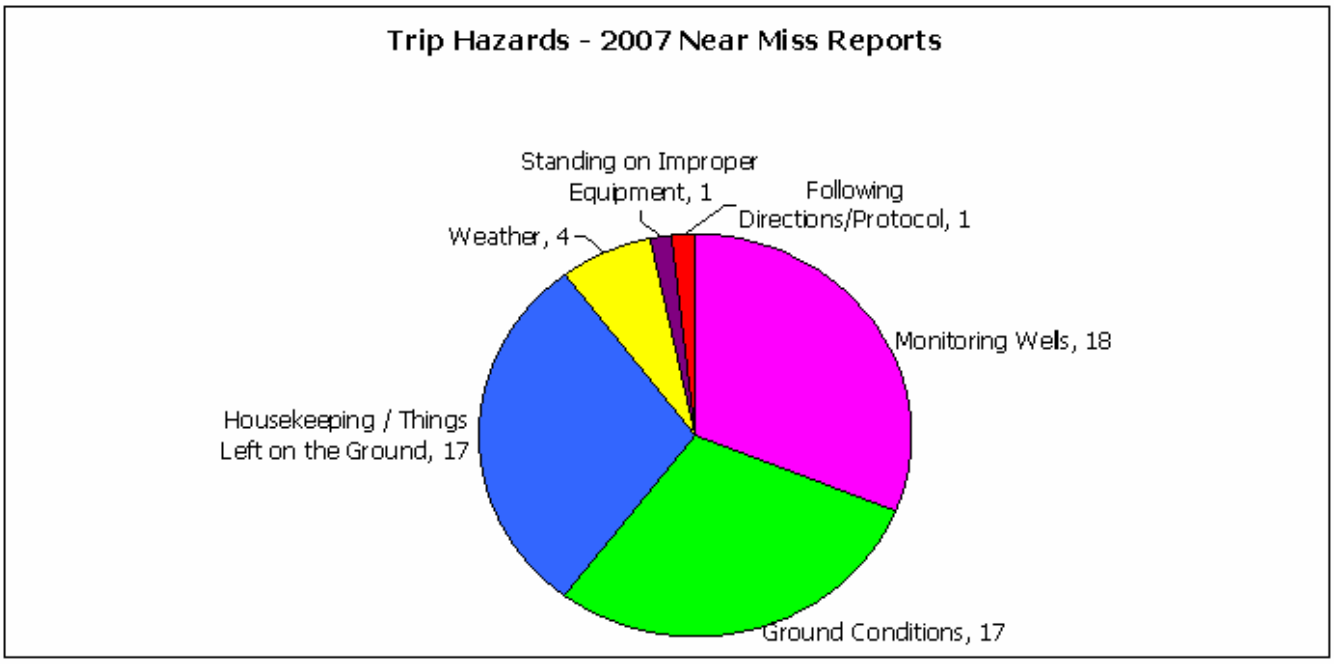
Slips, Trips and Falls – (24 Near Misses in 2007)

Slips, Trips, and Falls (STF) pose a hazard at any site. The Site contains several areas that pose a STF risk beyond that inherent in any task. The pond areas and channels contain sloped sides and snow and ice pose and additional hazard during the winter months. There were 3 near misses and one first aid incident recorded at the Site in 2007.



Trip Hazards – (58 Near Misses in 2007)

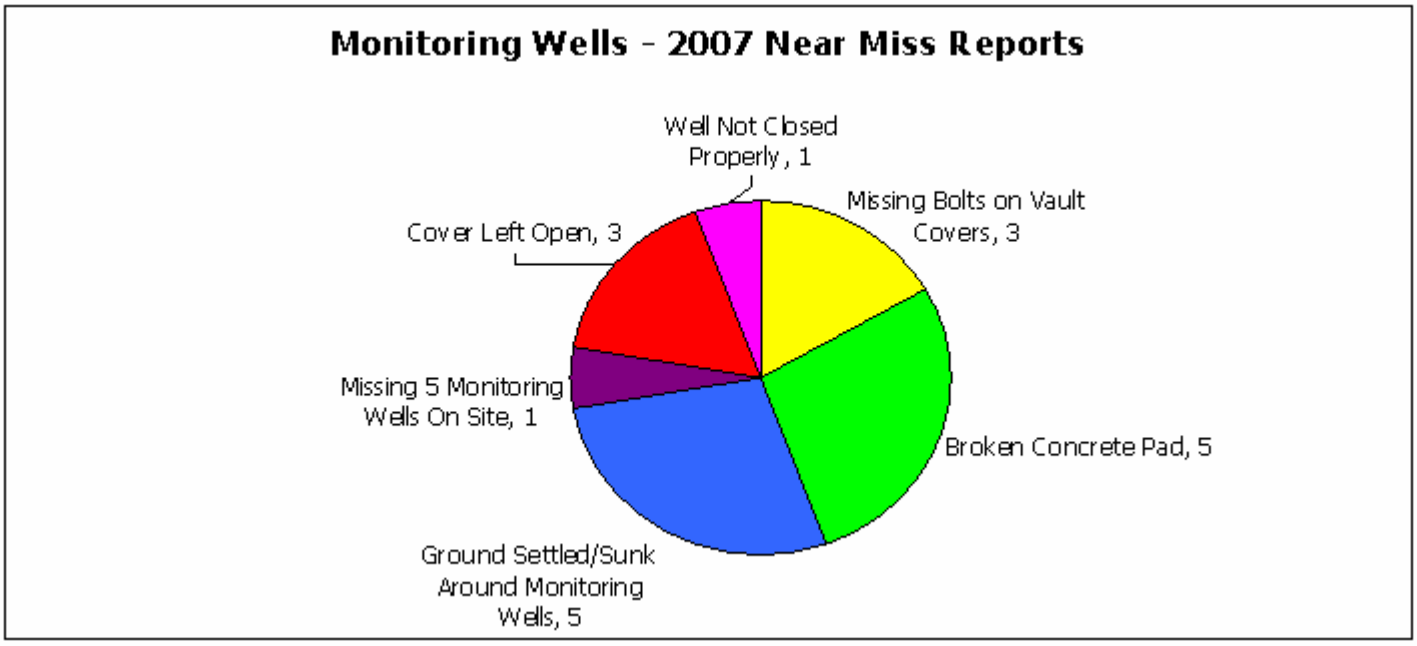
The following graph displays the breakdown of potential trip hazards recorded in 2007. Reports that were entered were generally where a trip did not occur, but there was potential for a trip or fall to take place based on the circumstances. It is important to note that ground conditions and housekeeping accounted for over half of the near misses.



Trip Hazards - Housekeeping & Things on the Ground:

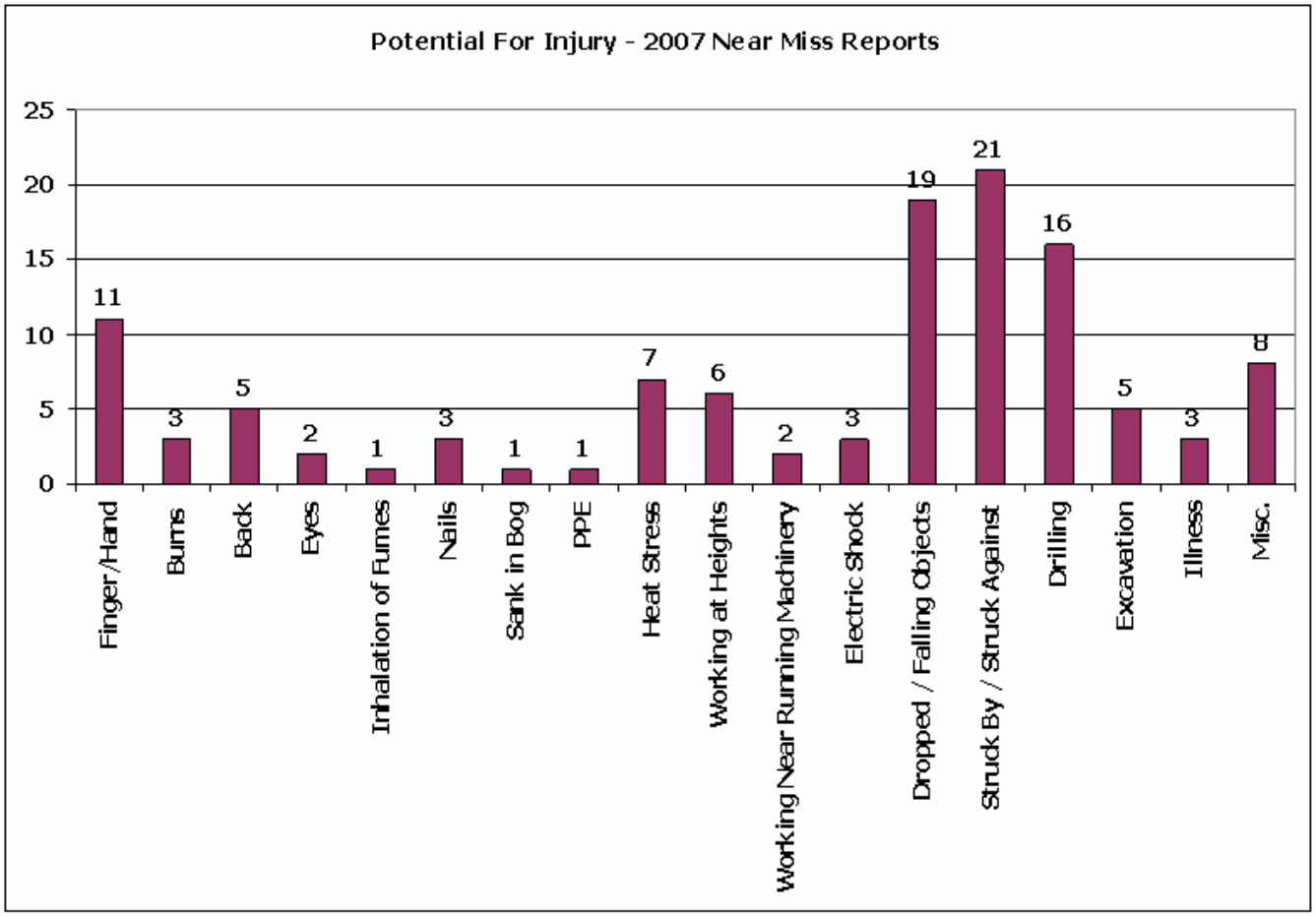
There were 14 reports where items were left on the ground causing potential for a trip, such as hoses, cables, extension cords etc. and in general messy or sloppy conditions.

Trip Hazards - Problems with Monitoring Wells: Uncovered holes, missing bolts on vault covers, broken well pads, and the ground settled or sunk around the monitoring wells.

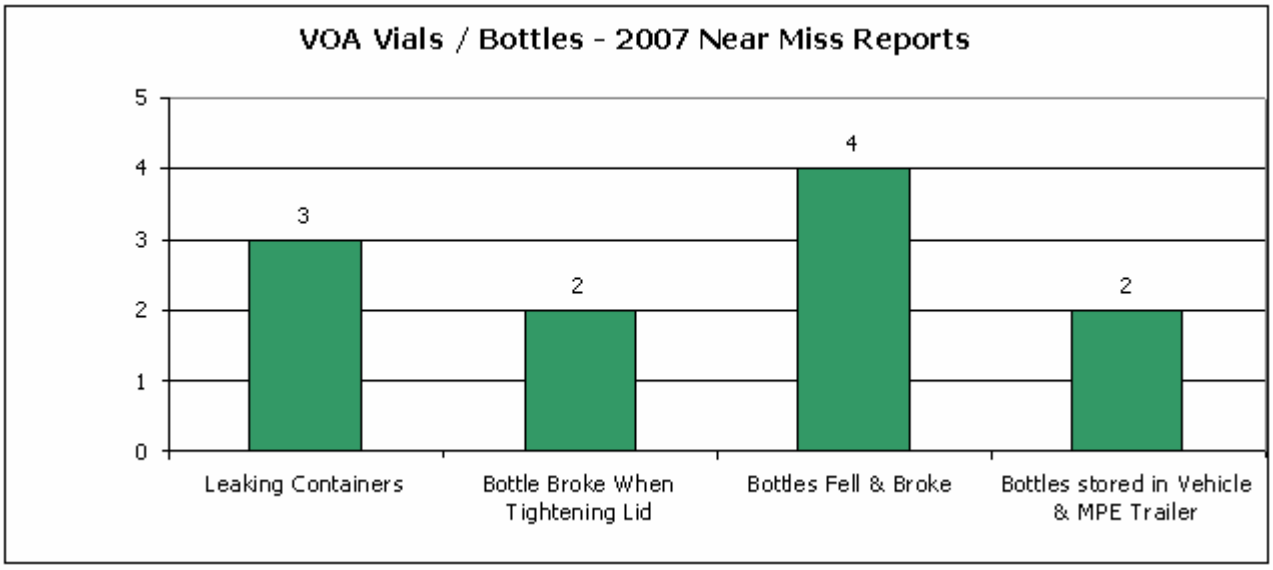


Potential for Injury – (115 Near Misses in 2007)

There were a lot of concerning reports where there was potential for someone to get hurt. There were at least 115 instances, and this does not include Slips Trips or Falls, Biohazards, or other category types. Each category is significant, the leading categories were: Struck By/Struck Against, Dropped/Falling Objects, and Drilling. There were 7 instances of bumped/hit head reports under the Struck By/Struck Against category. The Excavation reports, Heat Stress, Working at Heights, and Workers Working next to Running Machinery (backhoe and auger) when they should not have been were also noteworthy. We also had 1 report where a worker sank to thigh level in a bog. Additionally there were a number of reports involving finger/hand, eye, head, back, burns, fume inhalation, electric shock and nails sticking out of boards. There were five injuries requiring first aid treatment and one recordable back injury at the Site in 2007.

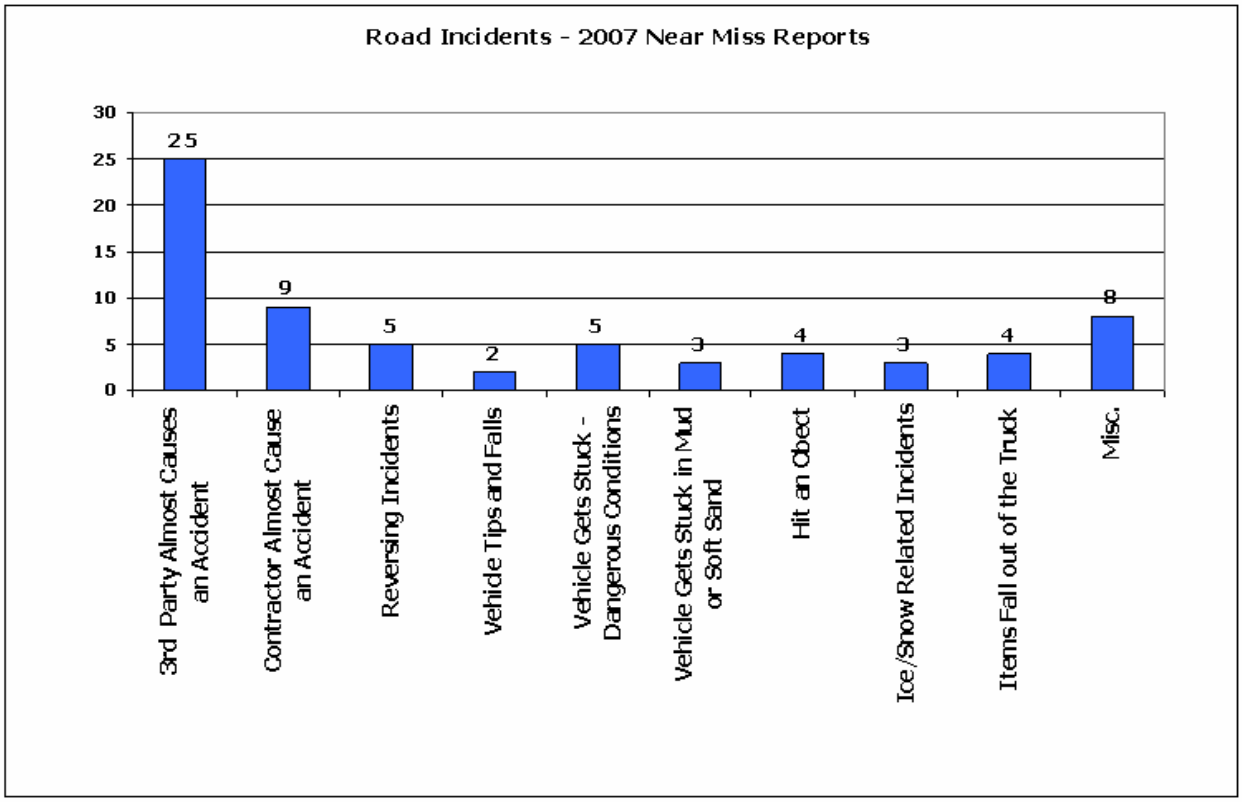


VOA Vials / Bottles – (11 Near Misses in 2007)



Road Incidents – (68 Near Misses in 2007)

Due to the long mobilization required to reach the Site and the size of the Site, worker are at a higher risk to vehicle hazards. Nine of the 21 near misses recorded at the Site in 2007 were vehicle related. The data below describes the near miss events related to vehicle incidents for RM in 2007.



There have been a lot of really bad vehicle incidents. There were 28 contractor vehicle incidents, many of which could have been serious; and 25 instances where we were able to avoid an accident due to the negligence of a 3rd party driver. A rundown of each category is listed below.

3rd Party Almost Causes an Accident - (25):

7 – 3rd party suddenly swerved or switched into our lane
3 – 3rd party ran through stop sign
1 – 3rd party merged onto ramp at the last second
1 – 3rd party failed to yield in roundabout
1 – 3rd party overshot the intersection ending up in our lane
1 – 3rd party crossed median & heading towards our vehicle
1 – 3rd party stopped abruptly in lane on hwy. when police pulled person over
1 – 3rd party traveling the wrong direction on a one way street
1 – 3rd party almost hit our vehicle as we were passing an access road
1 – 3rd party driving erratically, speeding up, slowing down, swerving
1 – 3rd party motor bike almost hit contractor who was walking
1 – 3rd party pedestrian ran in front of our vehicle
1 – Two 3rd party vehicles collided in intersection where contractor had just completed work
1 – 3rd party traveling parallel to site was hydroplaning
1 - 3rd party vehicle tried to overtake contractor vehicle and 3rd party started hydroplaning into contractor's lane, contractor braked hard and utilized the shoulder to avoid the vehicle

1 – 3rd party overtaking our vehicle, contractor braked to allow the car to pass
1 – 3rd party making a right turn in front of us, overshot the intersection and began reversing towards our vehicle.

Contractor Incidents – (28 Near Misses in 2007)

- Fell Asleep at the Wheel
- Almost rear-ended a vehicle
- Lost control when making a turn, truck came close to excavation
- 2 - Standing/Sitting in back of truck while vehicle was in motion
- Heavy Equip. Vehicle Almost Fell in a Concrete Vault
- Tractor slowly tips towards a water tank
- Truck and low-boy trailer with end of boom section became stuck on the railroad tracks (high centered).
- Narrow mountain road - our vehicle pulled over to the edge of the berm with the front wheel hanging over the edge in order to make room for an oversized vehicle to get by.
- 2 – Vehicle got stuck on S curve of the mountain road and had to be towed out
- Convoy of vehicles left the mountain site due to snow and met 2 semi's on the narrow mountain road, all 13 vehicles had to back up or pull into turnouts to allow the semi's to get through
- Making a right turn off of interstate and failed to see a cyclist coming into the intersection, cyclist was aware and slowed down
- Front tires went off the edge of the gravel pad about 5 feet but did not travel off the gravel pad which sloped down to the tundra.
- Pup trailer partially went into the ditch
- Parked on a slope, put emergency brake on but forgot to put vehicle in park, started to roll
- 5 - Reversing Incidents (1 where the worker did not see a co-worker behind him)
- 3 - Vehicle got stuck in mud or soft sand
- 4 – Hit an object (3 were fences/gates)

There were also had 3 weather/road related incidents, 4 incidents where items fell out of the back of the truck (concrete in 2 of the instances), and 8 misc. events.

Barricades / Traffic Control Problems – (41 Near Misses in 2007)

The location of the Site inherently causes potential traffic control problems as discussed in Section 4.8.2.

There were 28 instances where a 3rd party entered the controlled work area, with 4 reports where our worker was almost hit by a 3rd party vehicle. A break out is below:

3rd Party Enters the work zone etc. – (28 Near Misses in 2007)

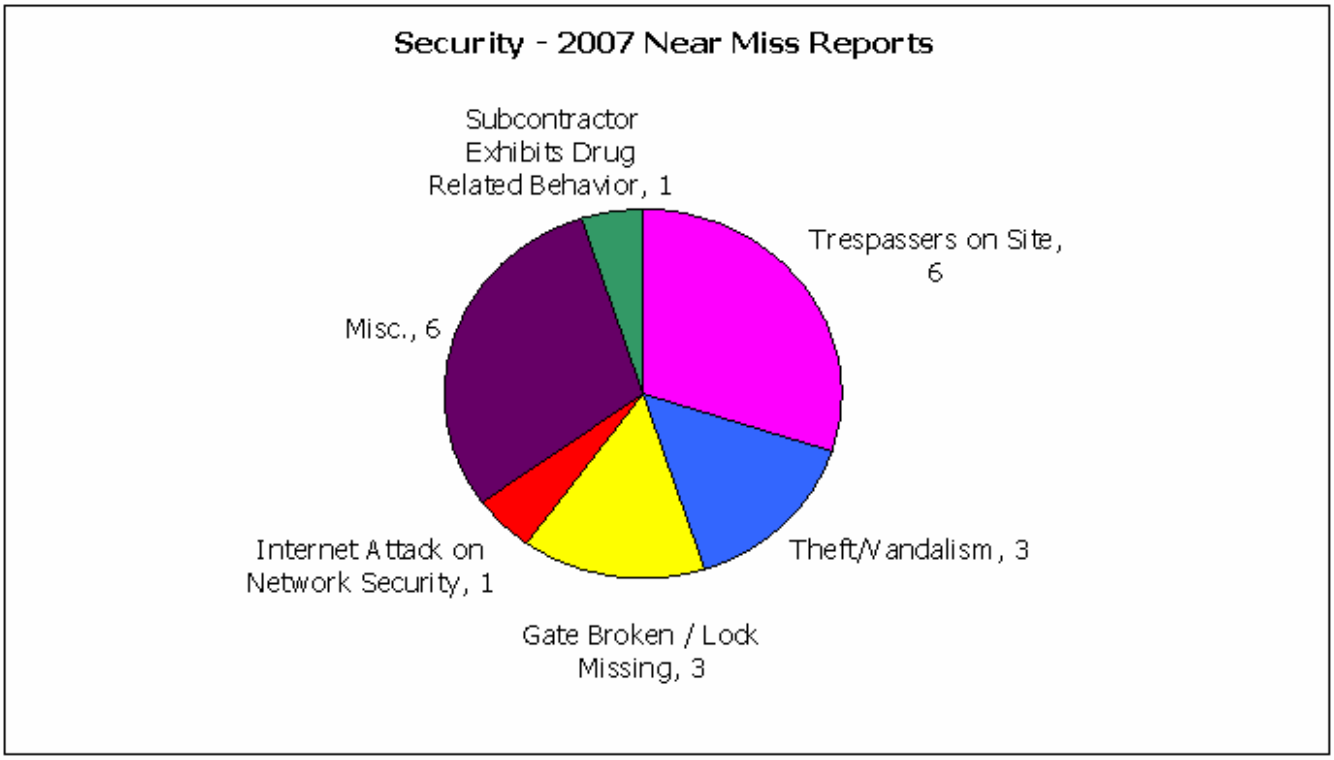
4 – Contractor was nudged (1) or almost hit (3) by a 3rd party vehicle
2 - 3rd party individuals walked into the controlled work zone
7 - Vehicles entered the controlled work zone (1-drove between the work team & barricades, 1-nearly hit the contractor vehicle)
10 - 3rd party backed into or ran over cones; (1-ran over the cones, barricades, flags & caution tape)
1 - 3rd party driving recklessly near work zone
1 - 3rd party speeds into the pump island and throws a lit cigarette toward the vac truck
1 - 3rd party was driving with relative high speed through the retail site to avoid traffic lights.
1 - 3rd party entered the forecourt, made eye contact with the workers but continued to drive & came close to one of the staff members
1 - Motorists not obeying traffic control efforts

Additional Barricades/Traffic Control Notes:

4 - Instances of other dangerous work situations
1 - Open trench on site with little control where the risk of falling into the trench was high.
8 – Good Practices – Re-evaluated the situation and used good strategic thinking in the work planning, i.e. placement of barricades, traffic control etc. to avoid problems. In 4 instances work was stopped.

Security – (20 Near Misses in 2007)

There was one Site security near miss reported at the Site in 2007 involving a subcontractor being on the Site before working hours began. The security procedures outlined in Section 4.9 should be followed to prevent unauthorized personnel from entering the Site and keep all personnel off of the Site outside of working hours.



Gate Problems – (6 Near Misses in 2007)

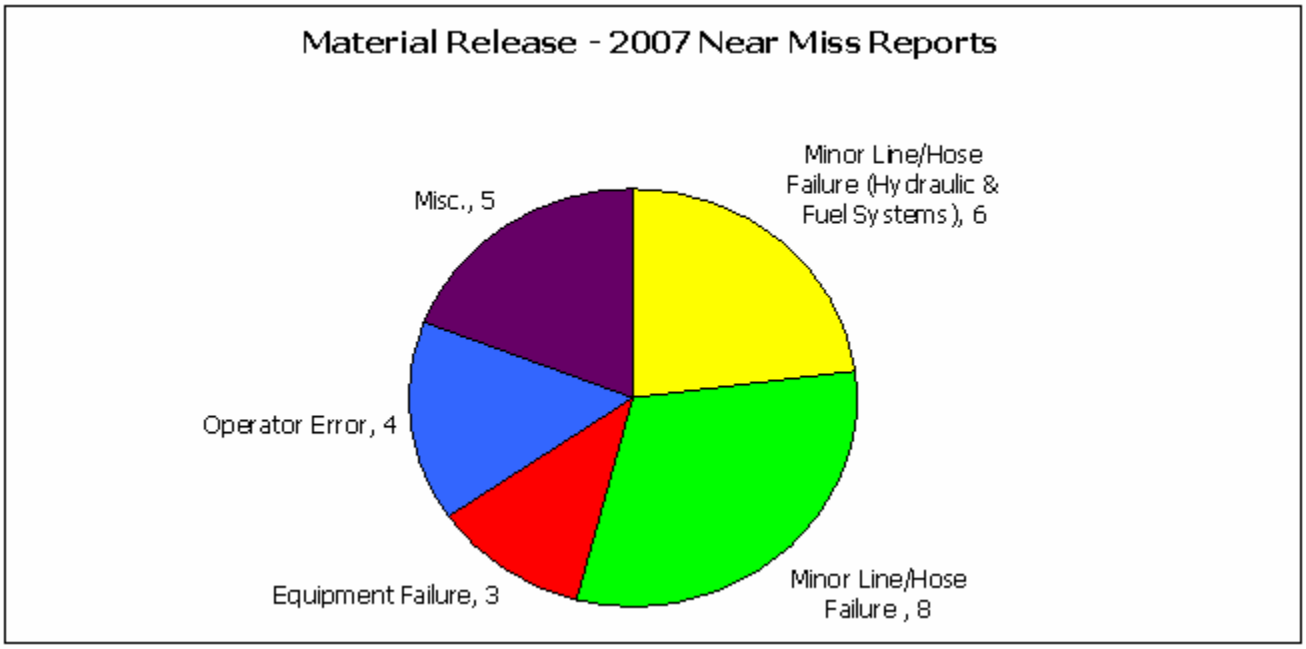
6 additional reports entered regarding gate/fence problems where security issues were not apparent.

Fire / Explosion Potential – (6 Near Misses in 2007)

- While excavating at the bottom of a pit, the shovel head struck a piece of concrete debris and ignited vapors. Vapor in the soil was significant. The space had been checked with an LEL prior and had been okayed.
- Generator was sitting in the back of the pickup truck. The confined space attendant/ fire watch noticed that a gas powered grinder (also in the back of the truck) had shifted and was sitting close to the generator. The heat generated from the exhaust pipe of the generator had begun to melt the plastic gas cap of the gas powered grinder.
- A bush fire occurred close to the Remediation Unit. Wind direction was towards the Remediation Unit. There was danger of the fire spreading.
- Explosion Potential – Employee of the gas station was smoking on the forecourt.
- Overheating transformer of a neon light was smoking.
- Fire alarm went off in the hotel and our employee slept through the alarm, unaware of an incident.

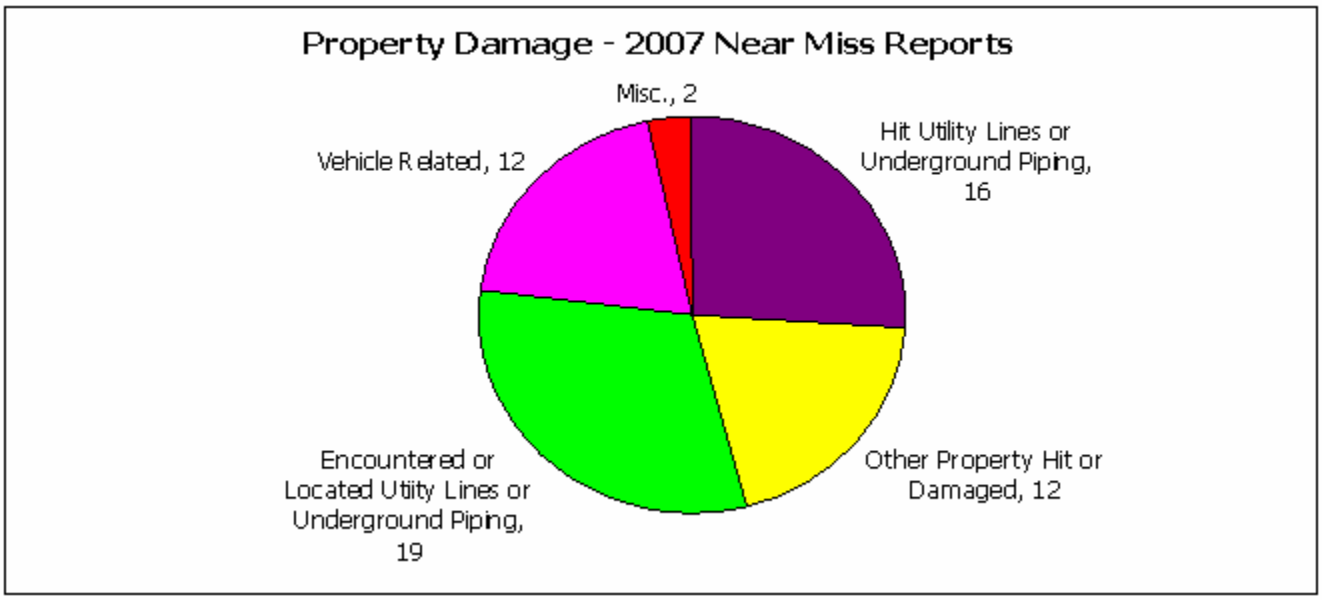
Material Release - (26 Near Misses in 2007)

Nine material releases were reported at the Site in 2007.



There were about 20 actual small material releases which were reported as near misses. Over half of the incidents were minor line hose failures, along with 3 equipment failures, and 4 operator errors.

Property Damage - (61 Near Misses in 2007)



There were 16 reports where we hit a utility line or underground piping; the damaged property is listed out below: There was one incident reported at the Leviathan Site in 2007 where a 55 gallon drum was damaged.

- 6” diameter clay tile sewer pipe
- Electric cable (incurred minor electric shock)
- Sewer line
- Steel tube 50 mm in diameter
- Weight of Excavator Equipment broke a water main
- 2 PVC pipes
- Water line break
- Damaged concrete heating system - in floor heater lines at car wash exit
- Metal pipe
- Motor-spirit line severed
- Sewer pipe
- Electrical cable hooked by bucket
- Electrical line severed by the excavator
- Natural Gas line was exposed & outer coating was chipped
- Conduit and cable

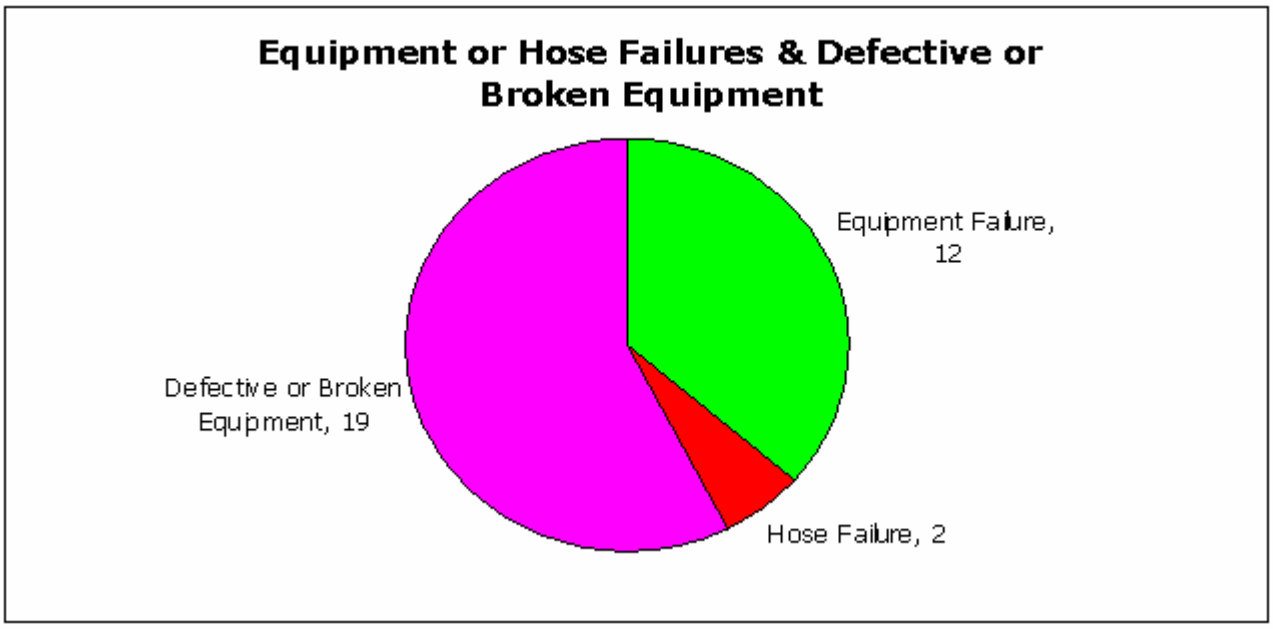
Other Property Damaged - 12:

- Process Water Valve Cover - The front outrigger caught the handle on the Process Water Valve cover, bent the metal plate, & broke the non-functioning handle position sensor, damaging the conduit and wire.
- Fence Damage from forklift.
- Struck a fluorescent light and broke it
- Garage Door Damaged – backing out of the garage without fully raising the door, auto crane’s boom hit the bottom of the door.
- Hit support trestle supporting the central access to the dock.
- Broken Window
- PVC casing of a vapor monitoring well
- Excavator bucket damaged well
- Scratched 3rd party vehicle with backhoe when loading asphalt
- Trying to pry off a Lug on a gattic cover and it hit a 3rd party vehicle, no damage
- Broke glass door when bringing pumping equipment on a pallet through the door
- Pulling the sand truck out, the pull pin slipped out of the bottom slot causing all pull force to be placed on the top slot and a bend in the truck bumper

Vehicle Related Property Damage - 12:

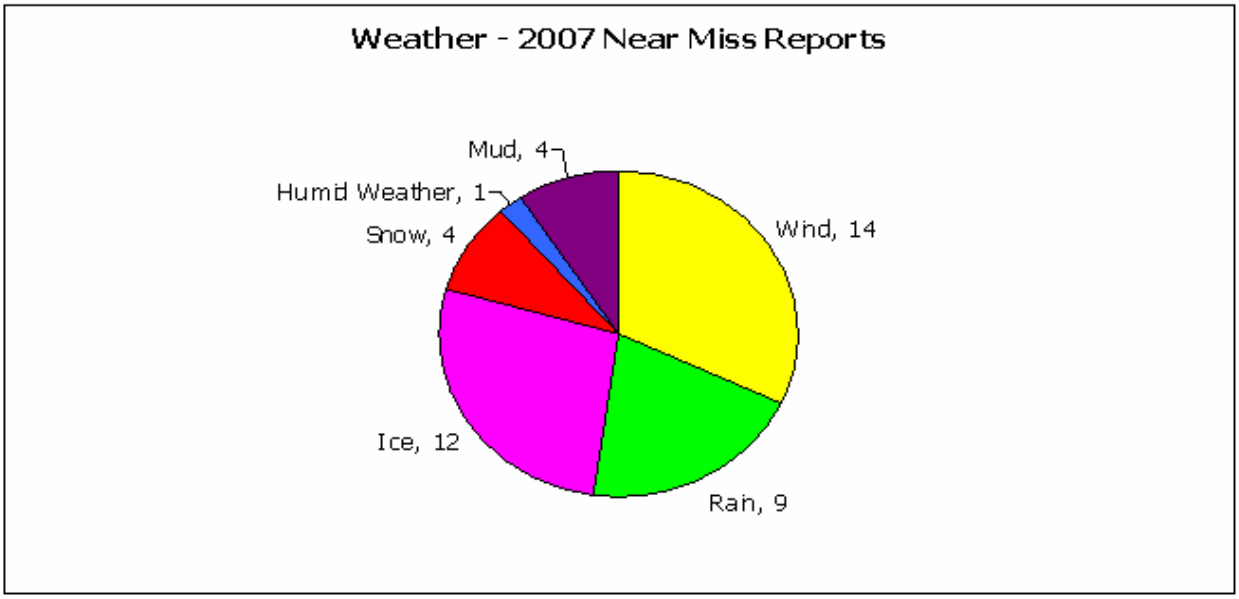
- 5 Flat Tires
- 3rd Party backed into our parked vehicle
- Rock struck windshield
- Vehicle hit by a golf ball
- 2 - Vehicle stalled out or broke down on the highway

- 1 – Vehicle would not start
- 3rd party ran over fence and hit site fence



Weather – (44 Near Misses in 2007)

The Site is susceptible to extreme weather and storm conditions. The altitude allows for extremely heavy snowfalls, sometimes exceeding 100 inches in a single season. Winds can also reach 100 mph or more. Temperature records range from 10 °F to 98 °F. The county is also subject to frequent and fast moving storms that push over the summit. In the winter months (November through May), the Site may experience snow pack of five to ten feet or more and temperatures well below freezing. One of the near misses at the Site in 2007 was a potential STF hazard caused by rain.

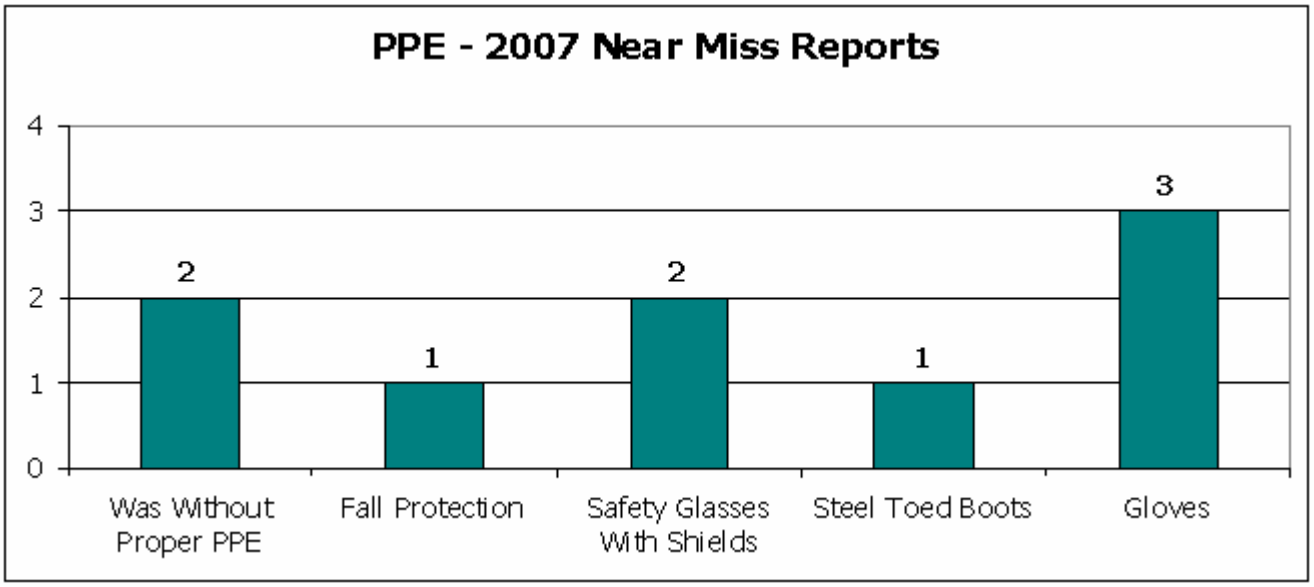


Weather plays a big part in operations. There were numerous instances of stopping work or rescheduling events in 2007 due to the weather which showed good leadership.

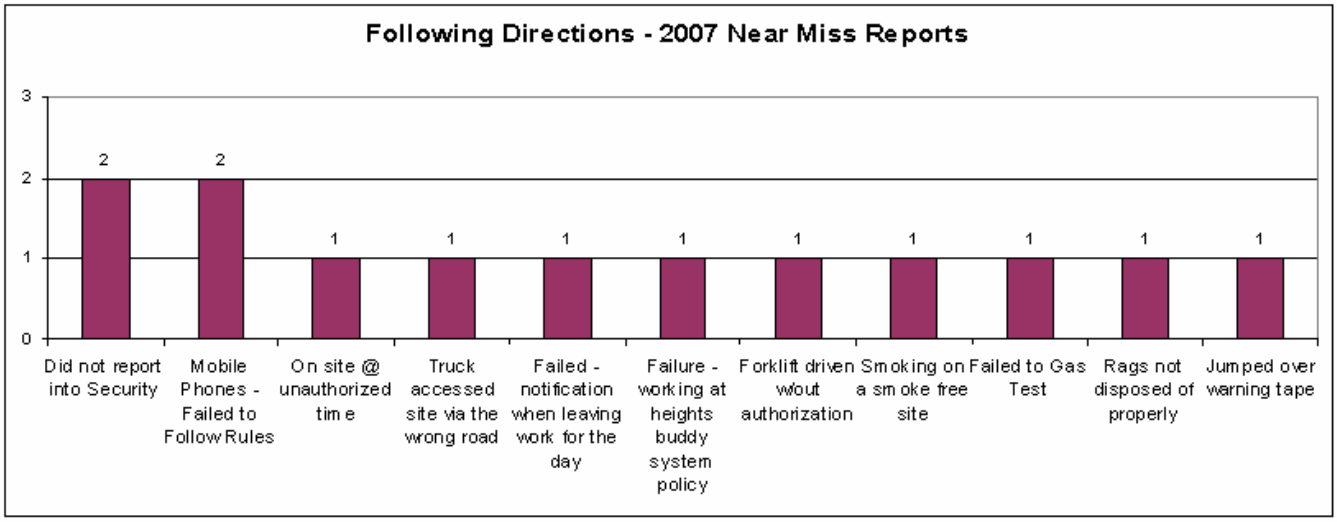
Stopped Work – (35 Near Misses in 2007)

It is the responsibility of EVERYONE at the Site to stop work if they notice un-safe work conditions. The chart below shows different reasons for which work was stopped in 2007. There were many other instances also, particularly with property damage events, this is a good sample but does not include all instances.

PPE – (9 Near Misses in 2007)



Following Directions – (13 Near Misses in 2007)



Additionally, there were a few reports regarding electrical problems, batteries, lock out tag out, office incidents, and 1 situation where we avoided an NOV (below). There were also a number of safety opportunities, observations and safety conversations which were not included in this analysis.

Avoided NOV – (1 Near Misses in 2007)

- NOV Avoidance - During a review of weekly O&M site data, engineer noticed that the Executer specified a lab report due date for compliance samples was later then what was required to complete the compliance report before the due date. The lab report was required for an agency related monthly POTW groundwater discharge permit report. Contractor contacted the Executor consultant project manager to request that the lab expedite the analysis and report. After the initial request to the Executer (~5/08/2007), multiple other requests were made to obtain the report. Contractor did not receive the lab report until 2:30 PM, the day the discharge report was due. The report was submitted by fax on time. If the report had been missing the subject lab data a NOV would likely have resulted.

2.5. BP Company Requirements

2.5.1. BP Aspirations

RM supports the BP Group HSSE goals which are simply stated –

No accidents, no harm to people, no damage to the environment

Visible leadership

Meet and exceed HSSE performance indicators

In support of these aspirations, RM and their appointed contractors will have a demonstrable process of 'continuous improvement' in place with measurable Performance Indicators.

2.5.2. BP Functional Standards

BP is committed to providing all BP employees – and those of other companies working on our premises – with a safe and secure work environment where no one is subject to unnecessary risk. We recognize that safe operations depend not only on technically-sound plants, facilities and equipment, but also on competent people and an active HSSE culture. No activity is so important that it can not be done safely.

Simply obeying safety rules is not enough. BP's commitment to safety means that each member of the workforce needs to be alert to safety risks as they go about their jobs.

Always:

- Comply with the requirements of the HSSE management system – including the use of relevant standards, instructions and processes – and with the Golden Rules of Safety;
- Stop any work that becomes unsafe;
- Only complete work for which you are trained, competent, medically fit and sufficiently rested and alert to carry out;
- Know what to do if an emergency occurs at the place of work;
- Help ensure that those who we work with – employees, contractors and other third parties – act consistently with BP's HSSE commitments, and
- Promptly report to Site management any accident, injury, illness, unsafe or unhealthy condition, incident, spill, or release of material to the environment, so that steps can be taken

to correct, prevent or control those conditions immediately. Never assume that someone else will report a risk or concern.

Seek advice and help if:

- Unclear on these HSSE expectations, or
- Concerned about a potential or actual breach of HSSE law or a BP HSSE requirement.

Never:

- Undertake work when performance is impaired by alcohol or other drugs, legal or illegal, prescribed or otherwise;
- Possess, use or transfer illegal drugs or other substances on company premises or during the conducting of RM business, and
- Use threats, intimidation, or other violence at work, or bring weapons – including those carried for sporting purposes – onto company premises.

Environment

Wherever BP operates, BP and its contractors will strive to minimize any damage to the environment arising from their activities. In addition to fully complying with all legal requirements, BP and its contractors will constantly strive to drive down the environmental and health impact of their operations through the responsible use of natural resources and the reduction of waste and emissions. These challenges apply to all parts of the business and to all worksites and workplaces. Working to protect the natural environment and the health and safety of the communities in which it operates is a core commitment of BP. For this reason, the group reports externally on its environmental, health and safety record.

Basic rules to be followed:

- Take responsibility for ensuring that BP products and operations meet applicable government and company standards, whichever are more stringent;
- Safely handle, transport and arrange for the disposal of raw materials, products and wastes in an environmentally responsible manner, and
- Promptly report any breaches of HSSE laws or BP's own HSSE requirements.

To help achieve its HSSE aspirations, BP has developed a HSSE management system framework, getting HSE right (gHSEr), which provides the basis for the development of local/site/facility HSSE management systems. The framework helps BP line managers focus on critical HSSE needs, forecast and allocate resources, set direction for HSSE activities, and consistently deliver improved HSSE

performance. It encompasses the complete spectrum of health, safety and environmental risk management including personal security and product stewardship.

Contractors are responsible for complying with BP Functional Standards per RM's guidance.

2.5.2.1. Functional Standard – Driving

Within the Personal Safety Functional Standard, the Driving Standard focuses on elements that constitute compliance with driver and vehicle requirements during BP-related business driving.

2.5.2.2. Functional Standard – Control of Work

Within the Personal Safety Functional Standard, Control of Work sets out the compliance process(s) which must be used to ensure the safety of the workforce in potentially high-hazard activity. Contractors are required to meet the expectation of the RM Control of Work process. No activities will start on any RM site without the proper authorization, required permits in place and the necessary parties notified of such activity. The designated responsible person will issue permit(s) for each job/task as required to the Contractor. The designated responsible person will ensure that all the workers under their supervision will be included in the permit(s) discussions and have them sign off on the permit being issued.

The Contractor will also be responsible for ensuring that all permits are followed until such time that the permit is no longer valid or necessary. This will include closing out the permit and ensuring that all relevant associated documents (e.g., ground disturbance, confined space, hot work or working at heights) are properly signed by the designated responsible person.

2.5.2.3. Security

The BP Security Standard sets out the compliance requirements on major facilities, travel and business processes. Getting Security Right is the document that provides guidance on compliance with the Security Standard. BP, together with our employees and contractors, will provide a secure working environment by protecting ourselves, our assets and our operations against risk of injury, loss or damage from criminal, hostile or malicious acts.

2.5.3. BP Golden Rules of Safety

The Golden Rules of Safety cover the following activities:

- Permit to work

- Energy isolation
- Ground disturbance
- Confined space entry
- Working at heights
- Lifting operations
- Driving safety
- Management of change

They are the minimum standards for safeguarding personal safety and the key controls and procedures that must be followed in all places of work. These rules have been prepared to allow the learning from past safety incidents to be shared widely across BP and emphasize the basic rules that should be in place in all locations for managing safety during typical risk activities.

The Golden Rules of Safety must be strictly enforced to ensure the safety of our people and the communities in which we live. They also provide a basis of safe practice for managing risks outside of work activities.

Everyone should be aware of these rules and follow them. Management is accountable for communicating, training, implementing and auditing them to assure compliance.

Getting the Basics Right

BP's safety policy states no harm to people and no accidents. Everyone who works for, or on behalf of, BP is responsible for their safety and the safety of those around them.

The following safety rules will be strictly enforced to ensure that safety of our people and our communities.

Although embedded in each of these rules, it is important to emphasize that:

- Work will not be conducted without a pre-job risk assessment and a safety discussion appropriate for the level of risk;
- All persons will be trained and competent in the work they conduct;
- Personal protection equipment will be worn as per risk assessment and minimum site requirements;

- Emergency response plans, developed from a review of potential emergency scenarios, will be in place before commencement of work, and

- **EVERYONE HAS AN OBLIGATION TO STOP WORK THAT IS UNSAFE.**

Permit to Work

Before conducting work that involves confined space entry, work on energy systems, ground disturbance in locations where buried hazards may exist, or hot work in potentially explosive environments, a permit must be obtained that:

- Defines scope of work;
- Identifies hazards and assesses risk;
- Establishes control measures to eliminate or mitigate hazards;
- Links the work to other associated work permits or simultaneous operations;
- Is authorized by the responsible person(s);
- Communicates above information to all involved in the work, and
- Ensures adequate control over the return to normal operations.

A permit to work must be used whenever abnormal or high-risk work is to be carried out, or where specific circumstances require protection above that which normal working conditions provide. The permit provides written confirmation that a risk assessment of the specific conditions affecting the work has been carried out and that appropriate control measures to protect personnel and equipment from each of the hazards have been provided. It is a formal agreement between the permit authority (responsible person) and those who will carry out the work that both the risks and the controls that will mitigate them are understood and that the controls will be fully implemented. Sign it only when you are happy that you understand all the requirements.

Energy Isolation

Any isolation of energy systems; mechanical, electrical, process, hydraulic and others, cannot proceed unless:

- The method of isolation and discharge of stored energy are agreed and executed by a competent person(s);
- Any stored energy is discharged;
- A system of locks and tags is utilized at isolation points;
- A test is conducted to ensure the isolation is effective, and
- Isolation effectiveness is periodically monitored.

An energy source in this context includes any electrical, mechanical, hydraulic, pneumatic, gravitational, chemical, nuclear, thermal or other energy source that could cause injury.

Energy sources must be isolated whenever servicing or performing maintenance on machines and equipment in which the unexpected energization or start up, or the release of stored energy could cause injury.

Ground Disturbance

Work that involves a man-made cut, cavity, trench or depression in the earth's surface formed by earth removal cannot proceed unless:

- A hazard assessment of the work site is completed by the competent person(s), and
- All underground hazards, i.e. pipelines, electric cables, etc., have been identified, located and, if necessary, isolated.

Where persons are to enter an excavation:

- A confined space entry permit must be issued if the entry meets the confined space definition;
- Ground movement must be controlled and collapse prevented by systematically shoring, sloping, benching, etc., as appropriate, and
- Ground and environmental conditions must be continuously monitored for change.

Ground excavation must not commence until it has been authorized by a competent person, i.e. one who can identify the hazards and put in place the right measures to control them.

Particular care is required if members of the workforce are required to enter the excavation, and conditions must be monitored during their entry to make sure that they are not endangered by changes in soil stability as a result of the weather or other work that is going on.

Confined Space Entry

Entry into any confined space cannot proceed unless:

- All other options have been ruled out;
- Permit is issued with authorization by a responsible person(s);
- Permit is communicated to all affected personnel and posted, as required;
- All persons involved are competent to do the work;
- All sources of energy affecting the space have been isolated;
- Testing of atmospheres is conducted, verified and repeated as often as defined by the risk assessment;
- Stand-by person is stationed, and
- Unauthorized entry is prevented.

A confined space is one that is large enough for personnel to enter, has limited or restricted means of entry, and is not designed for normal or continuous occupancy. It can be any space of an enclosed nature

where there is a risk of death or serious injury from hazardous substances or dangerous conditions (e.g. lack of oxygen).

Entry to confined spaces must be controlled, and is only authorized following a risk assessment and the establishment of controls over the hazards. In particular, the quality of the atmosphere inside the space must be subject the stringent monitoring. On some occasions when it becomes necessary to work in an inert atmosphere, specialist teams and very rigid procedures are required for personnel both in the vessel and in the vicinity of it where the atmosphere may still be unsafe.

Working at Heights

Working at heights of 2 meters (6 feet) or higher above the ground cannot proceed unless:

- A fixed platform is used with guard or hand rails, verified by a competent person, or…
- Fall arrest equipment is used that is capable of supporting at least a 2275 kg (5000 lbs) static load per person and has:
  - A proper anchor, mounted preferably overhead
  - Full body harness using double latch self locking snap hooks at each connection
  - Synthetic fiber lanyards
  - Shock absorber
- Fall arrest equipment will limit free fall to 2 meters (6 feet) or less;
- A visual inspection of the fall arrest equipment and system is completed and any equipment that is damaged or has been activated is taken out of service, and
- Person(s) are competent to perform the work.

The precautions required for working safely at height are very straightforward so it is disappointing that accidents during such operations are rather common. Each business unit must have a Fall Protection Policy based on the above rule, taking into account the specific risks that are involved, and also the national, regional and industry sector regulations that may apply. Remember that every office has windows to clean and a roof to maintain, so the potential is there in just about every location.

Lifting Operations

Lifts utilizing cranes, hoists, or other mechanical lifting devices will not commence unless:

- An assessment of the lift has been completed and the lift method and equipment has been determined by a competent person(s);
- Operators of powered lifting devices are trained and certified for that equipment;
- Rigging of the load is carried out by a competent person(s);
- Lifting devices and equipment have been certified for use within the last 12 months (at a minimum);
- Load does not exceed dynamic and/or static capacities of the lifting equipment;
- Any safety devices installed on lifting equipment are operational, and
- All lifting devices and equipment have been visually examined before each lift by a competent person(s).

Lifting, whether using simple hand operated mechanical devices or more complex ones, must only be carried out by trained and competent persons using approved and recently inspected equipment. The area underneath the lift is under control and clear of unnecessary persons or equipment.

Each business unit must specify its own clear rules for lifting; dependant on the type and frequency of lifting operations that are involved, and taking into account both regulatory requirements and industry good practice.

Driving Safety

All categories of vehicle, including self-propelled mobile plant, must not be operated unless:

- Vehicle is fit for purpose, inspected and confirmed to be in safe working order;
- Number of passengers does not exceed manufacturer's design specification for the vehicle;
- Loads are secure and do not exceed manufacturer's design specifications or legal limits for the vehicle;
- Seat belts are installed and worn by all occupants, and
- Safety helmets are worn by riders and passengers of motorcycles, bicycles, quads, snow-mobiles and similar types of vehicle.

Drivers must not be authorized to operate the vehicle unless:

- They are trained, certified and medically fit to operate the class of vehicle;
- They are not under the influence of alcohol or drugs, and are not suffering from fatigue, and
- They do not use hand-held mobile phones and radios while driving (best practice is to switch off all phones and two-way radios when driving).

Operation of road transport, of all kinds, light vehicles, heavy vehicles, or self-propelled mobile plant on or off-road, is the source of the greatest number of serious accidents and fatalities, both for BP and for the world in general. The two key components of getting road safety right are: access to the right vehicles with appropriate equipment, standards, procedures; and the quality of the training and competencies of drivers together with their behaviors and attitudes.

Management of Change

Work arising from temporary and permanent changes to organization, personnel, systems, process, procedures, equipment, products, materials or substances, and laws and regulations cannot proceed unless a Management of Change process is completed, where applicable, to include:

- A risk assessment conducted by all impacted by the change;
- Development of a work plan that clearly specifies the timescale for the change and any control measures to be implemented regarding:
  - equipment, facilities and process
  - operations, maintenance, inspection procedures
  - training, personnel and communication
  - documentation
- Authorization of the work plan by the responsible person(s) through completion.

Ensuring systematic Management of Change (MOC) is a key part of Process Safety Management (PSM) and the detailed processes that are necessary will be covered in site and business documentation elsewhere. Failure to identify and control the potential hazards that are associated with changes has led to a number of catastrophic incidents, and many others that have caused great harm to people and facilities. As a result, it is vital that everyone understands what is meant by a 'change' and is aware of the MOC process. Every affected person must be briefed on the control measures that are to be put in place to manage any proposed change.

2.5.4. Drugs and Alcohol Policy

RM projects and worksites are to be free from drugs and alcohol.

Every RM employee, contractor, sub-contractor or their employees working on a RM-related project are subject to testing and search for drugs and alcohol. This could include but is not limited to pre-employment screening, post accident, reasonable cause and random screening.

Failure to comply with this program can result in disciplinary action of up to and including immediate termination of the individual involved. Additionally, failure to enforce this program could lead to the termination of the contractor's contract.

Everyone is expected to report Fit for Duty, and remain fit throughout their work day or shift. Anyone found with drugs or alcohol on site will be immediately removed from the project/site. Anyone suspected of excessive alcohol consumption from the previous evening and/or shows signs of being hung over will be sent home for the day. If it happens a second time then the individual will be removed from the project.

If unexpected circumstances arise where a contract worker is requested to perform services outside of their regularly scheduled hours and has recently used Alcohol or Drugs, the individual is expected to request that responsibility be delegated to another contract worker. This request will not be considered a breach of contract.

2.5.5. Weapons Free Workplace

The Leviathan site is a weapon free workplace. Every Atlantic Richfield employee, contractor, sub-contractor or their employees working on the project should ensure they do not bring weapons onto the worksite. Weapons include but are not limited to guns, knives and explosives.

Failure to comply with the intent of this declaration can result in disciplinary action of up to and including immediate removal from site of the individual involved. Additionally, failure to enforce this declaration could lead to the termination of the contractor's contract.

2.5.6. Site Smoking Policy

Smoking is not allowed on the Leviathan site with the exception of personal vehicles due to the possibility of wildfires and the location of fuel tanks.

3.0 Emergency Response Plan

3.1. Emergency Evacuation Procedures

In case of an emergency on site that requires evacuation, two off-Site muster points (see Figure 3) are set up to meet, perform a head count, and assess the situation and any injuries. In the case of a Site evacuation, notification will be made via the satellite phone. Site evacuation will also be signaled using the air raid siren located at Aspen Seep and Pond 4.

Personnel not able to make their way to the muster point should find safety and contact their Contractor Site HSSE Officer or Operations Manager via satellite phone or mobile phone when able to do so safely.

Evacuation Plan A:
This on site muster point is located at the Site trailer at the water treatment plant at Pond 4. (Lat: 38.706579N, Long: 119.662539W).

Evacuation Plan B:
This California (CA) off-Site muster point is south of the mine Site at the Heenan Lake parking area. Take the US Forest Service (USFS) Access Road 52 to CA State Route 89 (SR 89) to the Heenan Lake parking area (Lat: 38.6562096N, Long: 119.6646157W).

Evacuation Plan C:
This Nevada (NV) off-Site muster point is north of the mine Site at the intersection of Leviathan Mine Road and State Highway 395 (Hwy 395). Take Leviathan Mine Road to Hwy 395 (Lat: 38.80306N, Long: 119.6072647W).

Evacuation Plan D:
This on site muster point is at the upper shed area of Aspen Seep. (Lat: 38.71111N, Long: 119.65318W).

3.2. Potential Incidents

Although unlikely, the following situations could occur at the Site and would require emergency response actions:

- Release of hazardous vapors or gases,
- Uncontrolled release and/or spill,
- Fire,
- Adverse weather and natural phenomenon; or
- Medical emergency.

Table 3-1: Emergency Actions

Cause	Action
Release of H_2S	In the event of detection by handheld air monitoring of a sudden release of hazardous vapors or gases constituting a potentially hazardous situation, the field team will halt operations and evacuate the work area (in a diagonal and upwind direction) using appropriate emergency signals (air horn, alarm or hand signals). The On-Site Health and Safety Coordinator will notify appropriate emergency response and supervisory personnel identified in Table 1.
Uncontrolled Release or Spill	Sorbent materials, pads, booms, or pillows and other cleanup materials and equipment will be used to neutralize and/or absorb spills and provide for a quick, easy, and safe response to any release or spill of fuels or hazardous materials. Winter clean up of spills will be conducted as weather permits. Due to the extreme contact hazard associated with Sodium Hydroxide, any significant release or spill of this material will require the development of a spill response plan and detailed JSA prior to implementing any cleanup actions. In the event of a hazardous material spill, refer to Table 7 for the reportable quantity (RQ) for all chemical hazards present onsite.
Fire- Incipient or Small Fires	Small fires will be managed using on site fire extinguishers. Personnel who may respond to emergencies will be trained in the use of fire extinguishers on an annual basis.
Fire- Uncontrollable	In case of a potentially uncontrollable fire, the On-Site Health and Safety Coordinator will: Immediately notify the Alpine County Sheriff's office at 530-694-2231; Determine the extent of the fire; Assess the hazard posed to the treatment system and ancillary facilities at the Site and to on site personnel, and Determine whether or not it is safe to attempt to control or extinguish the blaze while waiting for emergency response to arrive. Depending on the location of the fire the On-Site Health and Safety Coordinator will determine the best route to evacuate all Site personnel.
Fires- Ethanol related	Ethanol is highly flammable and explosive. Vapors may form an explosive mixture with air. Vapors can travel to a source of ignition and flash back. Containers may explode in the heat of a fire. Flammable liquid and vapor may form explosive peroxides. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. In case of fire, use water, dry chemical, chemical foam, or alcohol-resistant foam. Use water spray to cool fire-exposed containers. Do NOT use straight streams of water. For large fires, use dry chemical, carbon dioxide, alcohol-resistant foam, or water spray. Cool containers with flooding quantities of water until well after fire is out.
Wildfires	Wildfires often begin un-noticed. They spark quickly, igniting brush and trees. If you notice a fire: Call the Alpine County Sheriff Office 530-694-2231 as soon as safely possible; Evacuate to the immediate vicinity of the Pond 4; Evac A and/or D If there is a fire alert or an evacuation request: choose a route away from the fire hazards, and Watch for changes in the speed and direction of the fire and smoke.
Adverse Weather- Electrical Storms	If lightning is spotted near the Site, the On-Site Health and Safety Coordinator, Construction Superintendent or Operations Manager will determine if a lightning danger exists at the Site by using the 30/30 Rule. The 30/30 Rule is defined as

Table 3-1: Emergency Actions

Cause	Action
	follows: if the time between seeing lightning and hearing thunder is <30 seconds, personnel shall go inside or take shelter in a vehicle. Personnel will stay indoors for 30 minutes after hearing the last clap of thunder or seeing lightning. If lightning is visible but thunder is not heard, personnel will take shelter.
Adverse Weather- High Winds	If it is determined by the On-Site Health and Safety Coordinator or Operations Manager that a high wind emergency is occurring, or eminent, a site wide high wind emergency shall be declared. A high wind emergency is determined to be when winds reach a speed of 35 miles per hour (mph). Dust storms will be evaluated on a case by case basis by the On-Site Health and Safety Coordinator to determine if work can continue or shelter must be obtained. The On-Site Health and Safety Coordinator, Site Superintendent or Operations Manager will then direct Site personnel to take cover in the appropriate Site trailers or low profile vehicles, and account for all personnel at each shelter location. The On-Site Health and Safety Coordinator or Operations Manager will determine when the high wind emergency is over, and assess whether the Site is safe to allow a return to work by all or some of the employees (some tasks may have to be postponed until the wind speeds diminish). If minor damage is noted following the high wind event, the On-Site Health and Safety Coordinator or Operations Manager shall assess the damage and determine if repairs are needed before personnel can return and safely resume normal Site activities.
Adverse Weather-Flash Floods	If it is determined by the On-Site Health and Safety Coordinator or Operations Manager that a flash flood emergency is occurring, or imminent, a Site wide flash flood emergency shall be declared. The On-Site Health and Safety Coordinator or Operations Manager shall determine if the Site can be evacuated safely during the flash flood emergency. . If it is determined by Site management and the local authorities that travel is too hazardous to leave the Site, On-Site Health and Safety Coordinator or Operations Manager will designate safe areas on site which can be used for assembly and shelter until such time that travel is deemed safe enough for Site evacuation. Any areas of flowing water should be avoided both on foot and in an automobile, as it is often impossible to judge the speed and depth of the flowing water. The On-Site Health and Safety Coordinator with assistance from the local emergency response personnel shall determine when the flash flood emergency is over and will assess any damage which has occurred on the Site and determine whether or not Site personnel can return to all or a portion of the Site.
Adverse Weather-Avalanche	Avalanche conditions form as a result of the interaction of terrain, weather, and snow pack. The combination of new snowfall and wind creates the unstable layering that result in slab avalanches. A prolonged period of cold and clear weather can substantially weaken the snow pack. Qualities like the stiffness or a Styrofoam texture of the snow cover are significant. Hollow sounds, cracking, or collapsing are also important field observations. If you are caught in an avalanche, try to travel off the slab at a 45 degree angle before it breaks up and tumbles you, grab trees or other secure objects once you begin to tumble and use swimming motions and fight hard to stay on top of the snow. As the slide begins to slow, clear an air space in front of your face, thrust a hand towards the snow surface and try to remain calm. Personnel who may be potentially exposed to areas where avalanches are likely will carry avalanche beacons. Avalanche beacons are a class of radio transceivers specialized to the purpose of finding people or equipment buried under snow. When transmitting, the device emits a pulsed signal which another transceiver can receive. All new beacons transmit and search at an operating frequency of 457 khz (international standard).

Table 3-1: Emergency Actions

Cause	Action
Earthquake	The On-Site Health and Safety Coordinator or Operations Manager should then coordinate an evacuation of the Site to the predetermined muster points, in the case of an earthquake. All employees, contractors and visitors shall be accounted for and not allowed to leave the Site until given permission by the On-Site Health and Safety Coordinator or Operations Manager. If a significant earthquake event does occur, the most likely place for injuries or fatalities on the Site will be in locations where falling debris or soil collapse could occur, or where flood waters may flow in the event of a breached pond. Therefore, once the quake has stopped or slowed to only minor aftershocks, response efforts should focus on those locations where personnel were in or near, collapsed buildings, open trenches, steep slopes or tailings piles. If personnel are missing, the On-Site Health and Safety Coordinator or Operations Manager shall immediately help coordinate search efforts with local emergency crews (if they can reach the Site) and on site employees and/or contractors
Medical Emergency	In the event of a serious injury or illness, the On-Site Health and Safety Coordinator will evaluate whether emergency services should be called or if the individual can be safely moved to a medical facility. The selection of the medical facility depends on existing road conditions. Workers with suspected back or neck injuries are not to be moved. If there is evidence of serious trauma or unknown chemical exposure, Care Flight out of Reno, NV will provide emergency helicopter service to the Site from a base in the Minden-Gardnerville, NV area. In such instances, the worker should be stabilized while waiting for assistance. First aid kits will be maintained at the Site for treating minor injuries. At least two regular on site personnel will have First Aid/CPR training. Other Atlantic Richfield Company contractors will be required to determine how many people on site require First Aid/CPR training.

3.3. Fire Evacuation Plan

1.0 Introduction

On behalf of Atlantic Richfield (AR), Geomatrix Consultants Inc. (Geomatrix) has prepared this Fire Evacuation Plan to provide guidance to Site personnel on actions to take in the event of a wildfire in close proximity to the Site. Wildfire is prevalent in this area and is of serious concern to the safety of site personnel, incoming fire fighters, and the integrity of site equipment and property.

Wildfires often begin unnoticed in this area. They can spark quickly, igniting brush and trees. If personnel notice a fire near the Site, call Alpine County Sheriff Office (Sheriffs) 530-694-2231 as soon as safely possible. Personnel should evacuate to the immediate vicinity of Pond 4. The Site Coordinator and/or Owner's Representative will collaborate with the contractor Site HSSE Officers to choose a safe evacuation route away from the fire hazards ensuring that all personnel are accounted for before and after evacuation.

This Fire Evacuation Plan is designed to protect all persons working at the Site. No one is to put their life or others life in danger in order to save equipment, property, or to continue treating water at the Site.

2.0 Accountability of Personnel

The most important action to remember during a fire and evacuation scenario is to account for all site workers that have signed in for the day. The Contractor Site HSSE Officer, Owner's Rep Team or other designated person will be in control of taking role and making sure all workers are accounted for before and at all times during and after an evacuation or a sheltering in place scenario. This should include persons working at Aspen Seep. The daily sign-in sheet will be used to call out names that have signed in but not signed out for the day.

To make site workers aware of an evacuation, air-raid sirens kept at Aspen and at Pond 4 will be sounded. If there are workers missing, once gathered in the Pond 4 vicinity, the air-raid siren will be used along with radio contact until the workers are found. Personnel at Pond 4 can not hear the air-raid siren at Aspen and personnel at Aspen can not hear the air-raid siren at Pond 4. The site radios can be used to help transmit the air-raid siren between Aspen and Pond 4. Personnel should not go look for missing workers unless it is safe to do so, and it has been coordinated with the Contractor Site HSSE Officer.

During an evacuation it is important to communicate with the Alpine County Sheriff's office so they are aware that all our workers are accounted for and evacuated safely or are being sheltered in place. If the Sheriff's office does not hear from us then they will assume that we are still at the Site and we may need

to be rescued. Not communicating with the Sheriff may put the fire rescue personnel in unnecessary danger.

3.0 Evacuation Scenarios

Geomatrix, Alpine County Sherriff's Department, and the United States Forest Service (USFS) collaborated to develop possible wildfire related scenarios. This collaboration resulted in any one or combination of the following scenarios that may occur:

Scenario 1: Fire starts at or very near the site and travels so fast that there is no way to escape.

- Sound the Air-Raid Siren and gather site workers in the open area in front of the office trailer at Pond 4. If personnel are working at Aspen, they will be called using the radio to tell them that there is a fire on site and they need to stop work and listen for further instructions. If the fire starts at Aspen they need to sound the air-raid siren at Aspen and notify the personnel at Pond 4 that there is a fire on-site. If the radios are not working, then satellite phones shall be used to communicate.

- During the time personnel are gathering at the open area in front of the office trailer, the Contractor Site HSSE Officer, Owner's Rep Team or other designated personnel will take roll.

- If the fire is at the Pond 4 area and the workers at Aspen have a chance to escape via the Nevada side before the fire reaches them then they need to let the personnel at Pond 4 know who is accounted for and who will be evacuating out the Nevada side of the site.

- The Contractor Site HSSE Officer, Owner's Rep Team or other designated person will call the Alpine County Sheriff's office and let them know that there is fire on site and it is too big for us to put out. They will be informed whether we are going to shelter in place at the Pond 4 office/building foundation or evacuate. If we are going to evacuate, they will be informed which evacuation route we will be taking and that our entire workforce is accounted for.

- If the decision is made to shelter in place, all site workers, including the personnel who were working at Aspen will stay in the open area at Pond 4 until it is safe to leave or we are rescued by trained professionals. During a fire all site workers will stay as far as possible from trees, wood office buildings, generators, and flammable chemicals including the diesel tanks, ethanol tanks, the gasoline drum, and the flammable cabinet.

- All equipment including vehicles will be grounded and removed from this open area. Generators will not be fueled.

Scenario 2: Fire starts or is burning within 1 mile of the site. The fire is slow moving and there is enough time to evacuate.

- If a site worker notices smoke in the area, the Contractor Site HSSE Officer, Owner's Rep Team or other designated person will investigate via reconnaissance, computer, or phone where and how far away the fire is. At no point will the Contractor Site HSSE Officer, Owner's Rep Team or other designated person put workers lives in danger to investigate the fire.

- The Contractor Site HSSE Officer, Owner's Rep Team or other designated person will call the Alpine County Sheriff's office to report the fire and to communicate the evacuation plan. The Sheriff's Office will be notified as to which road (Nevada or California) the evacuation will utilize.

- The air-raid siren will be sounded and all site workers gather in the open area in front of the office trailer. Personnel working at Aspen will be notified that there is a fire near the site and they need to stop what they are doing and come to the Pond 4 area immediately.

- Once an evacuation route has been decided, the Contractor Site HSSE Officer, Owner's Rep Team or other designated person will take roll as the site workers gather in the open area in front of the office trailer. The daily sign-in sheet will be used to call out names that have signed in but not signed out for the day. If there are missing workers then the air-raid siren will be sounded again and radio contact will be attempted until they are found or it is unsafe to continue.

- Before evacuation the generators will be fueled if there is ample time, to maximize system operations. The system will run by generator power for approximately 4 days unless the fire inhibits the generators from running.

Scenario 3: A fire is burning 1 or more miles away from the Site; however it is not causing immediate danger to the workers at the Site.

- Work will resume as normal on the site.

- The Contractor Site HSSE Officer, Owner's Rep Team or other designated person will remain in periodic contact with the Alpine County Sheriff's office and the USFS to monitor the speed and closeness of the forest fire.

- The Contractor Site HSSE Officer will monitor the particulates in the air and evaluate any inhalation hazard of smoke and ash.

- Scenario 2 will be followed if the fire gets within the same distance or smoke gets to a hazardous level that is unsafe for the workers.

Scenario 4: The fire burns through the Site and the surrounding roads after the site have been evacuated or when the site is vacant.

- Notifications to all the contractors and subcontractors scheduled to work at the site for the day will be informed of the fire and the work will be cancelled until further notice.

- Once the Alpine County Sheriff's office and the USFS determines that it is possible and safe to re-enter the Site, a small Geomatrix staff will convoy to the Site to evaluate damage and prepare the system for start-up, if it has shut down. Personnel will be aware of the potential for hot spots, as well as the potential hazards from damage of equipment and buildings.

- Re-entry to the site may be coordinated with Alpine County Fire Department and USFS prior to the fire being contained only if they are willing to escort us into the site in order to fuel the generators and make any small changes to the systems.

4.0 Securement of Equipment

The Alpine County Sheriff's office has been notified of the types and locations of petroleum products that are currently stored on site. Approximately all flammable chemicals are stored in containers that are labeled with the proper National Fire Protection Agency NFPA diamonds.

If evacuation of the Site is required, the water treatment plants will remain in operation unless the respective generators run out of fuel or until personnel can safely return to the Site. Geomatrix has chosen this method of handling water treatment operations as a way to minimize the fuel that is contained on Site in order to avoid further conflagration of the wildfire.

5.0 Coordination with RWQCB

In the event of a fire or evacuation at the Site during the time the State of California Regional Water Quality Control Board (RWQCB) has staff working in the area, the Contractor Site HSSE Officer, will notify their workers via radio. The Contractor Site HSSE Officer, Owner's Rep Team or other designated person will be responsible for communicating the location of the fire and notify this staff of Geomatrix and their evacuation plans. Geomatrix will help coordinate rescue operations if needed between the Alpine County Sheriff's and the RWQCB, however, only if it is safe to do so.

6.0 Re-Entry to the site

Re-entry to the site may not be immediately achievable due to the possibility of fallen trees and debris blocking both access roads into the Site. Once the Alpine County Sheriff's office determines that it is practical and safe to re-enter the Site on either the Nevada Road or the California Road, a small Contractor Site HSSE Officer, Owner's Rep Team or other designated person staff will convoy to the Site to evaluate damage and prepare the system for start-up, if it has shut down. Personnel will be aware of the potential for hot spots, as well as the potential hazards from damage of equipment and buildings.

7.0 Smoke and fire Information resources

Smoke from fires as far away as 280 miles has been observed at the site. If smoke is observed at the site, it is not necessarily from a fire nearby but should be visually confirmed by sending someone to verify that the smoke is not from a fire near to the Site. The status of fires in the area can also be determined by calling the Minden Dispatch for the Sierra Front Interagency Cooperators Fire Department at 775-883-5995. They are available seven days a week. The summer hours are 7 AM to 8 PM and the winter hours are 7 AM to 6 PM.

The following websites are also a good resource for fire information:

- www.sierrafront.com
- http://cdfdata.fire.ca.gov/incidents/incidents_current
- http://geomac.usgs.gov
- http://gacc.nifc.gov/wgbc/information/newsandnotes.htm
- http://www.nifc.gov/index.html

See Figure 3 for emergency evacuation muster points and helicopter landing area locations.

3.4. Emergency Assistance

Table 3-2 provides a list of emergency telephone numbers and contacts. Each Contractor's HASP is also required to contain a list of the contractors emergency contact numbers. This list, and the list from each contractor's HASP will be conspicuously posted on information boards at both the Pond 4 Area location and the Aspen Seep Bioreactor location and each company vehicle traveling to the Site will maintain a copy. In addition, a map indicating the locations of the nearest emergency medical facilities will also be posted at both locations and available in company vehicles traveling to the Site. Figures 1 and 4 identify the location and routes to the Carson Valley Medical Center in Gardnerville, NV and the Barton Memorial Hospital in South Lake Tahoe, CA.

Primary Emergency Response Phone Number:
ALL EMERGENCY RESPONSE CALLS SHOULD BE PLACED THROUGH THE ALPINE COUNTY SHERIFFS OFFICE 530-694-2231. THE SHERIFF WILL ROUTE CALLS TO THE APPROPRIATE AGENCIES.

3.4.1. Directions to Nearest Hospitals

The selection of a medical facility may be determined by driving conditions on Access Road 52 and Leviathan Mine Road.

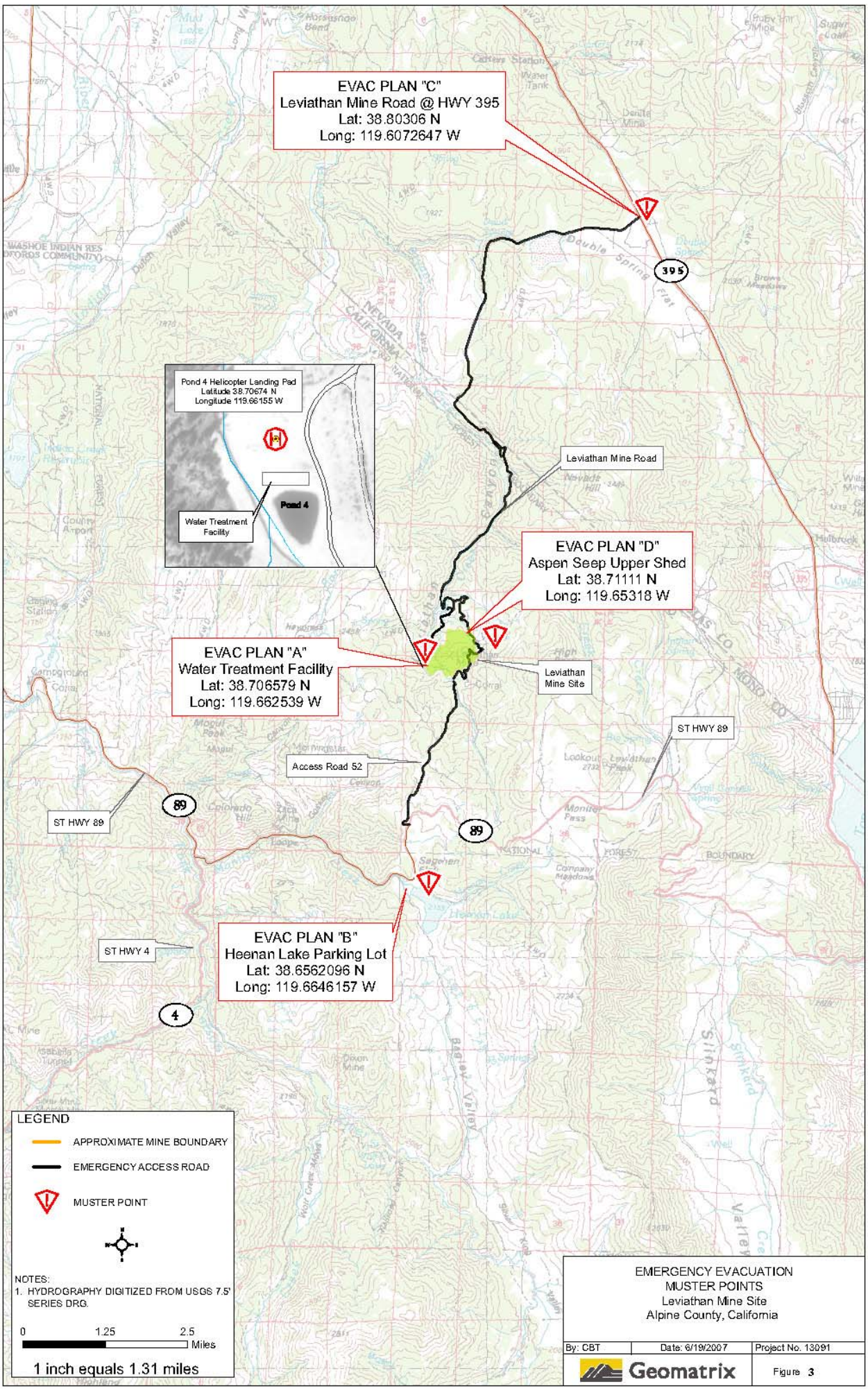
The nearest emergency medical facilities, depicted on Figure 4 are:

Carson Valley Medical Center at 1107 Hwy 395 in Gardnerville, NV (775-782-1600)
Primary Route: The primary route to the Carson Valley Medical Center, NV is as follows: take the Leviathan Mine Road to Hwy 395 and turn left and proceed to Gardnerville. Proceed to the first stop-light in town. The crossroad is Riverview Road to the left and Pine Nut Road to the right. The medical center is just past the stop-light on the right side of Hwy 395.

Alternate Route: Pending driving conditions on Leviathan Mine Road, an alternate secondary route to the Carson Valley Medical Center, NV is as follows: take Access Road 52, approximately 2.6 miles, south to CA State Route 89. Go approximately 10 miles and turn right on NV State Route 88 north and travel approximately 13 miles to Minden. Turn right onto Hwy 395 and proceed to Gardnerville. The crossroad is Riverview Road to the right and Pine Nut Road to the left. The medical center is just past the stop-light on the left side of Hwy 395.

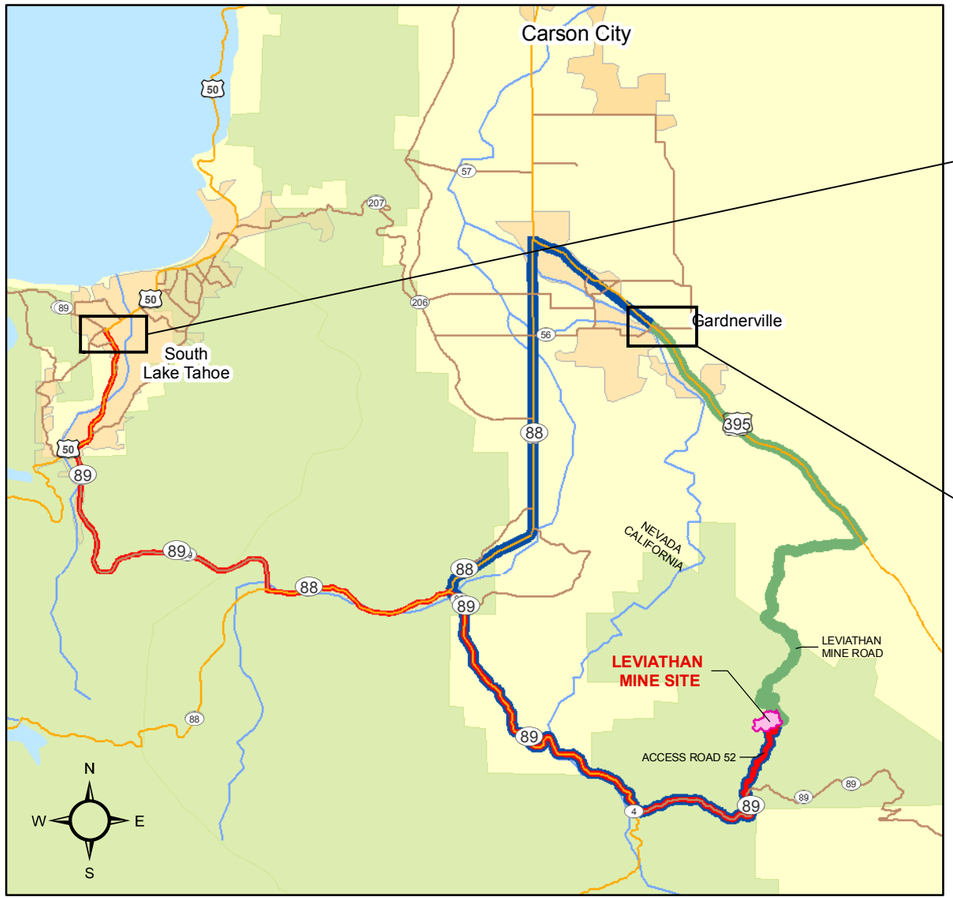
Barton Memorial Hospital at 2170 South Avenue in South Lake Tahoe, CA (530-541-3420)
Primary Route: To get to the Barton Memorial Hospital, take Access Road 52, approximately 2.6 miles, south to CA State Route 89, and turn right. Go approximately five (5) miles to State Route 89/4

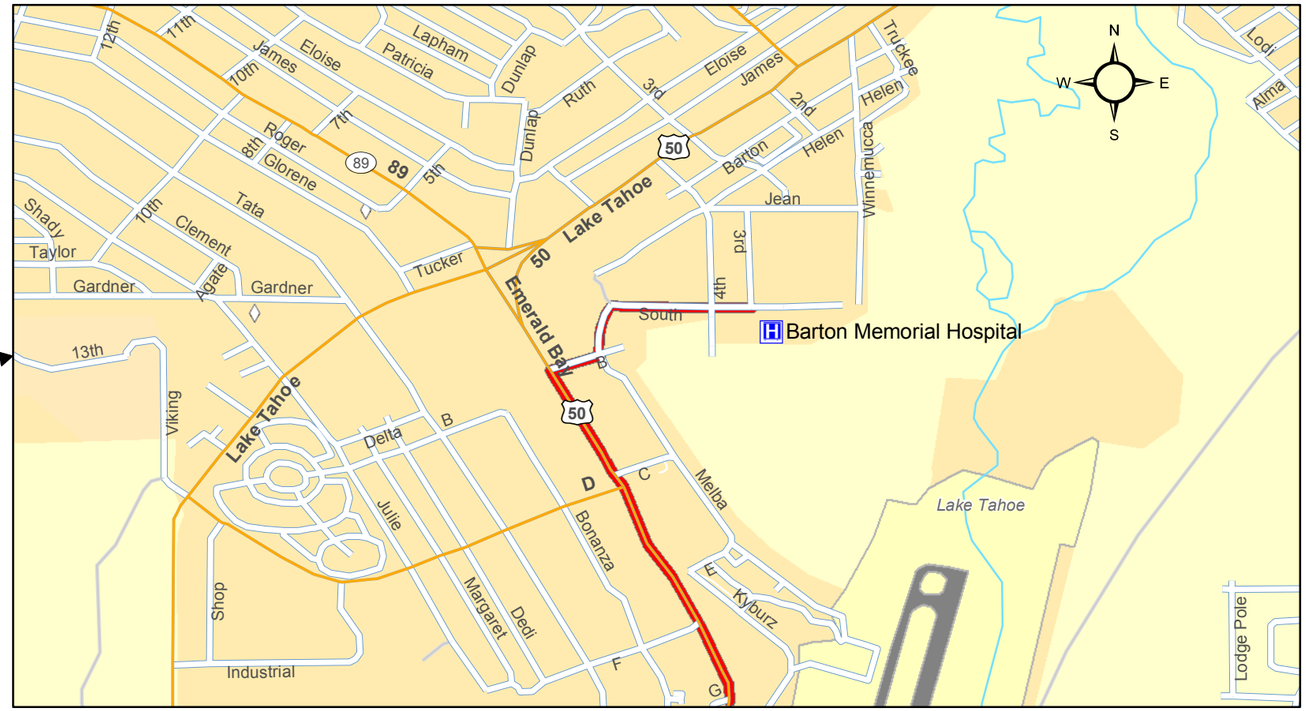
Junction. Turn right on State Route 89 to Markleeville and proceed to South Lake Tahoe. In South Lake Tahoe, continue on SR 89 past F, E, and C Streets, and turn right on South Avenue. Follow the hospital signs and continue past 4th Street. The hospital is on the right side.


EVAC PLAN "C"
Leviathan Mine Road @ HWY 395
Lat: 38.80306 N
Long: 119.6072647 W
Pond 4 Helicopter Landing Pad
Latitude 38.70674 N
Longitude 119.66155 W
Water Treatment Facility
Pond 4
Leviathan Mine Road
EVAC PLAN "D"
Aspen Seep Upper Shed
Lat: 38.71111 N
Long: 119.65318 W
EVAC PLAN "A"
Water Treatment Facility
Lat: 38.706579 N
Long: 119.662539 W
Leviathan Mine Site
ST HWY 89
Access Road 52
ST HWY 89
EVAC PLAN "B"
Heenan Lake Parking Lot
Lat: 38.6562096 N
Long: 119.6646157 W
ST HWY 4
395
89
89
4
LEGEND
APPROXIMATE MINE BOUNDARY
EMERGENCY ACCESS ROAD
MUSTER POINT
NOTES:
1. HYDROGRAPHY DIGITIZED FROM USGS 7.5' SERIES DRG.
0
1.25
2.5
Miles
1 inch equals 1.31 miles
EMERGENCY EVACUATION
MUSTER POINTS
Leviathan Mine Site
Alpine County, California
By: CBT
Date: 6/19/2007
Project No. 13091
Geomatrix
Figure 3
K:\Projects\Leviathan_13091\GIS_Maps\Map Documents\MSG\13091-8122_SHS5 EVAC Map.v2

DIRECTIONS TO BARTON MEMORIAL HOSPITAL, SOUTH LAKE TAHOE, CA:

Route is highlighted in red:
Take Access Road 52, approximately 2.6 miles, south to CA State Route 89, and turn right. Go approximately five miles to State Route 89/4 Junction. Turn right on State Route 89 to Markleeville and proceed to South Lake Tahoe. In South Lake Tahoe, continue on SR 89 past F, E, and C Streets, and turn right on South Avenue. Follow the hospital signs and continue past 4th Street. The hospital is on the right side.





DIRECTIONS TO CARSON VALLEY MEDICAL CENTER, GARDNERVILLE, NV:

Primary Route (highlighted in green):
The primary route to the Carson Valley Medical Center, NV is as follows: take the Leviathan Mine Road to Interstate Highway (HWY) 395 and turn left and proceed to Gardnerville. Proceed to the first stop-light in town. The crossroad is Riverview Road to the left and Pine Nut Road to the right. The medical center is just past the stop-light on the right side of HWY 395.

Alternate Route (highlighted in blue):
Pending driving conditions on Leviathan Mine Road, an alternate secondary route to the Carson Valley Medical Center, NV is as follows: take Access Road 52, approximately 2.6 miles, south to CA State Route 89. Go approximately 10 miles and turn right on NV State Route 88 north and travel appx. 13 miles to Minden. Turn right onto HWY 395 and proceed to Gardnerville. The crossroad is Riverview Road to the right and Pine Nut Road to the left. The medical center is just past the stop-light on the left side of HWY 395.

HOSPITAL DIRECTIONS AND LOCATION MAP
Leviathan Mine Site
Alpine County, California

By: JDJ	Date:4-17-2007	Project No. 13091
Geomatrix		Figure 4

K:\Projects\Leviathan_13091\GIS_Maps\MapDocuments\BG1081-B504_HospitalV2

Table 3-2: Emergency Response Telephone Numbers

Description	Address	Telephone Number	Comments
EMERGENCY SERVICE PROVIDER			
Alpine County Sheriff's Office	P. O. Box 278 12777 State Route 89 Markleeville, CA 96120	530-694-2231	Emergency assistance: police, ambulance, emergency rescue
Carson Valley Medical Center	1107 Hwy. 395 Gardnerville, NV 89410	775-782-1600	See Figures 1 and 2 for route maps
Barton Memorial Hospital	2170 South Avenue South Lake Tahoe, CA 96150	530-542-3000 ext 2222	See Figures 1 and 2 for route maps.
Care Flight – Emergency Helicopter Service	450 Edison Way Reno, NV 89502	800-648-4888	Site GPS coordinates should be provided when calling See Section 5.4 for coordinates.
National Response Center		800-424-8802	Toxic chemical releases/spills
Poison Control Center		800-222-1222	Poison control information
Ambulance Service		530-694-2231	Non-emergency number for ambulance service
Volunteer Fire Department, Markleeville	P.O. Box 45 Markleeville, CA 96120	530-694-2223	Chief – Wayne Thomson
Volunteer Fire Department, Woodfords	P.O. Box 21 Markleeville, CA 96120	530-694-2922	Chief – Paul Washam, Jr.
Concentra Health Site	3488 Goni Road, Bldg. E Carson City, NV 89706	775-887-5030	Concentra Health Site Clinic hours 8am-5pm, M-F
Med Direct Urgent Care	120 S. Carson Street Carson City, NV 89706	775-885-4685	Med Direct Urgent Care Hours 8am-8pm
Carson-Tahoe Hospital	775 Fleischmann Way Carson City, NV 89703	775-882-1361	Carson Tahoe Hospital for after-hours, holidays, or weekends in addition to 24-hour emergency care
When calling Atlantic Richfield Company personnel to report an incident, keep calling in the order below until you obtain ***direct voice*** contact:			
ATLANTIC RICHFIELD COMPANY – OWNER'S REPRESENTATIVE TEAM ON SITE			
Donald 'Buck' Rice		Mobile 903-520-9769	Owner's Representative
Jerry Johnson		Mobile 303-906-7251	Resident Engineer
Phil Thompson		Mobile 951-537-9177	HSSE Oversight

Description	Address	Telephone Number	Comments
Mike Wheeler		Mobile 509-979-4457	HSSE Oversight
Britt Jones		Mobile 916-612-6237	Site Coordinator
Michelle Souza		Site Phone 530-554-2599	Site Admin
ATLANTIC RICHFIELD COMPANY			
Anthony Brown	6 Centerpointe Drive LPR 6-172 La Palma, CA 90623	Day: 661-287-3855 Mobile: 951 265-4277	Atlantic Richfield Company Environmental Business Manager (EBM)
Chris Winsor	6 Centerpointe Drive LPR 6-174 La Palma, CA 90623	Day: 714-228-6710 Mobile: 714-264-3202	Atlantic Richfield Company Regional Manager
Ray Vose	6 Centerpointe Drive LPR 6-172 La Palma, CA 90623	Day: 714-670-5359 Mobile: 818-398-4177	Atlantic Richfield Company Safety Representative
Ron Halsey	6 Centerpointe Drive LPR 6-172 La Palma, CA 90623	Day: 714-670-5331 Mobile: 714-746-4227	Atlantic Richfield Company West Deputy Regional Manager – South
Alan Delise	2010 Crow Canyon Place San Ramon, CA. 94583	Day: 925-275-3810 Mobile: 916-496-2676	Atlantic Richfield Company West Deputy Regional Manager – North
ENVIRONMENTAL PROTECTION AGENCY, REGION 9			
Kevin Mayer	75 Hawthorne Street, SFD-7-2 San Francisco, CA 94105-3901	Day: 415-972-3176	Project Manager
REGIONAL WATER QUALITY CONTROL BOARD (RWQCB)			
Richard Booth	South Lake Tahoe	Day: 530-542-5574	Project Manager
Douglas Carey	South Lake Tahoe	Day: 530-542-5468 Pager: 530-494-8052	Site Manager
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION			
Fatality / Hospitalization Incident Reporting		1-800-321-6742	Call within 8 hours if a fatality or three or more injuries requiring hospitalization occur
PARK CATTLE CO. RANCH			
Park Cattle Co. Main Office	Minden, NV	Day: 775-782-2144	Report injured free-range cattle in immediate off-Site vicinity to RWQCB first. If RWQCB staff is unavailable contact Park Cattle Co. and notify them of injury directly.

3.5. Inclement Weather Plan

Inclement weather days:

1) If it is snowing or raining heavily in Gardnerville/Minden then there will automatically be a delayed start (on hold until a decision is made). This will be communicated to all subcontractors and vendors.

2) Buck Rice, the Owner's Representative, will call each contractor and tell them to hold. (Each contractor is responsible for contacting their subcontractors and vendors scheduled for the day)

3) No contractors, subcontractors or deliveries will be allowed on site until the hold is lifted.

4) Buck Rice, Phil Thompson, Mike Wheeler will make a test run in on the Nevada road.

5) They will either turn around if the weather is too bad and call off work for the day or they will call the contractors and tell them it is okay to work.

6) Buck Rice has the ultimate authority to call off work for contractor personnel and subcontractors.

Snowing after personnel are on site:

1) If it starts snowing (more than light snow) while personnel on site, all deliveries and new personnel coming up onto the site will be called and told to cancel for the day.

2) If snow starts to stick and conditions at the site are deteriorating, someone will be dispatched to check the Nevada road conditions every two hours while we are on site.

3) No one will exit the California side and the sheep trail from Aspen will not be used if snow is sticking to the ground.

4) Buck Rice, Phil Thompson, Mike Wheeler will make the final call of when to exit the Site.

5) Once the decision is made to evacuate. Everyone will sign out within a ½ hour and leave the site via the Nevada side.

3.6. Helicopter Emergency Operations

In case of emergency evacuation by helicopter, the Owner's Rep Team will give the Site's Latitude and Longitude to the emergency operators. Emergency evacuation landing area locations are shown on Figure 3 and include:

Aspen Creek: Latitude 38.71308 N and Longitude 119.65014 W
Pond 4: Latitude 38.70674 N and Longitude 119.66155 W

Do not approach the helicopter until the rotors have stopped and you are signaled by an air crew member that it is safe to approach the aircraft. Do not attempt to assist the pilot by using any hand signals or any other device unless specifically instructed to do so by a competent person. If radio or phone communication is established with the aircraft crew, ensure that any information is clearly understood. If you do not understand the instructions, request that the air crew member, "Say again…"

3.7. Notification and Responsibilities

If an incident requires more than first aid, the Contractor Site HSSE officer and Atlantic Richfield Site HSSE Oversight will determine whether emergency services are needed or whether the employee can be safely transported off site. If emergency services are needed, the Alpine County Sheriff's department will be called. Upon arrival of the appropriate emergency response personnel, field personnel shall defer authority but shall remain on the scene if necessary to provide possible assistance. Employee care is the primary goal during an injury. At the earliest opportunity, the Contractor Site HSSE officer shall contact the on-Site Atlantic Richfield Site HSSE Oversight and their Project Manger. The contractor's Project Manager will contact the Atlantic Richfield Company EBM. Table 3 lists project emergency response phone numbers. Contractor specific emergency response phone numbers are located within each contractor specific HASP.

All incidents, including injuries and incidents (such as property damage, material releases, and unauthorized discharges) must be reported to the Atlantic Richfield Site HSSE Oversight and Contractor Site HSSE officer within one hour or as the situation permits. The Contractor Site HSSE officer will then inform their Project Manager, who will notify Atlantic Richfield's EBM. An Emergency Call-Out Tree is provided in Figure 6 with the hierarchy for notification in the event of an incident as well as contact information. All near misses must be reported as soon as practical (no longer than an 8-hour shift) to the Contractor Site HSSE officer and Atlantic Richfield. Copies of the near miss reports must be provided to the contractor's on-Site H&S coordinator within 8-hours of the time of the near miss so the information can be entered into Atlantic Richfield's electronic reporting system (Tr@ction) and provided to Atlantic Richfield.

Each contractor must be familiar with Incident Reporting expectations laid out in the RM Incident & Near Miss Notification and Reporting Guidance Manual (Revision 11 – September 8, 2005). An excerpt from that document, Table 3-3 Incident Notification and Reporting Matrix, has been included in this document for more information. The full documents can be found at http://rmhsse.bpglobal.com/templatefiles/includes/common/displayFile.ashx?fileId=29&current_flag=true

It is the responsibility of all RM employees and contractors to report all HSSE related incidents, near misses, unsafe conditions and unsafe acts occurring on a RM project or site. RM uses Tr@ction as the recording and action tracking tool and all RM employees and contractor shall have access to allow prompt reporting.

All incidents are to be investigated in an appropriate manner, which permits a scaled approach dependant on the actual and potential outcomes of an incident on near miss.

RM operations utilize the Comprehensive List of Causes (CLC) while conducting a Root Cause Investigation. A summary of this process can be found at http://rmhsse.bpglobal.com/assurance/processes/incident/

Table 3-3: Incident Notification and Reporting Matrix
[Excerpt from RM Incident & Near Miss Notification and Reporting Guidance Manual (Revision 11 – September 8, 2005) - Appendix E]

Incident Severity	NOTIFICATION			REPORTING		
	Notification Required	**Accountability By**	**When**	**Forms / Reports**	**Accountability By**	**When**
MAJOR / HIGH POTENTIAL Refer to BP Group Major Incident and High Potential Incident Reporting Guideline	Head of Function Chief Operating Officer/VP Operations HSSE Manager Regional Manager EBM/HSSE Coordinator Operating Facility Contact (if applicable) Core Distribution (see Key Process 5) BP Notification Center (as needed)	RM Employee or Contractor Site HSSE officer	Immediately (within 1 hour)	Major Incident Announcement Form OSHA 300 Log (as applicable) Tr@ction Report (See Appendix E)	Regional Manager	Within 24 Hours
NON-MAJOR (excluding recordables)	Head of Function * Chief Operating Officer/VP Operations* HSSE Manager Regional Manager EBM/HSSE Coordinator Operating Facility Contact (if applicable) BP Notification Center (as needed)	RM Employee or Contractor Site HSSE officer	Immediately (within 1 hour)	Tr@ction Report	Regional Manager	Within 24 Hours

Table 3-3: Incident Notification and Reporting Matrix
[Excerpt from RM Incident & Near Miss Notification and Reporting Guidance Manual (Revision 11 – September 8, 2005) - Appendix E]
(Continued)

Incident Severity	NOTIFICATION			REPORTING		
	Notification Required	**Accountability By**	**When**	**Forms / Reports**	**Accountability By**	**When**
Days Away from Work (DAFW) CASE	Head of Function * Chief Operating Officer/VP Operations* HSSE Manager Regional Manager EBM/HSSE Coordinator Operating Facility Contact (if applicable) BP Notification Center (as needed)	RM Employee or Contractor Site HSSE officer	Immediately (within 1 hour)	Tr@ction Report OSHA 300 Log – as applicable	Regional Manager	Within 24 Hours
INJURY (Recordables)	See notification list above for Non-Major	RM Employee or Contractor Site HSSE officer	Immediately (within 1 hour)	Incident Report in Tr@ction OSHA 300 Log – as applicable	Regional Manager	Within 24 Hours
FIRST AID	EBM/HSSE Coordinator Operating Facility Contact (if applicable)	RM Employee or Contractor Site HSSE officer	Immediately (within 1 hour)	Tr@ction Report OSHA 300 Log – as applicable	Regional Manager	Within 72 Hours
NEAR MISS/ HSSE Opportunities	EBM/HSSE Coordinator Operating Facility Contact (if applicable)	RM Employee or Contractor Site HSSE officer	Report within 4 hours	Tr@ction Report	Regional Manager	Within 72 Hours

NOTE: If EBM or PM is not available, contractor is responsible for notifying the next applicable level.
* For OSHA Recordables, DAFW Cases, or otherwise determined.

3.8. Case Management

It will be the responsibility of each contractor to actively manage all injuries or illnesses to ensure that the employee has received proper medical attention and returns to work as quickly as medically feasible.

Contractors shall ensure that the Site has appropriate first aid arrangements. See Table 3-4 for employees on the Site with First Aid/CPR training. Remediation Management's first concern is good medical care. Utilizing occupational health providers that know OSHA rules is important to help offer alternative treatment (butterfly bandage instead of sutures) to prevent unnecessary OSHA recordables. Knowing the OSHA rules does not prevent good health care.

Each contractor will ensure that OSHA recordable cases are classified and managed appropriately. Subcontractors will also be encouraged to manage their cases to provide proper care for employees and to prevent unnecessary OSHA recordable cases.

In addition, RM also expects contractors to have a modified work program in place. These programs allow injured workers to return to work as soon as possible. In some situations, it may allow the Contactor to avoid a Day Away From Work Case and reduce Workers Compensation claims. Proper case management must be followed for all recordable and Day Away from Work (DAFWC) cases.

Table 3-4 – Employee First Aid/CPR Training Summary

Employee	Contractor Company	First Aid Training Date & Provider	CPR Training Date & Provider	Additional Certifications

3.9. Emergency Response Drills

On an annual basis, three types of emergency response drills will be conducted. A planned on site evacuation drill, a surprise on site evacuation drill, and a full-scale evacuation drill involving local emergency services. The type and extent of the drill will be modified based on current activities at the Site. The purpose of the drills will be to evaluate written procedures and employee training. Results of drills will be documented and used as training tools.

4.0 Site Wide Requirements and Procedures

4.1. General Requirements

All visitors to the Site and personnel working at the Site must comply with the requirements of this HSSE Program and any applicable contractor specific HASP. Requirements will differ for each task. Task specific requirements should be obtained from each relevant contractor specific HASP. The following sections provide general Site requirements, Regulatory requirements, and general BP requirements. Contractor Site HSSE officers are responsible for ensuring that all employees and subcontractors are knowledgeable and comply with these requirements.

4.1.1. Site Orientation

All personnel that will be performing work on-Site must complete a Site orientation as part of their initial Health and Safety Briefing and must review this document and review and sign their respective contractor HASP. The initial Site orientation will be conducted by the Site Coordinator or the appropriate Contractor Site HSSE officer.

Visitors to the Site must complete a Site orientation that contains a review of the Site Layout, the HAZWOPER covered work areas, and the Emergency Response Plan.

4.2. Regulatory Requirements

Personnel must comply with relevant legislation and regulations at all times. This Site is regulated by the Environmental Protection Agency (EPA) and Cal/OSHA.

The primary federal regulations of interest on this Site are:

- Occupational Safety and Health Act 29, Code of Federal Regulations (CFR) Parts 1910;
- Resource Conservation and Recovery Act (RCRA) Title 40 Parts 260-270;
- Superfund Amendments and Reauthorization Act (SARA) Title III, and
- Toxic Substances Control Act (TSCA) 40 CFR Parts 760-761.

The primary California regulations governing this Site are:

- California Code of Regulations (CCR), Title 8, Industrial Relations, Division 1, Chapter 3.2 and Chapter 4, CAL/OSHA regulations;

- CCR, Title 17, Natural Resources, Division 7, California Integrated Waste Management Board;
- CCR, Title 19, Public Safety, Division 2, Office of Emergency Services;
- CCR, Title 22, Social Security, Division 4 and 4.5, Appendix XII to Chapter 12, Environmental Health Standards;
- CCR, Title 23, Waters, Division 3, State Water Resources Control Board (SWRCB) and Regional Water Quality Control Boards;
- CCR, Title 27, Environmental Protection

4.3. Training Requirements

The Atlantic Richfield Company Project Team has a "duty of care" to provide workers with information, instruction, training and supervision to ensure employees are safe from injury and risks to health. All personnel involved in this project shall be provided with appropriate health and safety training and briefed on expected local Site conditions. The following are the minimum required training for work at the Site:

- Before You Go – Site Access Training;
- Site Orientation Training;
- Hazardous Waste Operations and Emergency Response (HAZWOPER) Training;
- HAZWOPER Management and Supervisor Training (Supervisors only);
- Tailgate Safety Meetings;
- Authorization to Work Training (for people filling out ATW's), and
- Permit Writer Training (for people filing permits).

Additional task specific training will be discussed within each Contractor HASP. All training records for employees and visitors will be kept on the Site. The Contractor Site HSSE officer is responsible for verifying that employee training documentation is complete and current and the training certificate has been delivered to the Site Coordinator before the employee begins work. Specific subject training certificates, such as hazard communication training, respirator training, PPE training, will also be filed in the field office.

4.3.1. Before You Go – Site Access

All personnel, prior to accessing the site, are required to review the Before You Go – Site Access training presentation and handout. This training has been developed to brief personnel on the hazards of getting to the site and requirements for access. It is the responsibility of each Contractor Site HSSE officer to deliver this training to their appropriate employees, subcontractors, and visitors prior to their arrival on the site and to collect the certification forms verifying completion.

4.3.2. Site Orientation Training

All personnel entering the Site as work personnel or as visitors, will be instructed by means of a formal, documented training class that addresses Site specific information. This orientation training shall include the inherent risks of exposure to all potential hazards at the Site. Orientation will be given on site on an as needed basis.

4.3.3. HAZWOPER Training

Employees working in an area in which there could be potential exposure to hazardous substances above the PEL (hot zone) are required to comply with 29 CFR 1910.120(e)(3)(i) or applicable state regulations. This regulation requires Site personnel exposed to hazardous substances to complete 40 hours of off-Site instruction and three days of field experience supervised by a trained supervisor. All 40-hour training courses and field training will be documented and maintained in the employee's file on site.

Employees working in areas that are classified as HAZWOEPR areas but have no potential to be exposed above the PEL are required to comply with 29 CFR 1910.120(e)(3)(ii) or (iii) or applicable state regulations. Workers regularly on site who work in areas which have been monitored and fully characterized indicating that exposures are under permissible exposure limits and published exposure limits where respirators are not necessary, and the characterization indicates that there are no health hazards or the possibility of an emergency developing, shall receive a minimum of 24 hours of instruction off the site, and the minimum of one day actual field experience under the direct supervision of a trained, experienced supervisor. All 24-hour training courses and field training will be documented and maintained in the employee's file on site. In accordance with 29 CFR Section 1910.120(e)(3)(iv), occasional Site personnel having completed an initial 24 hour classroom instruction must complete an additional 16 hours of classroom instruction and two days of field experience supervised by a trained supervisor before they are qualified to engage in activities that may expose them to hazardous substances above PELs.

In addition, an 8 hour Refresher Training course is required annually for all regular Site workers. No work can be done in the hot zone by an employee who is not current with this training.

Please refer to section 2.3 for determination of Site locations where HAZWOPER is applicable.

4.3.4. Management and Supervisor Training

In accordance with 29 CFR Section 1910.120(e)(4), individuals who manage or supervise personnel engaged in hazardous waste operations at the Site must receive 40 hours of classroom instruction and three days of field experience supervised by a trained supervisor. In addition, management and supervisory personnel shall receive an additional 8 hours of specialized training that addresses the following areas:

- Site safety and health program and the associated employee training program;
- Personal protective equipment and respiratory equipment programs;
- Health hazard monitoring procedures;
- Incident investigation, and
- Emergency response procedures.

4.3.5. Exempt Personnel

Exempt personnel requesting access to the Site include personnel making deliveries or performing repairs to utilities, public or government officials, untrained visitors, or local residents. Individuals from these groups will not be required to comply with the training requirements. However, access will be limited to designated work, delivery, or observation areas on site to minimize potential exposure. Observation areas on site will be upwind from Site operations, as decided on the basis of predominant wind directions in order to avoid exposure to dust or chemical contaminants. Access to observation areas may be restricted by weather conditions or Site activities. Approvals for exempting personnel will be handled on a case-by-case basis by the Site Coordinator in consultation with the appropriate Contractor HSSE Officer.

4.3.6. Personnel Working on Clean Construction Projects

Personnel working on clean construction projects in areas where exposure to hazardous materials is not likely, are exempt from 40 hour Hazardous Waste Operations Training. However, access will be limited to areas on site with limited potential exposure. No access to exclusion zones will be allowed without the proper training. Training other than Hazardous Waste Operations such as hazard communication, lock-out/tag-out, fall protection, etc. is still required.

4.3.7. Tailgate Safety Meetings

A tailgate safety meeting shall be conducted at least daily or

- Whenever risks or hazards change;
- Whenever new personnel arrive, and
- When Site operations warrant indoctrination and training.

Due to the potential large numbers of contractors on site and in order to ensure that Tailgate Safety Meetings are informative, useful and applicable to all, each employee will attend 2 meetings each morning. The first will be a Site-wide safety meeting followed by a task-specific safety meeting.

Site-wide Safety Meeting

Initial Site-wide safety meetings shall be conducted by the Owner's Rep Team and documented on a Daily Health and Safety Briefing Form (Included as Appendix A). The initial Site-wide safety meeting shall address:

- Review of planned activities and all contractors on Site;
- Emergency procedures;
- Communications;
- Change from previous days activities;
- Scheduled site traffic and deliveries;
- Site-wide HSSE concerns (i.e.: weather, near misses, etc.); and
- Review Prior Day Safety Observations.

Task-specific Safety Meeting

Immediately following the Site-wide meeting, each Contractor team will break off to conduct a task-specific safety meeting documented in the Authorization to Work form. This meeting will be lead by the Contractor HSSE Officer or other qualified individual and will be documented on the Authorization to Work form. If a Contractor has more than one activity ongoing, an Authorization to Work should be completed and signed by all participating in their specific activity.

The following should be addressed during the task-specific meetings:

- Validation of JSA for the task;
- Known or suspected hazards;
- Control measures to be employed to eliminate hazards;
- PPE required;
- Review of non-routine tasks; and
- Lessons learned.

4.4. Medical Monitoring

In accordance with OSHA regulation 29 CFR 1910.120, personnel working in potentially contaminated areas (HAZWOPER covered areas) will:

- Complete an Emergency Contact Form;
- Have a comprehensive medical evaluation;
- Be medically fit to wear a respirator, if necessary for the task;
- Have an audiometric exam (if exposed above 85 dBA), and
- Enrolled in a drug testing program.

Personnel working in support areas will:

- Complete an Emergency Contact Form, and
- Enrolled in a drug testing program.

Emergency Contact Form
Every person going on site as an employee, subcontractor, vendor or visitor will fill out an Emergency Contact Form (Included in Appendix B). This form will identify who to contact in case of emergency and also if the person has any allergies which may affect their work on site.

Medical Evaluation Requirements for HAZWOPER covered areas
Field employees working on the Site more than 30 days per year will receive a baseline and annual comprehensive medical evaluation to qualify for hazardous waste Site assignments and to monitor work-

related illness or contamination. Personnel working on the Site less than 30 days per year will receive a baseline and periodic exams (less frequently than annually).

Any employee who suffers an illness or injury that imposes a medical restriction on his or her job duties must have a physician's release statement indicating that he or she is fit for duty before the Site Coordinator will permit that employee to return to full duty. This release must be issued by the area office contract physician.

Visitors, subcontractors, client representatives, U.S. Environmental Protection Agency (EPA) officials, and others visiting the Site who may be exposed to contaminants will be asked to verify that they have an applicable medical monitoring program. .

4.5. PPE

Whenever engineering controls or other protective measures are not feasible or adequate to reduce exposures and safeguard the worker, the Contractor Site HSSE Officer will select appropriate PPE. PPE will be selected on the basis of hazards known or suspected at the work Site, and the level of PPE will not be reduced until adequate documentation can demonstrate that the hazard level has been reduced enough to warrant such adjustment. Each Contractor HASP will discuss tasks that have PPE requirements greater than the Site minimum, discussed below and it shall be each contractors responsibility to ensure that their employees are supplied with sufficient PPE to protect them from the potential hazards associated with each task that they perform.

There were 9 recorded near misses on Remediation Management Sites involving improper PPE in 2007. The following procedures and the PPE procedures in each Contractor HASP must be followed when personnel are at the Site to protect workers from Site and work hazards.

Selection and Use
Selection and use of PPE shall be based on the requirements outlined within each relevant Contractor specific HASP. An adequate selection of PPE will be kept on site to allow for the handling of unexpected material. All PPE selections will be documented within each Contractor HASP and certified.

Maintenance and Storage
PPE shall be maintained and stored in a central location at both the Aspen Bioreactor side and the Pond 4 side. The storage location will be separate from any site chemicals or equipment and will be kept orderly and clean. Used and/or dirty PPE will be kept separate from clean and/or new PPE. Each employee is responsible for ensuring that they clean their PPE as necessary to maintain safe use prior to use. Adequate facilities for cleaning, maintenance, storage, and issuance of PPE will be made available. Maintenance of PPE shall be completed in accordance with manufacturer's instructions. Specific functions to be carried out may include:

- Storing and issuing PPE;
- Maintaining and inspecting all PPE;
- Cleaning reusable PPE, and
- Disposing of used PPE.

Training
Appropriate training for PPE users will be provided prior to issuance of PPE. Additional training will be performed in 40-hour hazardous waste operations and emergency response training, and daily safety meetings. Emphasis of PPE training will be on the appropriate methods for wearing PPE, donning and doffing correctly, limitations of PPE, action levels for upgrading PPE, proper storage and cleaning, and emergency responses.

Inspection of PPE
Personnel who will be required to wear PPE during the course of their work activities will be trained on the proper techniques for inspecting PPE. PPE will be inspected prior to each use and frequently during the day.

Minimum PPE for Entry at the Site
For the Leviathan Site operations, the minimum level of PPE required is Level D as listed below. In the event of a change in conditions during work activities as dictated by air monitoring or sampling data, either a Contractor Site HSSE Officer, or the Atlantic Richfield Site HSSE Oversight may determine that an upgrade from Level D PPE to either Modified D or Level C PPE is necessary. Minimum PPE may be donned and doffed in the office trailer area and does not have to be donned and doffed at the Site entrance gate.

Level D PPE
Personal protective equipment required where minor skin hazards may exist, but no respiratory protection is required. The following constitutes Level D PPE and the minimum requirements for this Site:

- High visibility safety vests or high visibility clothing;
- Long sleeved shirt;
- Full-length pants;
- Boots/shoes, safety toe, chemical resistant (as applicable);
- Gloves, (type of glove dependant on the work task);
- Safety glasses or chemical splash goggles meeting ANSI Z.87.1 requirements or full mask face shield depending on the work task;
- Hardhat meeting ANSI Z.89.1 requirements, and

- Earplugs and/or earmuffs in work areas where noise levels equal or exceed 85dBA (A general field rule to determine areas with noise greater than 85dBA, is to evaluate how hard it is to hear normal conversation at 2 feet from the speaker. If conversation is difficult without shouting, then the area should be considered to be above 85dBA). Noise surveys will be completed on an as needed basis by the contractor.

Respiratory Protection Policy

Each contractor specific HASP must contain a respiratory protection program and each contractor will be responsible for managing their own program.

4.6. BP Policies

Specific processes have been developed by RM that incorporate standard practices and help ensure a consistent approach to operate. These processes represent the basic level of performance required to work on RM projects. They take into account potential differing regulatory requirements around the world, as well as circumstances where more rigorous controls are required.

4.6.1. Authorization to Work

4.6.1.1. Applicability

All field work conducted for RM will be done under an Authorization to Work (ATW) form. The ATW needs to be completed before the work commences each day and re-endorsed when any changed conditions require and update to the original form. The ATW covers the task to be completed in the period covered by the form and stipulates the control of work procedures and permits required. Authorization to Work forms can be self-authorized for all work not requiring a permit. When a permit is required, it can only be signed by a designated responsible person and can not be the person doing the work. An ATW is only valid when all required signed permits are attached to it. Copies of all issued ATW forms are to be kept with the Contractor HASP for the project.

4.6.1.2. Authorization to Work Procedure

Authority:	RM HSSE	**Custodian:**	Global HSSE Manager
Scope:	All RM Projects	**Issuing Dept.**	RM HSSE
Issue Date:	26/08/2005	**Last Revision Date:**	
Control Status:	Unified Controlled Document	**Next Revision Date:**	

Scope and Applicability of Procedure

All field work conducted for Remediation Management will be done under an Authorization to Work (ATW) process. The ATW needs to be completed before the work commences each day and covers the task to be completed in the period covered by the form. Copies of all issued ATW permits are to be kept with the Health & Safety Plan (HASP) for the project.

Scope of Definitions

The ATW must stipulate its effective period and describe the work scope to effectively identify where the work is being done. Work will not be authorized unless a Health and Safety plan, an Emergency Response Plan (could be part of the HASP), and the applicable JSAs are on site.

Scope of Responsibility

It is the responsibility of the Project Manager or other designated person in charge of the work to issue or endorse an existing ATW on a daily basis.

All RM or contractor workers coming onto site needs to review and sign the ATW.

Scope of Training and Qualification

All personnel with the responsibility for issuing ATWs shall complete the ATW and PTW training modules.

Scope of Procedures

All of the tasks to be completed under this form are to be listed, the JSAs for those tasks reviewed, and the equipment to be used for each task listed.

The hazards of the tasks are to be checked off on the sheet (Chemical/Products/Material, Hazardous Energy, and Other Potential Hazards) and discussed with the team. All applicable safety precautions should be checked and discussed with the team (including PPE required).

The PPE and other safety precautions need to be in place for anyone coming on site. Any exceptions made to these requirements need to be noted. Minimum PPE requirements for all Remediation Management sites are: High visibility clothing; safety glasses, hard hat, long trousers and long-sleeve work shirt; and steel-toed boots or shoes.

4.6.1.3. Authorization to Work Form Instructions

All field work undertaken for Remediation Management will be done under an Authorization to Work (ATW) form. The ATW needs to be completed before the work commences each day and covers the task to be completed in the period covered by the form and stipulates the Control of Work procedures and permits required. Authorization to Work forms can be self-authorized for all work not requiring a permit. When a permit is required, it can only be signed by a person authorized to do so and can not be the person doing the work. An ATW is only valid when all required signed permits are attached to it. Copies of all issued ATW permits are to be kept with the HASP for the project.

Completing the ATW form:

Pre-Task Hazard Review: All of the tasks to be completed under this form are to be listed, the JSAs for those tasks reviewed, and the Equipment to be used for each task listed.
The hazards of the tasks are to be checked off on the sheet (Chemical/Products/Material, Hazardous Energy, and Other Potential Hazards) and discussed with the team. Anyone coming on to the work site needs to have a full understanding of the hazards.
All applicable safety precautions should be checked and discussed with the team (including PPE required). The PPE and other safety precautions need to be in place for anyone coming on site. Any exceptions made to these requirements need to be noted. Minimum PPE requirements for all Remediation Management sites are: High visibility clothing; safety glasses, goggles or face shield; hard hat; long trousers and long-sleeve work shirt; and steel-toed boots or shoes.

Required Procedures: All of the Control of Work Procedures that apply to the tasks being performed are to be checked and the procedures reviewed.
Before any drilling work is undertaken the Drilling Procedure and Ground Disturbance Procedure information need to be reviewed and the Pre-Drilling Checklist completed and attached to the ATW.
Any changes to the scope of work and work outside the JSA conditions needs to undergo an analysis using the MOC procedures.
Any work being done in congested areas, public right of ways, and retail forecourts need to follow the traffic control procedures.
Any work requiring energy isolation needs to follow the LO/TO procedure.
Any work that involves lifting needs to follow the hoisting/lifting procedures.
Workers traveling alone to a remote work site need to complete a Journey Hazard Assessment and attach it to the ATW.

Required Permits: All permits that apply to the tasks being completed need to be checked, and the permits need to be obtained before the work commences. The ATW for work requiring a permit can not be self-authorized. Once completed, all permits required for the work need to be attached to the ATW. Permits are required for all tasks involving Hot Work, Trenching/Excavation, Confined Space, and Working from Heights.

Signatures: An ATW is only valid with an authorization signature. When a permit is required the authorization signature is that of the permit writer otherwise it is either the project manager or person in charge of the work. The ATW should stipulate its effective period and describe the work site location in enough detail to effectively identify where the work is being done. Work should not be authorized unless a Health and Safety plan, an Emergency Response Plan (could be part of the HASP), and the applicable JSAs are on site. Anyone coming on site needs to review the ATW and sign to attest that they understand the content.

REMEDIATION MANAGEMENT - AUTHORIZATION TO WORK

PRE-TASK HAZARD REVIEW

TASK	EQUIPMENT
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.
6.	6.

Chemical / Products / Material

1. ☐ Hydrogen Sulfide	2. ☐ Benzene	3. ☐ Diesel	4. ☐ Hydrocarbon	5. ☐ Acid	6. ☐ Lead
7. ☐ Carbon Monoxide	8. ☐ Asbestos	9. ☐ Caustic	10. ☐ Gasoline	11. ☐ Heavy Metals	
12. ☐ NORMS	13. ☐ Other:				

Hazardous Energy

19. ☐ Radiation	20. ☐ Electric	21. ☐ Pneumatic	22. ☐ Thermal-Steam
23. ☐ Hydraulic	24. ☐ Pressure	25. ☐ Mechanical	26. ☐ Fluids & Gases
27. ☐ Gravitational		28. ☐ Other:	

Other Potential Hazards

34. ☐ Walking / Working Surfaces		35. ☐ Traffic	36. ☐ Working at Heights	37. ☐ Pinch Points
38. ☐ Weather	39. ☐ Noise	40. ☐ Grinding	41. ☐ Heavy equipment	42. ☐ Sharp Edges
43. ☐ Hot Work	44. ☐ Security	45. ☐ Congested Area		46. ☐ Overhead Work
47. ☐ Body Position	48. ☐ Static Posture	49. ☐ Wind	50. ☐ Rotating Equipment	51. ☐ Lifting
52. ☐ Housekeeping	53. ☐ Spills	54. ☐ Underground Utility		55. ☐ Slopes and Terrain
56. ☐ Confined Space	57. ☐ Vibration	58. ☐ Ground Disturbance		59. ☐ Rigging
60. ☐ Vehicle Safety – Driving		61. ☐ Repetitive Motion		62. ☐ Container/Drum Labels
63. ☐ Waste	64. ☐ Heat/Cold Stress	65. ☐ Hand & Power Tools		66. ☐ Fitness to Work
67. ☐ Open Pipe	68. ☐ Boom Swing	69. ☐ Lighting	70. ☐ Exposure to poisonous plants / animals / bugs	
71. ☐ Overhead Electrical		72. ☐ Auger/Drill Stem		73. ☐ Other:

Required Safety Precautions

79. ☐ Safety Glasses	80. ☐ Goggles	81. ☐ Face Shield	82. ☐ Ear Plugs	83. ☐ High Visibility Clothing
84. ☐ Hard Hat	85. ☐ Escape Pak	86. ☐ Steel Toe Shoes	87. ☐ Ear Muffs	88. ☐ Respirator:
89. ☐ FRC	90. ☐ Supplied Air	91. ☐ Topical Creams / Repellents		92. ☐ Gloves:
93. ☐ Fire Watch	94. ☐ Drip Pans	95. ☐ Plastic Sheeting	96. ☐ Vac Truck	97. ☐ Fall Protection
98. ☐ Barricade	99. ☐ Fire Blanket	100. ☐ Upwind Areas Checked		101. ☐ Warning Signs
102. ☐ Flag Off Area	103. ☐ Life Lines	104. ☐ Fire Extinguisher at Jobsite		105. ☐ Sampling Prohibited
106. ☐ Seal Manholes, Sewers, and Catch Basins		107. ☐ Communication Method		108. ☐ Welding Shields
109. ☐ Continuous Monitoring		110. ☐ Wet Down Area		111. ☐ Ladder Tie Off
112. ☐ Tag Lines	113. ☐ Active Site Hazard Communication			114. ☐ Fence Off Area
115. ☐ No Cell Phone	116. ☐ Long Sleeve Shirt	117. ☐ No Smoking		118. ☐ Other:

REQUIRED PROCEDURES

☐ Drilling	☐ MOC	☐ Traffic Control	☐ LO/TO/Blinding
☐ Hoist/Lifting	☐ Journey Hazard Assessment	☐ Ground Disturbance	

REQUIRED PERMITS

☐ Hot Work	☐ Trenching/Excavation	☐ Confined Space	☐ Working from Heights	☐ None

Contractor(s) / Employee(s) Signatures: I have reviewed and understand the conditions of this permit, and its attachments. I will report hazardous conditions or acts identified on this job site to my supervisor and / or BP representative so they can be corrected as necessary.		1.	2.
		3	4.
5.	6.	7.	8.
9.	10.	11.	12.

Onsite Manager: (Print Name)		Date:	Location of Site Work:
Site	Date/Time Issued: am/pm		Date/Time Expires: am/pm
☐ Is HASP onsite?	☐ Is ERP onsite?		☐ Is JSA onsite?
Authorization Signature:			
Exceptions/Comments			

Revision 001, Date: 08/01/05

4.6.2. Confined Space Entry

4.6.2.1. Applicability

In accordance with the RM Confined Space Procedure, any work which requires entry into a confined space shall not be entered without a Confined Space Entry Permit. Confined Space Entry Permits may be issued only for one shift, and can be revoked any time conditions change. The permits are issued by the designated responsible person. A copy must be displayed at the entrance to the confined space until the work is completed or the authorized time on the permit has expired.

Confined Space Entry

Sump Entry and Other Confined Spaces at RM SITES

SAFETY PROCEDURES

SEQUENCE & SAFE METHOD OF WORK

- These safety procedures are for confined space entry when entering a sump or any other area defined as a confined space at a Remediation Management Project Site.
- Entry into underground storage tanks is prohibited without prior written authorization from BP.
- Once the manhole cover has been removed, the sump shall be protected from unauthorized entry and/or from falling objects.
- Before any person enters the space, the air inside the space shall be tested. Testing must be done with an approved direct reading instrument with a current calibration date. At a minimum the following conditions must be monitored prior to entry:
  - Oxygen (19.5% - 23.5%)
  - Flammables or Lower Explosive Limit (LEL) <10% (for 0–10% LEL, entry is permitted into hazardous atmosphere provided air supplied respiratory protection is used).
- The space will be verified to have adequate ventilation. It may be that a mechanical fan is needed to ensure this. Potential fan set-up shown at end of this document for sump ventilation.
- The space must be re-tested to ensure that the supply of air from ventilation source has not introduced any additional hazards into the space.
- While any person is working in the space, they are required to maintain continuous air monitoring and ventilation to ensure conditions have not changed.
- If a change in conditions is detected, i.e. a hazardous atmosphere is detected; the workers must immediately leave the space.
- The space must be re-evaluated to determine why the change occurred, if it is hazardous, and how it can be eliminated or be made safe.
- Prior to any re-entry into the space, corrective actions taken must be documented on the permit.
- Neither the Entrant nor the Attendant may be in possession of a cellular phone at any time while working in and around a confined space that could potentially contain gasoline. Any communication device used for calling for emergency response personnel must be classified as intrinsically safe.

It is imperative that all workers understand that no task is so important or so urgent that it cannot be done safely.

PURPOSE AND SCOPE

The purpose of this procedure is to assure an *Incident and Injury Free Workplace* when personnel work in tank sumps and other areas classified as confined spaces at BP sites. BP requires all employees and contractors performing work on behalf of BP to follow these procedures. These safety procedures are considered as a minimum requirement and are mandatory. Additional safety measures may be required by BP site or job specific requirements or by government regulations such as the OSHA standards for working in Permit-required confined spaces (29 CFR 1926.21 and 1910.146) which may be obtained from the OSHA web site at http://www.osha.gov/index.html.

It is the responsibility of the parties conducting the work to understand and follow all required safety regulations and practices. In all cases where regulations or job conditions require more stringent requirements than stated in these procedures, the more stringent rules shall be applied.

DEFINITIONS

Confined Space: means a space that is large enough for a person to enter, has limited or restricted means for entry/exit, and is not designed for continuous occupancy. Confined spaces include inside tanks and open top spaces such as sumps, UST manholes, sewer manholes, separators, storm water retention devices, crawl spaces, excavations.

Permit-required Confined Space (Permit Space) means a confined space that contains or has a potential (likelihood) to contain a hazardous atmosphere or contains any other recognized serious health or safety hazard (e.g. electrocution hazard, entrapment).

Hazardous Atmosphere means an atmosphere that may expose employees to injury or acute illness from a combustible or flammable gas in excess of 2% of the lower flammable limit, or oxygen concentrations below 19.5% or above 23.5% (or oxygen levels in accordance with local regulatory requirements) or levels of toxic substances (e.g., benzene, lead) above their permissible exposure limit (or other national equivalent measure).

A Confined Space Entry occurs when any part of a worker's body crosses the plane of the confined space.

Required Safety Practices

Assigned Duties

General Responsibility for all existing Remediation Management project sites, the Project Manager is responsible for identifying all confined space areas, implementing and enforcing the confined space entry program.

The Project Designated Permit Writer is the person responsible for determining if acceptable entry conditions exist, for authorizing entry and overseeing operations, and for terminating entry when necessary. The permit writer must be identified on the entry permit and is responsible for the following duties:

- Must know the hazards that may be faced during entry, including the symptoms and consequences of exposure.
- Verify by checking that the permit is complete, including testing and specified equipment in place, before endorsing the permit.
- Terminate the permit when entry operations are complete, or when conditions not allowed under the permit arise.
- Verify rescue services are available and a means for summoning them.
- Prevent unauthorized individuals from entering the confined space.

Determine at periodic intervals that acceptable entry conditions are maintained

An Authorized Entrant is allowed to enter the confined space and has the following duties:

- Must know the hazards that may be faced during entry, including the symptoms and consequences of exposure.
- Must be able to properly use monitoring equipment, ventilating equipment, personal protective equipment and any other equipment necessary for safe entry.
    - Communicate with the Attendant as necessary.
    - Alert the Attendant whenever the entrant detects a prohibited condition.
    - Exit the permit space whenever ordered to by Attendant or when a prohibited condition is detected.
    - Performs only work described on permit. All other work to be re-endorsed on permit.

An Attendant is an individual stationed outside a permit space who monitors the Authorized Entrants (Could be the permit writer) and:

- Knows the hazards that may be faced during entry, including the symptoms and consequences of exposure.
- Is aware of possible behavioral effects of hazard exposure.
- Constantly remains outside the permit space during entry operations until relieved by another attendant.
- Communicates with authorized entrants as necessary to monitor entrant status.
- Monitors activities inside and outside the space to determine if it is safe for entrants to remain in the space and orders evacuation of space upon:
    - Detection of prohibited condition.
    - Detection of behavioral effects of hazard exposure in authorized entrant.
    - Detection of a condition outside the space that could endanger the entrants.
    - When the attendant cannot perform all assigned duties.
- Summons rescue and emergency services as necessary.
- Keeps unauthorized persons from entering the space.
- Performs non-entry rescues, if applicable.
- Performs monitoring of the confined space atmosphere.
- Performs no duties that might interfere with monitoring and protecting the Authorized Entrants.

In all cases of permit-required space entry, an Attendant(s) shall be posted outside of the entry/ exit in order to handle emergencies. Circumstances may require more than one person posted at different access/entry points to maintain communication. Rescue procedures and resources shall be in place as appropriate to the work being performed.

- A Permit Writer also may serve as the Attendant.
- Under no circumstances does the Attendant enter the confined space to affect rescue.

Employee Training

- Employees must be trained so they know the relevant aspects of safety regarding confined spaces. Training shall include but not be limited to:
    - Types and locations of confined spaces at the facility.
    - Chemical or physical hazards involved, including symptoms and consequences of exposure.
    - Work practices and techniques.
    - Atmospheric testing procedures.
    - Personal protective equipment, monitoring equipment, and ventilation equipment.
    - Rescue procedures.
    - Assigned duties.
- All new employees shall be trained prior to their first confined space entry work, when assigned duties change, or when the employee's supervisor believes it to be appropriate.
- Training shall establish employee proficiency (e.g., written and/or skills testing) in their assigned duties.
- Training must be documented and certify (by name of the employees, date of training, and signature of the trainer) that the training has been accomplished.

Incident Reporting

All incidents involving personal injury or property damage, or which had the potential to cause significant injury or damage, must be immediately reported to BP site management per the RM Incident Notification Guidance Manual. All information and assistance must be made available, upon request, to assist with an incident investigation, if necessary.

Job Safety Analysis (JSA) – Permit-Required Confined Space Entry

PRINCIPLE WORK STEPS	HAZARDS	CONTROLS
Work Control	• General	• The person in control of the operation shall prescribe site safety measures, i.e.: Lock Out – Tag Out of energy sources, dispenser / fuel system or other operating system shut down, or other areas of concern related to the safety and welfare of the public and / or the workforce.
Protection of the Public and Workforce	• Injury • Property Damage	• Every worker will be made aware that our greatest responsibility is assuring that no harm come to any member of the public or worker at a BP site. • The need for pre-planning work activities and having all the necessary protective equipment available is essential to conducting business at any BP site. • All work will be conducted in barricaded controlled work areas to ensure that an effective protective buffer zone between work activities and the public will be maintained at all times. (See next item)
Establishing a Controlled Work Area	• Vehicle impact • Unauthorized entry	• The controlled work area will comprise a zone enclosing the confined space area. The control measures will protect the space from unauthorized entry; protect the worker from falling objects and ensure the worker safety from vehicle traffic.
Permit Required Confined Space Entry	• Atmospheric • Physical • Mechanical • Explosive vapors/gas • Toxic vapors/ gas • Oxygen deficiency • Falling • Bumping into obstructions • Entrapment • Temperature variables • Engulfment • Electrical hazards • Collapse of walls or structures	• Isolate the confined space through lockout, blinding, etc. • Test confined space for oxygen, LEL and benzene. • Develop plan for permit space entry- conditions. • Develop and document site-specific rescue procedures. • Control atmospheric hazards- purging/ventilating. • Provide necessary equipment (PPE). • Monitor confined space continuously (Readings must be documented on permit). • Provide attendant. • Designate persons with active roles; i.e., attendants, authorized entrant(s) • Complete entry permit. • Enter for as long as permit conditions are met. • Reviews permit procedure if any problems arise. • All work stops if conditions or scope of works changes. • Close out permit when work has been completed.
Housekeeping	• Tripping Hazards	• Housekeeping is to be a continuous activity. For Retail sites, the site must remain in "broom swept" condition at all times. The location of the waste containers shall be determined with the input and agreement of the Site Supervisor. That location will take into account the safe flow of site traffic ingress and egress.

Fire Prevention	• Fire
	• Personal Injury
	• Property Damage
		• There will be no smoking on site.
		• There will be no open flame activities permitted on site.
		• Employees will look out for any freestanding gasoline (Retail spills) or other flammable materials in the area.
		• During fuel deliveries all work must stop and all entrants must exit the confined space.
		• Workers are to be aware that there are defined lateral hazard zones at Retail sites:
		  ◦ Within 14ft of the dispensing nozzle
		  ◦ Within 3ft of the vent outlet.
		• Contractors will provide a 20-pound fire extinguisher ABC, dry chemical type.
		• Contractors must be aware of the location of the service stations fire extinguishing equipment and emergency procedures.
		• Any fire incidents must be reported to the Site Supervisor and EBM per the RM Incident Notification Guidelines Manual.

Repair or replace Electrical Equipment	• Electrocution Hazard • Stale air and/or Unlikely exposure to gasoline vapors	• All electrical equipment to sump shall be locked out and tagged out then tested to ensure no electrical hazard exist in the sump prior to employee entry. • Open sump. • Monitor O_2 and LEL with a gas detector. • Potential toxic substances such as benzene must also be monitored. • Provide mechanical ventilation.

PRINCIPLE WORK STEPS	HAZARDS	CONTROLS
Repair or replace Leak Detector	• Electrocution Hazard • Fire • Possible overexposure to gasoline vapors	• Electrical equipment to sump shall be locked out and tagged to remove electrical hazard • Open flames are not permitted on site without a hotwork permit. • Non-sparking tools, explosion-proof electrical tools/equipment, and battery-powered tools and equipment shall be used to control ignition sources in the sump. • Monitor O_2 and LEL with a gas detector. • Potential toxic substances such as benzene must also be monitored. • Flammable vapors shall be removed and forced-air ventilation equipment shall be used ensures adequate fresh air. • Complete confined space entry permit and adhere to all permit conditions.
Repair or replace Submersible Pump	• Electrocution Hazard • Fire • Possible overexposure to gasoline vapors	• Electrical equipment to sump shall be locked out/tagged to remove electrical hazard • Open flames are not permitted on site without a hotwork permit. • Non-sparking tools, explosion-proof electrical tools/equipment, and battery-powered tools and equipment shall be used to control ignition sources in the sump. • Freestanding hydrocarbons or flammable vapors shall be removed and ventilation equipment shall be used ensures adequate fresh air. • Monitor O_2 and LEL with a gas detector. • Potential toxic substances such as benzene must also be monitored.
Repairs of any kind in a sump greater than 5 feet deep.	• Electrocution Hazard • Fire • Possible overexposure to gasoline vapors	• Electrical equipment to sump shall be locked out/tagged to remove electrical hazard • Open flames are not permitted on site without a hotwork permit. • Non-sparking tools, explosion-proof electrical tools/equipment, and battery-powered tools and equipment shall be used to control ignition sources in the sump. • Freestanding hydrocarbons and/or flammable vapors shall be removed and ventilation equipment shall be used ensures adequate fresh air. • Monitor O_2 and LEL with a gas detector. • Potential toxic substances such as benzene must also be monitored. • Full retrieval gear must be used. Additionally, site-specific rescue procedures and contact numbers must be documented and in place prior to the start of work.

PPE

PERSONAL PROTECTIVE EQUIPMENT (PPE)

When a hazardous situation is recognized, steps should be immediately taken to eliminate the hazard either by engineering revision or by changing work methods. If it is not practical to eliminate the hazard, then personal protective equipment (PPE) must be used.

PPE Requirements

1.	High visibility clothing:	Always
2.	Safety glasses, goggles or face shield:	Always
3.	Ear plugs or muffs:	When working in close proximity to loud noises (jack hammer, vacuum trucks)
4.	Hard hat:	Always
5.	Safety Harness & lifeline:	When working in confined spaces in depths greater than 5 feet
6.	Gloves (chemical resistant):	When working with gasoline or other solvents or corrosive chemicals
7.	Gloves (leather or cotton):	When working with sharp or abrasive materials
8.	Long pants and long-sleeve work shirt:	Always
9.	Steel-toe boots or shoes (leather):	Always
10.	Respiratory Protection:	As needed for protection against specific hazardous atmosphere

- Secure work area with barricades, etc.
- Isolate the confined space through lockout.
- Test confined space for oxygen, LEL and benzene.
- Monitor after ventilation and as often as required to assure conditions have not changed.

- Control atmospheric hazards- purging/ventilating.
- Monitor confined space continuously.
- Complete Pre-Entry Checklist.

- Designate persons with active roles; i.e., attendants, authorized entrant(s).
- Complete entry permit.
- Enter for as long as permit conditions are met.
- Use full retrieval gear for repairs deeper than 5 feet.
- Cancel permit when job is complete.
- Reviews permit procedure if any problems arise.

CONFINED SPACE ENTRY - PERMIT TO WORK

Confined Space Entry Permit

Date & Time Issued		**Date & time Expires**	
Entry Attendant Name		**Entry Attendant Name**	
Space I.D.		**Location**	
Equipment Affected			
Name of All Entrants			
Work Description			
Space Hazard Assessment has been reviewed by Attendants and Entrants	_____ Permit Writer Signature	Pre-entry brief has been conducted with Entrants and Attendants.	_____ Permit Writer Signature

Pre-Entry Atmospheric Checks						
Time (am - pm)						
Oxygen (19.5% - 23.5%)						
Explosive (<10% LEL)						
Toxic (PPM)						
Testers Signature						
Testing Equipment			**Calibration Date**			

Pre-entry Fluid System Isolation	**Yes**	**No**	**N/A**	**If No or N/A, Why?**
Pumps/lines valve closed, or electrically disconnected				
Yolk Disconnected				

Ventilation Source Est	**Yes**	**No**	**N/A**	**If No or N/A, Why?**
Mechanical Forced Air				

Communication Procedures			
Emergency services phone number(s)			

Rescue Procedures

Training Verification
The following persons successfully completed required training and training is current for the space to be entered

Position	**YES**	**NO**
All persons entering Confined Space		
All persons acting as Supervisor for the Entry		
All persons assigned to monitor access and interior activities		
All persons assigned to emergency rescue team		

Confined Space Entry Permit Page 2

Entry & Rescue Equipment on Scene									
Description	**Type**	**YES**	**NO**	**NA**	**Description**	**Type**	**YES**	**NO**	**NA**
Safety Harness/life line					PPE & Protective Clothing				
Fall Arrest/Hoisting equip					Communication equip				
Supplied Air Respirators					Fire Extinguishers				

SPECIAL INSTRUCTIONS & WORK INSTRUCTIONS

Note: Within a confined space, hand tools should be of a non-sparking type, electrical equipment should be intrinsically-safe or explosion-proof, and battery-powered equipment should be low voltage.

Approval: A review of the work authorized by this permit and the information contained on this Entry Permit, as well as written instructions and safety procedures have been communicated to all affected personnel. Entry cannot be approved if any items are marked in the "No" column.

This permit is not valid unless all appropriate items are completed.

AUTHORISATION TO CARRY OUT WORK

I CERTIFY THAT THE ABOVE EQUIPMENT/SITE IS SAFE TO CARRY OUT CONFINED SPACE WORK BY PERSONS SUBJECT TO THE SPECIFIED REQUIREMENTS

ISSUED BY: …… PERMIT VALID FROM DATE ……/……/…… ……..AM/PM

COUNTERSIGNED: …… TO DATE ….../……/…… ……. AM/PM

I UNDERSTAND THE NATURE OF THE WORK AND CERTIFY THAT THE ABOVE CONDITIONS WILL BE OBSERVED AT ALL TIMES

RECEIVED BY – CONTRACTOR/EMPLOYEE …… DATE ……/……/……

WORK COMPLETED		**WORK HAND BACK**	
Time	Contractor/Employee	Time	Received by Site Manager
Date	……	Date	

This permit is to be kept at the jobsite throughout the job.

Upon completion, the completed permit is to be kept with the Contractor HASP.

4.6.3. Ground Disturbance

4.6.3.1. Applicability

Any ground disturbance deeper than the surface by mechanical means will be considered a ground disturbance and will require a Trenching & Excavation permit. All ground disturbance work will be executed in accordance with RM's Trenching & Excavation procedure with the exception of general ground disturbance, as defined below and in the following standards.

It is recognized that there may be activities resulting in ground disturbance that do not meet the definition of trenching and excavating. RM has put into place a practice to address the hazards and controls for general ground disturbance. Contractors or RM Operating Regions may deem it necessary to have more stringent requirements in place for specific tasks, based on past work experience and hazard assessments. In all cases, Federal, State, and local regulations, which are more stringent than the RM developed guidance, will be practiced.

RM Control of Work
Recommended Safety Guidance

Utility Markouts

Forward: *This guidance note is the first to be issued under the RM Control of Work standard. The utility markout steps in the blue box below are considered required RM conduct on all sites and supplement the minimum standards contained in the Ground Disturbance Practice in the HSSE Assurance Plan (http://rmhsse.bpglobal.com). The technical material in the adjacent columns is for guidance only.*

Required Markout Steps

- Assemble and review site as-built drawings and all public utility maps. Conduct pre-drilling interviews with site personnel or third party owners to solicit their input, including precautions on equipment use.
- In the US, contact the public utility notification service who will have their members (electric, cable, water companies, etc.) identify utility mains, pipeline point-of-entry and potential on-site line locations. Verify all potential buried utilities are considered and contact the relevant companies directly who are not service members.
- Contract private utility locating company for either partial or entire site markout.
- Specify electro-magnetic (EM) and sewer sonde equipment for metallic and non-metallic line identification, respectively.
- Consider GPR if high risk utilities are not located by EM and sonde technologies.
- Update drawings with latest information obtained.
- Follow other HSSE steps as needed, including borehole clearing before drilling.

Background:

Prior to installing any wells, performing excavations or penetrating the subsurface for any investigation, RM requires that all service lines, including water, electrical power, natural gas, sewers, cable and product distribution piping be mapped out on the ground surface. This requirement is independent of the need for borehole clearing to 5 ft. Both exercises together minimize the safety risk as well as the time and cost penalty associated with severing an underground line.

Purpose:

This guidance note is to describe and recommend technologies that should be (and normally are) employed from the companies performing the mapping, which are private utility locators in the US and in most parts of Europe. Public utility locating services will identify line point-of-entry from a right-of-way, but in many cases are unwilling to mark locations within the footprint of a site. Even if the public companies provide on-site service, it is good insurance to have a private company verify buried utility locations because of the potential failure consequences.

Technologies:

Because subsurface lines may be metal, plastic, clay or concrete, multiple technologies are generally needed for their identification. For most applications the following technologies are *fit-for-purpose*:

- Electro-Magnetic (EM) Device: This technology uses an electro-magnetic field in the subsurface to accurately locate metallic lines, or non-metallic lines incorporating a metallic trace wire along their surface. The field is created either by direct contact to the pipe or trace wire, or by an induced current via radio waves.
- Sewer Sonde: For non-metallic lines where internal access is possible (such as clean-out ports in a sewer), a beacon or 'sonde' that emits a signal to a surface receiver as it is *snaked* through the pipe provides the same accuracy as the EM detector. If the internal condition of the pipe is desired, a camera can be deployed instead of a simple sonde.
- Ground Penetrating Radar (GPR): This technology involving radar waves reflecting to a surface receiver provides a visual real-time map of the subsurface by which anomalies (such as pipes or tanks) may be detected. It has limitations in clay or wet soils and requires a skilled operator for interpretation. For high risk utilities (e.g. PVC natural gas lines without trace wire) where line-of-sight projection from site entry point to a kiosk or other building is uncertain, it should be considered.

Cost:

For most retail sites, utility markouts using the above technologies can be conducted in about 2 hours, assuming work covers a limited area where subsurface activities will be conducted. Typical U.S. costs are $150-200 per hour, plus mobilization. Consideration should be given to mapping an entire retail site if *as-built* drawings are suspect and work is planned over an extended period of time.

RM CoW #1 — July 2006	
✓	Site Investigation
	Remedy Selection
	Remedial Design
	Performance / O&M
	Decommissioning
	Prevention

Editor: Terry.Walden@bp.com

4.6.3.3. Ground Disturbance Practice

Authority: Global RM HSSE Manager **Custodian:** Global RM HSSE Manager
Issue Date: 08/24/2005 **Scope of Application:** Remediation Management
Revision Date: 08/24/2005 **Next Review Date:** 08/24/2007

Purpose/Scope

This practice establishes minimum Ground Disturbance requirements for all RM and contractor personnel involved with ground disturbance activities as defined in this document. Contract Partners or RM Operating Regions may deem it necessary to have more stringent requirements in place for specific tasks, based on past work experience and hazard assessments.

Definitions

Ground Disturbance: Any indentation, interruption, intrusion, excavation, construction or other activity in the earth's surface as a result of work being carried out that result in the penetration of the ground. For example:

- Any mechanical excavation (e.g., back hoes, augers) that results in penetration of the ground;
- Any manual ground penetration (e.g., digging with shovels, hand augering, hammering of stakes) greater than 12 inches;
- Any mechanical scraping activity (e.g., road grading, bull dozing) that results in penetration of the ground, including company owned or maintained property, work sites and roads.

Exceptions:

- Using fill dirt as an alternative to grading low spots or areas where erosion has occurred, or using stockpiled material, does not constitute a Ground Disturbance activity.
- Snow removal does not constitute Ground Disturbance.

A risk assessment, action plan and an MOC approved by the Environmental Business Manager (EBM) and the Contractor Project Manager is required to vary from these requirements.

Federal, State or local regulations, which are more stringent than the RM developed guidance, will be practiced.

Competent Person: Each Contract Partner and RM Operating Region shall designate individuals (employee or contract) who are capable, through experience and/or training, to identify existing and predictable hazards in the surroundings or working conditions which are hazardous or dangerous to personnel and who has authorization to take prompt corrective measures to eliminate such hazards. The primary responsibility for ensuring a safe ground disturbance as defined by this procedure is assigned to the "Competent Person". The Competent Person must demonstrate that they have the knowledge, training, and experience required to perform the defined role. The Competent Person(s) will be clearly identified in the Health and Safety Plan.

Qualified Equipment Operator: A person who through experience and/or training and with the endorsement of their employer is competent to operate equipment used in ground disturbance activities. Operator's qualifications shall be verified and Operators shall be approved by a competent person prior to beginning work activity.

Qualified Line Finder: A person who through experience and/or training and with the endorsement of their employer is competent to operate line finding equipment used to locate buried facilities prior to ground disturbance activities. A Competent Person shall verify qualified Line Finder's qualifications and Qualified Line Finder shall be approved prior to beginning work activity.

General Requirements – Reporting and Distribution

A Competent Person must ensure that the appropriate regional One Call Notification Center has been notified of all planned ground disturbance activities and a request for line locates has been registered.

The Competent Person will affirm that all lines have been located and marked prior to any ground disturbance activity. When in doubt, a Competent Person will investigate the possibility of underground lines and contact appropriate parties as needed for verification.

Documented Contractor procedures, which are equivalent or more stringent, shall satisfy all requirements of this practice.

Training

All Environmental Business Managers or Project Managers shall ensure that all employees and/or contractors who participate in Ground Disturbance activity, or who may be directly affected, are trained through an accredited Ground Disturbance Training Program prior to their involvement in the activity and retrained every three years thereafter.

- Each Competent Person shall receive training in the recognition of applicable hazards associated with Ground Disturbance activities and corrective measures required to eliminate such hazards.

- Each Qualified Equipment Operator shall be instructed in the safe competent operation of equipment used in Ground Disturbance activities.

- Each Qualified Line Finder shall be instructed in the safe competent operation of equipment used to locate buried facilities prior to Ground Disturbance activities.

The training shall include a mechanism of ensuring employee and or contractor's comprehension of the Ground Disturbance process and/or associated equipment.

The training shall include rules and techniques for authorization and the means that will be used for enforcement of the program.

Retraining shall be provided whenever there is a change in the Ground Disturbance process, whenever job changes or changes in equipment or processes present a new hazard, or when there is reason to believe that there are inadequacies in the employee and/or contractor's knowledge.

All training must be documented, including the date and names of employees and/or contractors attending the training.

Key Responsibilities

Environmental Business Managers and Project Managers shall ensure that the requirements of this program are implemented and enforced.

All employees involved in or impacted by Ground Disturbance activities shall comply with this process and any documented site-specific procedures.

Procedure/Process

Line location & Plot Plan

Available records shall be referenced and contacts made to determine the existence and location of underground lines to facilities and utilities in the vicinity of the work area.

It is a Competent Person's responsibility to ensure that all available sources of information have been obtained and cross-referenced to ensure as far as is reasonable and practical the existence of all lines to facilities and underground utilities. Sources of information, including but not limited to, the following must be referenced when applicable to the job:

1. One Call (or similar state recognized program) - provides a listing of companies who registered buried structures in the proposed work area. Some public utilities and private companies are not members of One Call. A 48-hour waiting period is required prior to beginning work. Some emergency situations require less waiting time. State, regional, and local laws should be researched and followed.
2. Consult area operations personnel - plot plans, lines to facilities maps, or lease drawings (as available) must be obtained and discussed with area operations personnel. Experienced company personnel familiar with area operations may have knowledge of lines to facilities not otherwise documented.
3. Visible Company Markers - Check the work area for lines to facilities or utility markers and ensure the company named has been contacted to supply any additional information regarding underground facilities. (Never rely solely on company markers for location purposes.) Markers may have been knocked down or removed at some point in the past and may have been repositioned inaccurately.)

4. Visible Indicators – Look for any sign of ground disturbance within the proposed work area, including the search/controlled zone. This may include lines to facilities, power lines, gas co-ops, utility cables, new clearings, road construction, pipeline signs, settlement, vegetation color changes, or growth. If there is any visual sign of activity that is not reflected on the survey drawing, re-surveying should be considered.
5. Discussion with Landowner - Landowner and/or Tenant may also have additional knowledge of buried utilities not documented elsewhere and should be contacted when reasonable and practical.
6. A plot plan, lines to facilities map or drawing indicating the location of all underground facilities and utilities as determined from Item 2 above, shall be provided (or has been prepared) and is available for reference at the work site. The map or drawing shall be included in the Health and Safety Plan ("HASP").
7. Ground disturbance activities must not proceed without a plot plan, lines to facilities map or drawing clearly indicating the number of lines to facilities or utilities, line sizes, locations and alignments. Available plot plans or lease drawings must be reviewed and cross-referenced with other sources of information (as noted in Item 2) to ensure they are accurate and complete. Plot plan should be retained in the HASP.
8. If a plot plan; lines to facilities map or lease drawing is not available, but it has been determined from referencing other sources of information that buried lines do indeed pass at a minimum within 10 feet of both sides of the dig zone, a drawing must be prepared. This drawing may be hand drawn but must reflect all available information as accurately as possible.

Approvals & Agreements Required

- Approvals and agreements (as applicable) either verbal or written have been obtained.
- Pipeline Permits and Licenses (new installation, additions to existing lines, abandonment's) have been obtained.
- Notification to utility line owner regarding intent to cause ground disturbance within the controlled area, at a minimum 10 feet on both sides of dig zone has been completed and documented.
- Notifications of landowners and or tenant, where deemed reasonable and practical have been completed and documented.
- Facility crossing agreements have been obtained.

Pre-Job Safety Meeting

A pre-job safety meeting including Job Safety Analysis, Risk Assessment Tool, and Emergency Action Plan review will be held. Appropriate documentation of such meeting will be kept with the Authorization to Work ("ATW") within the HASP.

The following topics (as a minimum) have been discussed and the meeting minutes (with signed attendance list) have been recorded and retained on file.

- Review of potential hazards, safe work procedure, permitting requirements, etc.
- Agreement that ground disturbance does not occur unless a Competent Person is present at the job site.
- Mechanical excavation equipment must not be used to dig within 2' (or greater if specified in the crossing agreement) of a known underground facility. A spotter must be in place for all excavation within proximity of any underground utility and the 2' no dig zone adequately marked.
- Utilization of pick axes shall be evaluated and approved by a Competent Person prior to use.
- Agreement that all workers have the right and obligations to stop or refuse to carry out any work procedures they feel are unsafe.
- Personal protective equipment requirements, including applicability of fire retardant clothing use, will be evaluated.
- All accidents, injuries, and near miss incidents must be reported. A site-specific Emergency Response Plan must be in place and reviewed at the pre-job meeting. The Emergency Action Plan must include facility contact names and phone numbers.

Facility Marking

All known surface and sub-surface structures and utilities, as noted on the plot plan, utility line map, or drawing, that pass within the controlled area of an underground facility (minimum 10 ft of both sides of the dig zone) have been located, identified and marked to indicate location and alignment.
A Qualified Line Finder who is familiar with the area or lease and has in his possession a copy of the location drawing shall conduct line-locating procedures, lines, utility service map, or plot plan and shall verify and confirm that all suspected or actual lines are clearly marked on the plot plan.

The area to be disturbed will be "walked" (swept) using a "line finder". If required the area will be electronically swept using four separate "grid patterns" (e.g., North - South pattern followed by East - West as well as angular pattern) to ensure maximum detection capabilities.

The lines must be clearly identified and marked, at a minimum, within 10 ft of both sides of the dig zone.

The following color – code is to be used: (unless State requirements indicate otherwise)

Proposed Excavation – White
Temporary Survey Markings – Pink
Electrical – Red
Gas & Oil – Yellow
Potable Water – Blue
Drainage/Sewers - Green
Communication - Orange
Non-potable Water – Purple

Plot plans; lines to facility map, and drawing must be cross-referenced with the placement of markers prior to mechanical excavation to ensure there are no apparent inconsistencies. If there are inconsistencies between the plot plan, lines to facility maps, or drawing and placement of stakes, another line location must be done to verify correct line location and alignment.

The feasibility of locating all underground facilities and utilities and formal updating of plot plans, lines to facility maps, and lease drawings shall be considered prior to new construction involving ground disturbance activities.

Exposing Underground Facilities

All underground facilities and utilities within 2 ft of the line have been exposed as practicable to verify location, line size, and alignment. All underground facilities and utilities, identified at facility crossing shall be exposed as is practicable.

Procedures for exposing flagged line(s):

1. Use Hydrovac to expose line.
    A. If this is not effective proceed with the following steps
2. Set up excavating equipment parallel and to one side of flagged line
3. Start trenching 2 feet from flagged line
4. Hand Dig or use Hydrovac to remove soil/rock from the 2 foot area between trench and flags
5. If this is a line crossing you may choose to repeat steps 2 and 3 on the opposite side of the flagged utility line

Note: You must always maintain 2 foot of clearance around utility line with mechanical equipment unless conditions exist as listed below. Hydrovac may be used as manual removal of soil/rock

Procedures for exposing lines with mechanical equipment that are suspected to be in the dig zone but cannot be identified or located by using established procedures (e.g. line locate equipment):

1. De-energize line if possible
2. With the Competent Person on site, cautiously remove soil in the following manner.
    - Probe area to be excavated. If you are able to probe 10 inches then you can remove 5 inches of soil. Repeat process until utility line is located with probe. Mechanical equipment can only penetrate half of the distance that was probed.
    - Once exact location of line is determined, place probe to one side and commence excavation on that side no closer than 2 feet to known utility line.
    - Dig down beside utility line until the line can be exposed by hand to determine its orientation.
    - Use same procedure on opposite side of utility line.
    - Remove dirt plug underneath the utility line by hand. Mechanical equipment may be used if you are able to maintain 2 foot of clearance from utility line. (e.g. boring)

Probing procedures:

- Probe the area to be mechanically exposed (width of ditch)

- Probe every few inches and never wider than the size of line to be exposed.
- Probe diagonal to underground facility.

Note: Never allow mechanical device (e.g. bucket or teeth of bucket) to penetrate more than ½ of the depth you are able to probe.

Procedures for exposing utility lines that can't be exposed by hand digging or Hydrovac:

1. Competent Person shall be on site during line exposure.
2. Utility line must be properly isolated (locked and tagged out).
3. For all pressurized utility lines, the line will be properly de-pressured and vented to the atmosphere.
4. Mechanical equipment will be allowed to remove soil from around utility line closer than 2 feet following proper probing procedures. Caution should be taken not to damage coating or casing of utility line.
5. If during this process there is damage to exterior or coating, report immediately to the Competent Person.
6. Competent Person will supervise repairs and document damage.

Note: If a Third Party owns utility line being crossed, owners' specific procedures will be followed. If the line cannot be found by using one of the methods listed above the Competent Person shall develop a procedure for locating the line. This procedure will require an MOC along with review and approval from the RM EBM and the Contract Partner Project Manager.

When installing a new utility line that runs parallel (at a minimum within 10 ft) to an existing line, the existing line must be exposed to confirm location and then at appropriate intervals to confirm alignment. Intervals will be determined by the Competent Person and be indicated on the Plot Plan.

When installing a new utility line that runs parallel to an existing line the operations should maintain a distance of 5 ft. In circumstances where a 5 ft. distance cannot be maintained, (i.e. ROW agreements or landowner restrictions) additional precautions must be implemented, (i.e. expose line at shortened intervals to ensure orientation.) Where the excavation is complex or involves multiple lines, Hydrovac (if available) should be considered as the correct means for exposing of lines.

Additional Permits

Additional Safe Work Permits (e.g., Hot Work, Confined Space Entry, etc.) as per the Control of Work Practice may be required. If the ground disturbance activity is complex or involves multiple lines-specific procedures must be developed.

Ground disturbance activities in certain areas may require specific environmental permits be obtained or plans be developed. Projects such as remediation, location restoration, and site development may need Ground Disturbance Permits. Items such as wetland disturbance permit, dredging or filling permits, storm water discharge permits, and critical or sensitive habitat determination and pollution prevention plans may also be required.

Overhead Lines

Overhead power lines that may pose a hazard during movement of equipment must also be clearly indicated and clearances must be maintained. Barricades shall be placed to prevent equipment from inadvertently crossing under a line. A spotter is required to assist equipment operators in maintaining required safe distances while equipment is in operation.

Key Documents/Tools/References

- Occupational Safety and Health Administration, Department of Labor; 29 CFR, 1926.652.
- gHSEr Element # 5, "Facility Design and Construction"
- gHSEr Element # 6, "Operations and Maintenance"

REMEDIATION MANAGEMENT
Trenching and Excavation Safety Procedures

It is imperative that all workers understand that no task is so important or so urgent that it cannot be done safely.

SEQUENCE & SAFE METHOD OF WORK

- An OSHA(or equivalent) defined Competent Person must be onsite at all times while trenching work is underway and before employees enter the trench
- An Excavation Inspection – Permit to Work form must be completed prior to beginning excavation and daily or whenever conditions change that may affect the excavation
- A pre-task JSA must be completed and reviewed with employees prior to beginning work
- Preliminary planning work (identification of underground utilities, spoil layout, emergency procedures) must be completed prior to beginning work. Where available or required, calls should be made to local utility locating services such as the "One Call" in the US and Canada
- RM Traffic Control Procedures (which includes barricades, PPE, and other procedures to protect employees and customers) must be followed
- Once work begins, employees are not allowed in the trench while equipment is digging
- A means must be provided for employees to safely enter and exit from the trench (such as with ladders)
- Cave-in protection, such as sloping, shoring and/or trench boxes, must be used when the trench depth reaches 4 feet and deeper
- The potential for a hazardous atmosphere always exists in an excavation; therefore, air monitoring must be done prior to personnel entering the excavation and work suspended if a hazardous atmosphere is detected.

PURPOSE AND SCOPE

The purpose of this procedure is to assure an *Incident and Injury Free Workplace* when personnel work in excavations and trenches at BP sites. BP requires all employees and contractors performing work on behalf of BP to follow these procedures. These safety procedures are considered as a minimum requirement and are mandatory. Additional safety measures may be required on a job of site specific basis by BP or by government regulations such as the OSHA standards for working in excavation (trenches) (29 CFR 1926.650, 1926.651, and 1926.652) which may be obtained from the OSHA web site at http://www.osha.gov/index.html.

Below is a summary of BP's safety requirements for contractors performing trenching and excavations. It is the responsibility of the parties conducting the work to understand and follow all required safety regulations and practices. In all cases where regulations or job conditions require more stringent requirements than stated in these procedures, the more stringent rules shall be applied.

DEFINITIONS

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

Competent person – Defined by OSHA as a person capable of identifying existing and predictable hazards in the surroundings, or working conditions that are unsanitary, hazardous, or dangerous to employees. Authorized to take prompt corrective measures to eliminate existing and predictable hazards and to stop work when required. A competent person should have and be able to demonstrate the following:

1. Training experience, and knowledge of:
    - Soil Analysis
    - Use of protective systems
2. Ability to detect:
    - Conditions that could result in cave-ins
    - Failures in protective systems
    - Hazardous atmospheres
    - Other hazards including those associated with confined spaces

Shield (shield system) - A structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the confines of the structure. Shields can be permanent structure or can be designed to be portable and moved along as work progresses. Also known as trench box or trench shield.

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

Sloping (sloping system) - A method of protecting employees from cave-ins by excavating to form the sides of an excavation which are inclined away from the excavation. The angle of incline varies with differences in such factors as the soil type, environmental conditions, and depth of exposure.

Required Safety Practices

Competent Person

A competent person shall be placed in charge of all excavations. The competent person shall be responsible for classification of the soil type, daily inspections of excavations and protective systems, monitoring water removal and equipment, and determining if the excavation is safe for personnel to work in it.

Inspections

The competent person shall conduct inspections for evidence of possible cave-in, failure of protective systems, hazardous atmospheres, and other hazardous conditions when there is an employee exposure:

- Daily and before the start of each shift
- As dictated by the work being done in the trench
- After every rainstorm
- After other events that could increase hazards, such as snowstorm, thaw, earthquake, dramatic change in weather, etc.
- When fissures, tension cracks, sloughing, undercutting, water seepage, bulging at the bottom, or other similar conditions occur
- When there is a change in the size, location, or placement of the spoil pile
- When there is any indication of change or movement in adjacent structures
- For excavations 4 feet or greater in depth, an Excavation Inspection Form shall be filled out for each inspection (see Appendix C for sample form)

Soil Type

Because most excavations at BP sites will be conducted in areas where the soil has been previously disturbed, excavations shall be made to meet the requirements for Type B or Type C soils as covered below:

- Type B - Medium stability: silt, sandy loam, medium clay and unstable dry rock; previously disturbed soils unless otherwise classified as Type C; soils that meet the requirements of Type A soil but are fissured or subject to vibration.
- Type C - Least stable: gravel, loamy sand, soft clay, submerged soil or dense, heavy unstable rock, and soil from which water is freely seeping.

Excavating Soil

- Underground utilities must be located and marked before excavation begins.
- Employees are not allowed in the excavation while heavy equipment is digging.

Spoil

Temporary spoil shall be placed so that:
It is no closer than 2 feet from the surface edge of the excavation (permanent spoil should be placed a much greater distance from the excavation)

- Loose rock or soil from the temporary spoil will not fall on employees in the trench
- It channels rainwater and other run-off water away from the excavation
- It cannot accidentally run, slide, or fall back into the excavation

Surface Crossing of Trenches

Surface crossing of trenches should not be made unless absolutely necessary. When necessary, they are only permitted under the following conditions:

- Vehicle crossings must be designed by and installed under the supervision of a Registered Professional Engineer
- Walkways or bridges must:
  - Have a minimum clear width of 20 inches
  - Be fitted with standard rails
  - Extend a minimum of 24 inches past the surface edge of the trench

Ingress and Egress

- Trenches four feet or more in depth shall be provided with a fixed means of egress
- Spacing between ladders or other means of egress must be such that a worker will not have to travel more than 25 feet laterally to the nearest means of egress
- Ladders must be secured and extend a minimum of 36 inches above the landing.
- Metal ladders should not be used when electric utilities are present

Hazardous Atmospheres and Confined Spaces

- Personnel shall not be permitted to work in hazardous and / or toxic atmospheres
- Testing must be conducted before personnel enter a trench or excavation and then periodically to ensure the excavation remains safe
- The frequency of testing should be increased if equipment or processes used in the trench may alter the atmosphere
- Operations involving hazardous atmospheres must be conducted in accordance with OSHA or other application federal requirements.
- Excavations may qualify as confined spaces. When this occurs, compliance with BP's Confined Space Safety Procedure is also required.

Standing Water and Water Accumulation

The following requirements for controlling water accumulation must be provided if personnel must work in the excavation:

- Personnel must not work in excavations where standing water has accumulated
- Water removal or de-watering equipment, such as pumps, are installed and monitored by a competent person
- Personnel must exit from excavations during rainstorms
- Trenches must be carefully inspected by a competent person after each rain and before personnel are permitted to re-enter

Benching, Sloping, Shoring, and Shielding

- All excavations or trenches four feet or greater in depth shall be appropriately benched, shored, or sloped according to OSHA or other applicable federal requirement.
- Excavations or trenches 20 feet deep or greater must have a protective system designed by a Registered Professional Engineer.
- Excavation under the base of a foundation footing or wall requires a support system designed by a Registered Professional Engineer.
- Sidewalks and pavement shall not be undermined unless a support system or another method of protection is provided to protect from possible collapse.

Incident Reporting

All incidents involving personal injury or property damage, or which had the potential to cause significant injury or damage, must be immediately reported to BP per the RM Incident Notification Guidance Manual.

Job SAFETY Analysis (JSA) - Excavations

TASK	HAZARDS	CONTROLS
Setting up, digging, and working in the excavation	• Vehicular impact, unauthorized entry to work zone	• Compliance with RM's "Traffic Control Procedures is required. At all times during construction or maintenance jobs, employees must wear reflective vests or other clothing marked with or made of reflective or high-visibility materials. All work will be conducted in barricaded controlled work areas to ensure that an effective protective buffer zone between maintenance activities and the public will be maintained at all times. If a job will take longer than a single construction day, a minimum of 6 foot high chain link fencing shall be used to control entry into the work zone when no other means of access control is present.
Working in the excavation	• Fire	• There is to be no smoking on site. • There will be no open flame activities permitted on site. • Hot work of any kind performed in an excavation or anywhere on site requires a hot work permit. Hot work includes cutting, grinding, drilling, threading, scraping, welding, or use of electric tools. • During fuel deliveries all work must stop and all workers must exit the excavation. • Workers are to be made aware of the defined lateral hazard zone at Retail sites: o Within 14ft of the dispensing nozzle o Within 3ft of the vent outlet. o Contractors will provide 20-pound ABC type fire extinguishers. o Contractors must be aware of the location of the service station fire fighting equipment and emergency procedures. • Any fire incident must be promptly reported to the Site Supervisor and the EBM per the RM Incident Notification Guidance Manual.
Working in the excavation	• Atmospheric hazards	• Atmospheres must be tested prior to entry. Confined Space Procedures may apply.
	• Falling, suspended loads	• Never stand on or under suspended loads. Hoisting & Lifting Procedures apply.
	• Slips, trips, falls	• Proper housekeeping is a primary precaution against slips, trips and falls. Housekeeping will be a continuous activity and for sites such as Retail locations, the site will remain in "broom swept" condition at all times. Unused tools and debris shall be properly stored at all times. No worker may stand within six feet of the edge of an excavation deeper than six feet without proper fall protection procedures in place.

Personal Protective Equipment (PPE)

PERSONAL PROTECTIVE EQUIPMENT (PPE)

When a hazardous situation is recognized, steps should be immediately taken to eliminate the hazard either by engineering revision or by changing work methods. If it is not practical to eliminate the hazard, then personal protective equipment (PPE) must be used.

PPE Requirements

1.	High visibility clothing:	Always
2.	Safety glasses, goggles or face shield:	Always
3.	Ear plugs or muffs:	When working in close proximity to loud noises (jack hammer, vacuum trucks, lawn care)
4.	Hard hat:	Always
5.	Fall protection equipment:	When working at heights above six feet or within six feet from an exposed edge
6.	Gloves (chemical resistant):	When working with gasoline or other solvents or corrosive chemicals
7.	Gloves (leather or cotton):	When working with sharp or abrasive materials
8.	Long pants and long-sleeve work shirt:	Always
9.	Steel-toe Boots or shoes (leather):	Always

EXCAVATION INSPECTION AND ENTRY AUTHORIZATION FORM - PERMIT TO WORK

LOCATION:				DATE:
TIME OF INSPECTION:				
WEATHER CONDITIONS:				APPROX. TEMP:
CREW LEADER:				COMPETENT PERSON:
DIMENSIONS:	DEPTH =			Yes No HAZARDOUS CONDITIONS
	TOP =	W	L	❑ ❑ .....Saturated soil / standing or seeping water
	BOTTOM =	W	L	❑ ❑ .....Cracked or fissured wall(s)
SOIL TYPE:		TESTED:		❑ ❑ .....Bulging wall(s)
❑ Solid rock (most stable)		❑ Yes		❑ ❑ .....Floor heaving
❑ Average soil		❑ No		❑ ❑ .....Frozen soil
❑ Fill material				❑ ❑ .....Super-imposed loads
❑ Loose sand				❑ ❑ .....Vibration
				❑ ❑ .....Depth greater than 10’
PROTECTION METHODS:				PLACEMENT OF SPOILS & EQUIPMENT
(Walls MUST be vertical—NO voids)				❑ ❑ .....Spoils at least two feet from edge of trench
SHORING				❑ ❑ .....Equipment at least two feet from edge
❑ Timber				❑ ❑ .....Backhoe at end of trench
❑ Pneumatic				❑ ❑ .....Compressor, etc. at remote location
❑ Hydraulic				LADDER LOCATION
❑ Screw Jacks				❑ ❑ .....Located in protected area
❑ Trench Shield				❑ ❑ .....Within 25 feet of safe travel
UNEVEN, IRREGULAR WALLS				❑ ❑ .....Secured
❑ Trench Box				❑ ❑ .....Extends 36 inches above the landing
Sloping:	**q 1:1 (45°)**	**q 1 ½:1 (34°)**		❑ ❑ .....Leads to safe landing
Yes No ENVIRONMENTAL CONDITIONS:				OTHER:
❑ ❑ Gas detector used?				❑ ❑ Shoring equip. & materials inspected prior to use?
❑ ❑ Confined space permit issued?				❑ ❑ Is trench SAFE to enter?
SPECIAL INSTRUCTIONS & WORK INSTRUCTIONS				
❑ **Utility Locate Complete**				**Work Order #**

NOTE		
	All unsafe conditions must be corrected prior to excavation entry. If any hazardous conditions are observed, the excavation must be immediately evacuated and no one is allowed to re-enter until corrective action has been taken.	**TO BE FILLED OUT BY OSHA DEFINED COMPETENT PERSON** **Excavation Entry Authorized By:** **COMPETENT PERSON**

AUTHORISATION TO CARRY OUT WORK

I CERTIFY THAT THE ABOVE EQUIPMENT/SITE IS SAFE TO CARRY OUT WORK BY PERSONS SUBJECT TO THE SPECIFIED REQUIREMENTS

ISSUED BY: ……. PERMIT VALID FROM DATE ……/……/…… …….AM/PM

COUNTERSIGNED: …… TO DATE …./……/…… ……. AM/PM

I UNDERSTAND THE NATURE OF THE WORK AND CERTIFY THAT THE ABOVE CONDITIONS WILL BE OBSERVED AT ALL TIMES

RECEIVED BY – CONTRACTOR/EMPLOYEE …….. DATE ……/……/……

WORK COMPLETED		**WORK HAND BACK**	
Time	Contractor/Employee	Time	Received by Site Manager
Date ….....	…….	Date	……

4.6.4. Hot work

4.6.4.1. Applicability

Any work on RM sites which meets the definition of Hot Work must be completed in accordance with the RM Hot Work procedures.

Remediation Management
Hot Work Safety Procedures

It is imperative that all workers understand that no task is so important or so urgent that it cannot be done safely.

SEQUENCE & SAFE METHOD OF WORK

THE CONTRACTOR MUST COMPLETE THE FOLLOWING ITEMS AND REVIEW WITH WORKERS BEFORE HOT WORK STARTS

- Hot Work Permit requirements must be in place
- Job specific emergency procedures and notifications must be developed, reviewed with workers, and readily available
- Ensure the work area is free of non-essential personnel, equipment, combustible materials and vehicles
- All appropriate personal protective equipment (PPE) must be in use by workers (see Appendix B)
- A Fire Watch, with appropriate authority and responsibility, must be provided with the correct fire extinguishing equipment and combustible gas testing meter (see Appendix A – Duties of the Fire Watch)
- Blinding, isolation, and purging of equipment (with appropriate Lock-outs) must have been completed
- Ensure that at least two escape routes with unobstructed access are provided
- Before signing the permit, the person who writes the Hot Work Permit is responsible for determining if acceptable working conditions exist and verifying that permit is complete, including air testing and that specified equipment is in place (see Appendix A – Duties of Permit Writer)
- The Fire Watch must assist hot work activities by providing fire protection, air monitoring, and being constantly aware for fire hazards (see Appendix A – Duties of the Fire Watch)
- Upon completion of the hot work, the fire watch takes appropriate action to verify that no fire hazards exist before departing the area
- There shall be no work with open flames conducted at a BP site without prior verbal authorization from a BP Area Maintenance Manager or Facilities & Engineering Manager. Open flame work within the hazardous zone at former retail and non-retail sites will require EBM authorization.

Purpose and scope

The purpose of this procedure is to assure an Incident and Injury Free Workplace where personnel perform hot work at BP sites. BP requires all employees and contractors performing work on behalf of BP to follow these requirements. These safety requirements are considered as a minimum and are mandatory.

Additional measures may be required by government regulations or by BP or by government regulations such as applicable OSHA standard (29 CFR 1926. 352) which may be obtained from the OSHA web site at http://www.osha.gov/index.html. Below is a summary of BP's safety requirements. It is the responsibility of the parties conducting the work to understand and follow all required safety regulations and practices.

Definitions

Hot Work - any work that will generate sufficient heat or sparks to ignite combustible and/or flammable materials. Combustible materials are substances that will freely support combustion once ignited. The following activities are examples of hot work; however, there may be more that are applicable at specific locations: Welding, Drilling, Flame Cutting, Grinding, Portable Heaters, and Electrical Tools/Equipment (that are not explosion proof or intrinsically safe), Sandblasting operations (static charges), Operation of combustion engines (lawn mowers, vehicles, etc.)

Permitted Area – Any area where hot work is to take place and combustible or flammable vapors are or could exist even in an abnormal condition. Examples include: gasoline dispensers, tank vents, underground storage tank manways, fills or other access points, above ground storage tanks, excavations, or any equipment that has the potential to emit combustible or flammable vapors.

Responsibility

The contractor or work supervisor is responsible to ensure that all hot work is authorized and permitted prior to starting work.

Required Safety Practices

There shall be no work with open flames conducted at a BP site without express written permission from a BP Remediation Management Site EBM or Project Manager. A Hot Work Permit (See Appendix C) must be issued before hot work is performed within the hazardous zone (unless other site definition exists, this is 35 feet from the source or from an area where combustible or flammable vapors are or could exist, even in an abnormal condition).

Incident Reporting

All incidents involving personal injury or property damage, or which had the potential to cause significant injury or damage, must be immediately reported to BP site management per the RM Incident Notification Guidance Manual. All information and assistance must be made available upon request to assist with an incident investigation, if necessary.

Appendix A - Employee Training; assigned duties of the hot work permit issuer; assigned duties of the fire watch

Employee Training

- Employees must be trained so they know the relevant aspects of safety regarding hot work. Training should include:
  - Types and locations of potential fire hazards at the facility and specifically near the work area.
  - Work practices and techniques to control hot work exposures.
  - Atmospheric testing procedures.
  - Use of fire extinguishers, atmosphere monitoring equipment, and ventilation equipment.
- Employees should be trained prior to conducting their first hot work, when assigned duties change, or when the employee's supervisor believes it to be appropriate.

Assigned Duties of the Hot Work Permit Issuer

The person who writes the Hot Work Permit is responsible for determining if acceptable working conditions exist. The permit writer is responsible for the following duties:

- Must know the hazards of hot work.
- Must verify by checking that the permit is complete, including testing and specified equipment in place, before endorsing the permit.
- Terminate the permit when the work is complete, or when conditions not allowed under the permit arise.
- Determine at periodic intervals that acceptable hot work conditions are maintained.

Assigned duties of Fire Watch

- The contractor or work supervisor is responsible for assigning a fire watch when hot work is within the hazardous zone (unless other site definition exists, this is 35 feet from source of a potential combustible or flammable vapor source). The fire watch must be trained in the proper use of a fire extinguisher. The duties of the fire watch include:
  - Understanding the location and nature of the hot work
  - Survey the area to be sure the necessary fire protection equipment is in place and ready for use
  - Survey the area for combustible or flammable materials
  - Remain in the area while the work is being performed and remain in constant communication range with person(s) doing the hot work
  - Never leave the work area for any reason without a replacement
  - When walls are involved in hot work, each side requires a fire watch
- The fire watch must be in the ready position at all times when hot work is being performed. The ready position consists of being attentive and having the fire extinguisher in position prior to the start of work. The fire extinguisher must be nearby while the hot work is being performed. The fire extinguisher must be returned to its designated location when the hot work is complete. The fire extinguisher must not be discharged unless a fire actually occurs.
- The fire watch must periodically survey the area with a direct-reading combustible gas meter to ensure the work area is suitable for hot work. The work must stop immediately if the combustible gas meter registers 10% or greater of the lower explosive level (L.E.L.) in the atmosphere.
- The fire watch is authorized to stop the hot work whenever work conditions become unsafe or if the work description on the permit is exceeded. The supervisor must be notified for any "stop work" situation.
- The fire watch shall be equipped with the personal protective equipment needed to perform the work safely, such as properly shaded goggles for working with welders.

Appendix B - Job Hazard Analysis (JHA) and Personal Protective Equipment (PPE)

JOB HAZARD ANALYSIS

TASK	HAZARDS	CONTROLS
Hot Work	• Fire/Explosion • Explosive vapors/gas • Temperature variables • Electrical hazards	1. Test work area oxygen and LEL with meter. 2. Assure all appropriate equipment isolation, shutdowns, LOTO, purging and barricading have been conducted to reduce flammability risk and atmospheric hazards. This includes isolation of workspace from the general public. 3. Provide necessary equipment including PPE. 4. Monitor work area continuously with air tester and document readings on permit. 5. Designate specific persons to provide fire watch. 6. Complete Hot Work Permit. 7. Perform hot work for as long as permit conditions are met. 8. Reviews permit procedure if any problems arise. 9. All work stops if conditions or scope of works changes. 10. Close out permit when work has been completed

PERSONAL PROTECTIVE EQUIPMENT (PPE)

When a hazardous situation is recognized, steps should be immediately taken to eliminate the hazard either by engineering revision or by changing work methods. If it is not practical to eliminate the hazard, then personal protective equipment (PPE) must be used.

PPE Requirements

1. High Visibility Clothing: Always
2. Safety Glasses: Always
3. Goggles, face shield: When fluid splash may exist or hammering, drilling, or where dust and loose material may blow
4. Welding goggles: When performing welding or while required to work in close proximity to a welding operation
5. Head protection (hard hats): Always
6. Gloves (chemical resistant): When working with gasoline or other solvents or corrosive chemicals
7. Gloves (leather or cotton): When working with sharp or abrasive materials
8. Long pants and long-sleeve work shirt: Always
9. Fire Resistant Clothing: For working where there is a high risk of a flash fire
10. Steel-toe Boots/Shoes (leather): Always

HOT WORK – PERMIT TO WORK

Facility	Purpose of Entry/Nature of Work (ex. Tank cleaning, inspection, welding, cutting abrasive blasting, etc.)
Specific Equipment/Area covered by permit	Contractor Name
Hazards of the Space (ex. Combustible gas, confined space, power lines, water, ice, open systems, energy sources, etc.)	

CHECK	Y/N/NA	DETAILS BELOW	CHECK	Y/N/NA	DETAILS BELOW
O. Has a Safety PSR (Process Safety Review) been done?			4. Earthing and bonding correctly applied?		
A. Have a plant and equipment been thoroughly:			5. Work to be kept wet with water?		
1, Depressurized			6. Are spark/flash screens/barriers in place?		
2. Drained?			7. Hot work site isolated/roped off?		
3. Isolated - By Blanking			8. Has product movement in the vicinity been stopped?		
- By Disconnection			9. Are PRVs vented to safe areas?		
4. Steamed			10. Fire protection checked/in place? List		
5. Water Flushed			11. Is a fire watch/fire brigade required and organized?		
6. Ventilated - Natural			12. Air Test: Was instrument calibrated prior to day's use? _____ Instrument type & serial # _____ Calibration results: %LEL _____ 0_2.....		
- Mechanical					
B. 1. Are sewers, pits & drains and contaminated ground Within 15m of worksite sealed?			C. Is access and exit provided?		
2, Combustible material removed & leaks controlled?			D. "Lead" precautions necessary/taken?		
3. Equipment, e.g. Welder, compressor, correctly sited?			E. Has electrical equipment been isolated and tagged?		
			F. Has wind direction been considered?		

Gas Tests Required: **Retest & assess hazards <u>when conditions change</u> and upon return to work after breaks and lunch**		**Time**	**Oxygen%**	**Combustible (%LEL)**	**CO (ppm)**	**Other (list, ex. Lead)**
Monitoring Results Tests Performed by:	**Safety Limits**					

PERSONAL PROTECTION REQUIRED (STATE YES OR NO)

EYES	EARS	HANDS	FEET	BREATHING	BODY - OTHER	
☐ **Goggles**	☐ **Ear Protection**	☐ **PVC Gloves**	☐ **Safety Shoes**	☐ **Canister Mask**	☐ **Safety Harness**	☐ **Overalls**
☐ **Shield**		☐ **Gloves**	☐ **Rubber Safety Shoes**	☐ **Air Supplied Respirator**	☐ **PVC Suit**	☐ **Hard Hat**
☐ Safety Glasses		☐ **Gauntlets**			☐ **Reflective Vest**	

SPECIAL INSTRUCTIONS & WORK INSTRUCTIONS

AUTHORISATION TO CARRY OUT WORK

I CERTIFY THAT THE ABOVE EQUIPMENT/SITE IS SAFE TO CARRY OUT HOT WORK BY PERSONS SUBJECT TO THE SPECIFIED REQUIREMENTS

ISSUED BY: …… PERMIT VALID FROM DATE ……/……/…… …….AM/PM

COUNTERSIGNED: …… TO DATE..../……/…… ……. AM/PM

I UNDERSTAND THE NATURE OF THE WORK AND CERTIFY THAT THE ABOVE CONDITIONS WILL BE OBSERVED AT ALL TIMES

RECEIVED BY – CONTRACTOR/EMPLOYEE …….. DATE ……/……/……

WORK COMPLETED		**WORK HAND BACK**	
Time.....	Contractor/Employee	Time	Received by Site Manager
Date	……	Date	……

DISPLAY OF PERMIT

- ORIGINAL COPY – SHALL BE CLEARLY DISPLAYED AT THE WORK SITE ALONG WITH THE ATW FORM WITH CONTRACTOR/EMPLOYEE PERFORMING WORK.
- SITE MANAGERS COPY TO BE GIVEN BY HAND TO THE SITE MANAGER.
- ISSUERS COPY TO BE KEPT BY THE PERSON ISSUING THE PERMIT.
- UPON COMPLETION OF WORK AND ACCEPTANCE, THE CONTRACTOR/EMPLOYEE SHALL SIGN AND HAND BACK PERMIT TO THE SITE MANAGER FOR CLOSEOUT. COPY OF THE PERMIT TO BE KEPT WITH THE SITE HASP.

PERMIT ISSUE

Permits are to be issued by a person to whom the authority has been delegated. They may be issued by non-plant staff with delegated authority in which case they shall be countersigned by Site Manager.

PERMIT VALIDITY

If work period exceeds one shift the permit must be re-endorsed below at each shift change, and at least daily, and any change of work control by either issuing Officer or the Recipient prior to the commencement of work.

NOTE – ENSURE GAS-FREE CERTIFICATE IS RE-ENDORSED

RE-ENDORSED BY DATE ……/……/…… ………………………………………………………………………………… Signature of Person Authorized to Re-endorse ………………………………………………………………………………… Valid for ……………………………………………………………………(date) Recipient …………………………………………………………………………….	**RE-ENDORSED BY** DATE ……/……/…… ………………………………………………………………………………… Signature of Person Authorized to Re-endorse ………………………………………………………………………………… Valid for ……………………………………………………………………(date) Recipient …………………………………………………………………………….

RE-ENDORSED BY DATE ……/……/…… ………………………………………………………………………………… Signature of Person Authorized to Re-endorse ………………………………………………………………………………… Valid for ……………………………………………………………………(date) Recipient …………………………………………………………………………….	**RE-ENDORSED BY** DATE ……/……/…… ………………………………………………………………………………… Signature of Person Authorized to Re-endorse ………………………………………………………………………………… Valid for ……………………………………………………………………(date) Recipient …………………………………………………………………………….

RE-ENDORSED BY DATE ……/……/…… ………………………………………………………………………………… Signature of Person Authorized to Re-endorse ………………………………………………………………………………… Valid for ……………………………………………………………………(date) Recipient …………………………………………………………………………….	**RE-ENDORSED BY** DATE ……/……/…… ………………………………………………………………………………… Signature of Person Authorized to Re-endorse ………………………………………………………………………………… Valid for ……………………………………………………………………(date) Recipient …………………………………………………………………………….

4.6.5. Job Safety Analysis

4.6.5.1. Applicability

RM recognizes that JSA is an important accident prevention tool that works by determining hazards and eliminating or minimizing them before the job is performed, and before they have a chance to become incidents. It also asserts who or what role holder is responsible for ensuring the mitigating action is taken. A JSA is a pre-work qualitative review of all tasks involved in the projects/works from mobilization to demobilization. It should be used for job clarification, hazard awareness and for informing workers of specific job hazards and protective measures.

JSAs should be completed by a competent person with input from the workers performing the tasks, the activities it involves, and the hazards it presents.

JSAs are to be performed on all RM work sites.

4.6.5.2. Job Safety Analysis Procedure

Job Safety Analysis (JSA) Procedure

Authority:	RM HSSE	**Custodian:**	Global HSSE Manager
Scope:	All RM Projects	**Issuing Dept.**	RM HSSE
Issue Date:	26/08/2005	**Last Revision Date:**	
Control Status:	Unified Controlled Document	**Next Revision Date:**	

Scope and Applicability of Procedure

Job Safety Analysis (JSA) is an important accident prevention tool that works by finding hazards and eliminating or minimizing them before the job is performed, and before they have a chance to become incidents. JSAs will be performed on all RM site work. Primarily JSAs shall be completed and form part of the project Health & Safety Plan (HASP) however where amendments to work scope are required during a project then JSAs shall be performed before the new works receive authority to proceed.

JSAs shall include all tasks involved from mobilization to demobilization. JSAs shall be used for job clarification and hazard awareness, as a guide in new employee training, for periodic contacts and for retraining of senior employees, as a refresher on jobs which run infrequently, as an accident investigation tool, and for informing employees of specific job hazards and protective measures.

1.1 This procedure applies to any consultant project manager, contractor supervisor or other competent person designated as those responsible for the planning of and resource provision for the works.

1.2 This procedure outlines the steps to be taken to assess the hazards involved in any operational being undertaken for RM.

1.3 This purpose of this procedure is to ensure that all hazards associated with tasks incorporated in the project scope of works are negated or mitigated to a workable level.

1.4 This procedure is to be used on all RM work sites including site investigation, sampling and remediation work tasks.

Scope of Definitions

The person completing the JSAs should consider the purpose of the job, the activities it involves, and the hazards it presents. In addition, observing a worker performing the job, or "walking through" the operation step-by-step may give additional insight into potential hazards.

The main criteria to be considered when completing a JSA are:

- The purpose of the job – What has to be done? Who has to do it?
- The activities involved – How is it done? When is it done? Where is it done?
- What tools and equipment will be used.

Scope of Responsibility

The Project Manager or other trained designated person shall be responsible for completing the JSAs prior to the completion of the HASP for the project.

Where changes to the scope of work occur, new JSAs shall be completed to include the scope changes before the 'Authorization to Work' (ATW) is issued for that day.

Scope of Training and Qualification

JSAs are a task to be undertaken by a competent person prior to the development of a Health & Safety Plan (HASP) and the issuing of Authorization to Work or associated Permits controlling the work.

RM EBMs and contractors should be trained in the JSA process as part of the Control of Work awareness training program.

Scope of Specific Sub-Tasks associated with this Procedure

Sequencing of basic Job Steps (Documenting Activities)

Each specific job shall be broken down into a series or tasks to enable discovery of potential hazards workers may encounter.

For example, a job might be to move an drill auger flight from its staged position on the ground next to the drill rig to the drill hole location for attachment to the drill string. To determine where a step begins or ends, look for a change to activity, change in direction or movement.

Moving the auger flight may begin by pulling the winch cable from the rig to the location of the stationed flight. Next, the cable must be attached to the flight using the clip or clevis at the end of the cable. Then the winch will be engaged to take up the slack in the cable while the flight is guided to the drill hole site. The flight will be lowered onto the drill string inn the hole and attached. The cable will be disconnected and retracted onto the winch.

Be sure to list all the steps needed to perform the job. Some steps may not be performed each time; an example could be checking the integrity of the cable fastener. However, if that step is generally part of the job, it should be listed.

Assessing Potential Hazards

A hazard is a potential danger. The purpose of the Job Safety Analysis is to identify ALL hazards – both those produced by the environment or conditions and those connected with the job procedure.

To identify hazards, the person completing the assessment should consider, at a minimum, these questions about each step:

- Is there a danger of the employee striking against, being struck by, or otherwise making injurious contact with an object?
- Can the employee be caught in, by or between objects?
- Is there potential for slipping, tripping, or falling?
- Could the employee suffer strains from pushing, pulling, lifting, bending, or twisting?
- Is the environment hazardous to safety and/or health (toxic gas, vapor, mist, fumes, dust, heat, radiation, flammable, or cold weather conditions)?
- Is there a potential for release of stored energy?

Close observation and knowledge of the job is important. The person completing the assessment should examine each step carefully to find and identify hazards – the actions, conditions, and possibilities that could lead to an accident. Compiling an accurate and complete list of potential hazards will help develop the recommended safe job procedure needed to prevent accidents.

Recommended Action or Procedure
Having considered the tasks and their associated hazards the person completing the assessment should then determine what actions or procedures are necessary to eliminate or minimize the hazards that could lead to an accident, injury, or occupational illness.

A hierarchy of potential solutions should be used, such as;

- find a safer way of doing the job
- engineer the hazard out;
- provide guards, safety devices, etc.
- provide job instruction training;
- provide personal protective equipment
- maintain good housekeeping;
- insure good ergonomics (positioning the person in relation to the machine or other elements in such a way as to improve safety)

In the appropriate column in the form the designated person should list the recommended safe operating procedures/risk control measures. Begin each with an action word. He/she should say exactly what needs to be done to correct the hazard, such as, “lift using your leg muscles.” And avoid general statements such as, “be careful.”

Also list the required or recommended personal protective equipment necessary to perform each step of the job. A recommended action or procedure should be given for each hazard.

When completing the assessment as a result of change of work scope during site operations then serious or high potential hazards should be corrected immediately. The JSAs should then be changed to reflect the new conditions.

Identify Who is Responsible
The Project Manager or designated responsible person completing the assessment shall ensure that all actions listed shall have an identified person responsible for ensuring the control measures/actions are implemented.

The person completing the assessment should review the input on all four columns for accuracy and completeness. Determine if the recommended actions or procedures have been put in place. Re-evaluate the job safety analysis if site conditions change.

As a final step the Project Manager or designated responsible person should, on site, assemble those involved in the activity and then, using the JSA worksheet, review step by step the tasks that make up the activity and their respective control measures with the operatives. (Also where change of work scope occurs on site then the operatives can form part of assessment ‘team’ and assist in completion of the JSA process).

Job Safety Analysis Worksheet

Contractor:		Date:		JSA No:	
Supervisor:		Permit to work required? Yes ☐ No ☐		BP Permit No:	
Location of worksite:		JSA team members:	Name / Initials / Name / Initials		
Description of work:	Environmental Drilling				

Activity List the tasks required to perform the activity in the sequence they are carried out.	Hazards Against each task list the hazards that could cause injury when the task is performed.	Risk control measures List the control measures required to eliminate or minimize the risk of injury arising from the identified hazard.	Who is responsible? Write the name of the person responsible (supervisor or above) to implement the control measure identified.
MOBILISATION TO SITE	DRIVING ACCIDENTS	ALL VEHICLES TO COMPLY WITH BP DRIVING SAFETY STANDARDS	DRILLER / CONSULTANT
		VEHICLE TO BE FIT FOR PURPOSE AND WELL MAINTAINED.	DRILLER / CONSULTANT
		LOADS TO BE SECURE AND NOT TO EXCEED VEHICLE SPECIFICATIONS OR LEGAL LIMTS.	DRILLER / CONSULTANT
		DRIVER TO BE LICENCED, TRAINED AND MEDICALLY FIT	DRILLER / CONSULTANT
		DRIVER TO BE RESTED AND ALERT	DRILLER / CONSULTANT
		MOBILE PHONE OR TWO-WAY RADIO TURNED OFF WHILST DRIVING	DRILLER / CONSULTANT
		PLAN YOUR ROUTE AHEAD OF TIME - reference RM Journey Assessment	DRILLER / CONSULTANT
		DRIVER NOT BE UNDER THE INFLUENCE OF ALCOHOL, DRUGS OR MEDICATION THAT IMPAIRS ABILITY TO DRIVE VEHICLE.	DRILLER / CONSULTANT
SET UP WORK SITE	AUTO / PUBLIC TRAFFIC	NOTIFY ATTENDANT OR SITE MANAGER / OWNER OF WORK ACTIVITIES AND LOCATION.	
		WORK LOCATION TO BE BARRICADED OFF; VEHICLE AND PEDISTRIAN TRAFFIC MANAGEMENT PLAN AS REQUIRED	DRILLER / CONSULTANT

SET UP WORK SITE (Cont'd)	AUTO / PUBLIC TRAFFIC (Cont'd)	HIGH VISIBLE CLOTHING, STEEL CAP BOOTS, LONG SLEEVES/PANTS/ HARD HAT / SAFETY GLASSES TO BE WORN AT ALL TIMES WHILE IN OPERATIONAL AREAS	DRILLER / CONSULTANT
		INSPECT AREA AROUND VEHICLE PRIOR TO PUTTING VEHICLE IN MOTION AND USE SPOTTER	DRILLER / CONSULTANT
	UNEVEN OR UNSTABLE GROUND	VISUALLY EXAMINE SITE PRIOR TO ENTRY. PLACE TIMBERS UNDER OUTRIGGERS TO SPREAD LOAD.	DRILLER
	UNEVEN OR UNSTABLE GROUND	VISUALLY EXAMINE SITE PRIOR TO ENTRY. PLACE TIMBERS UNDER OUTRIGGERS TO SPREAD LOAD.	DRILLER
	OVERHEAD POWER LINES	LOOK OVERHEAD PRIOR MOVING RIG OR RAISING MAST. MAST MUST BE 3.6M (12 FEET) AWAY FROM POWER LINES OR AS REQUIRED BY LOCAL POWER AUTHORITY.	DRILLER / CONSULTANT
		ELECTRICAL SPOTTER TO BE EMPLOYED WHEN WORKING WITHIN 3 – 6.4 M (10 TO 20 FEET) OF OHE LINES; POWER COMPANY PERMIT ALSO REQUIRED	CONSULTANT
	UNDERGROUND SERVICES	UNDERGROUND SERVICES TO BE LOCATED PRIOR TO BREAKING GROUND BY QUALIFIED SERVICE LOCATOR	CONSULTANT / SERVICE LOCATOR / DRILLER
DRILL RIG SET-UP	RIG ROLL OVER	DO NOT MOVE RIG WITH RAISED MAST	DRILLER
		CROSS ALL HILLS AND OBSTRUCTIONS HEAD ON	DRILLER
		SET JACK OR OUT-RIGGERS PRIOR TO RAISING MAST	DRILLER
		CHECK FOR UNSTABLE SOIL – ASSESS SOIL BY QUALIFIED PROFESSIONAL ENGINEER IF REQUIRED.	DRILLER / CONSULTANT
	CONTACT WITH ELECTRIC LINES AND OTHDER OVERHEAD OBSTICLES	POSITION RIG TO AVOID OVERHEAD UTILITIY LINES BY DISTANCE DEFINED BY VOLTAGE AND LOCAL REGULATIONS	DRILLER / CONSULTANT
DRILL RIG SET-UP (Cont'd)	CONTACT WITH ELECTRIC LINES AND OTHDER OVERHEAD OBSTICLES (Cont'd)	USE SPOTTER WHEN RAISING MAST TO CONFIRM CLEARANCE OF OVERHEAD LINES AND OTHER OBSTRUCTIONS	DRILLER

	INJURY BY MOVING RIG / VEHICLES	HEAVY EQUIPMENT SHALL BE EQUIPPED WITH BACK-UP ALARMS	DRILLER
CONCRETE CORING	IGNITION SOURCES / FIRE & EXPLOSION	ENSURE ELECTRICAL EQUIPMENT PROPERLY GROUNDED AND FITTED WITH EARTH LEAKAGE DEVICE. USE NON-ELECTRICAL CORING EQUIPMENT WHERE POSSIBLE	CONTRACTOR / DRILLER / CONSULTANT
		APPLY WATER AS NECESSARY TO ADDRESS SURFACE SPARKING POTENTIAL	CONTRACTOR / DRILLER / CONSULTANT
		AREA TO BE DEEMED FREE OF EXPOLSIVE CONDITIONS PRIOR TO WORK	CONSULTANT / DRILLER
		ENSURE AREA IS WETTED AT ALL TIMES, INCLUDING BIT	CONSULTANT / DRILLER
	HEARING DAMAGE DUE TO HIGH NOISE LEVELS	WEAR APPROPRIATE HEARING PROTECTION (EAR MUFFS OR EAR PLUGS)	CONTRACTOR / DRILLER / CONSULTANT
SOIL BORING / DRILLING	FAULTY OR INAPPROPRIATE EQUIPMENT	QUALIFIED DRILLER MUST INSPECT RIG PRIOR TO USE. FAULTY OR INAPPROPRIATE, EQUIPMENT SHALL BE PUT OUT OF SERVICE AND REPLACED / REPAIRED	DRILLER
		INSPECT ALL HAND TOOLS PRIOR TO USE. IF FAULTY OR INAPPROPRIATE, DO NOT USE UNTIL REPAIRED OR REPLACED	DRILLER
	MOVING / ROTATING EQUIPMENT	ALL APPROPRIATE GUARDING TO BE INPLACE PRIOR TO USE	DRILLER
		SET-UP ADEQUATE EXCLUSION ZONE – ONLY TRAINED, INDUCTED AND AUTHORISED PERSONNEL WITHIN THIS AREA	DRILLER
SOIL BORING / DRILLING (Cont'd)	MOVING / ROTATING EQUIPMENT (Cont'd)	STAY CLEAR OF ROTATING AUGER / EQUIPMENT – NO HANDS, FEET OR ANY BODY PART TO BE NEAR ROTATING EQUIPMENT. ROTATION TO STOP FOR SAMPLING ETC.	DRILLER
		USE LONG HANDLED SHOVELS TO CLEAR AWAY CUTTINGS WHEN AUGER HAS STOPPED	DRILLER

		WEAR APPROPRIATE PPE INCLUDING LEATHER GLOVES, STEEL CAPPED BOOTS, HARD HAT, AND SAFETY GLASSES. FULL LENGTH OVERALLS OR LONG SLEEVE SHIRT AND LONG PANTS - NO LOOSE CLOTHING, FIRE RETARDENT CLOTHING (FRC) WHEN APPROPRIATE.	DRILLER
	IMPACT BY SUSPENDED LOADS	DO NOT WALK UNDER SUSPENDED LOADS	DRILLER
	HEARING DAMAGE FROM HIGH NOISE LEVELS	USE HEARING PROTECTION (EAR MUFFS OR EAR PLUGS) IF NOISE > 85 dB	DRILLER
	VAPOURS AND AIRBORNE PARTCULATES	MONITOR AIR CONCENTRATIONS USING PHOTO-IONISATION DETECTOR, LEL METER etc	CONSULTANT
		STOP WORK IF HAZARDOUS CONDITIONS IDENTIFIED (EXPLOSIVE ATMOSHPERE, O2 DEFICIENT OR ENRICHED ATMOSPHERE) – REASSESS AND TAKE THE NECESSARY PRECAUTIONS.	DRILLER / CONSULTANT
		WEAR APPROPRIATE PPE INCLUDING FACE SHIELD / SAFETY GLASSES, DUST MASKS OR RESPIRATORS, LONG SLEEVE SHIRTS AND PANTS, FRC WHEN APPROPRIATE.	DRILLER / CONSULTANT
	SLIP, TRIP & FALL	KEEP WORK AREA TIDY AND CLEAN – INCLUING THE REMOVAL OF EXCESS CUTTINGS.	DRILLER / CONSULATANT
		KEEP WORK SURFACES DRY WHERE POSSIBLE	DRILLER / CONSULATANT
		WEAR APPROPRIATE PPE INCLUDING NON-SLIP RUBBER BOOTS IF WORKING ON WET OR SLICK SURFACES	DRILLER / CONSULATANT
SOIL BORING / DRILLING (Cont'd)	SLIP, TRIP & FALL (Cont'd)	STAY AWARE OF FOOTING AND DO NOT RUN	DRILLER / CONSULATANT
	HEAT / COLD STRESS	TAKE REGULAR BREAKS ON HOT DAYS OR IF FEELING FAINT OR OVEREXERTED	DRILLER / CONSULATANT
		CONSUME ADEQUATE FOOD / BEVERAGES (WATER / SPORTS DRINK)	DRILLER / CONSULATANT
		IF POSSIBLE, ADJUST WORK SCHEDULE TO AVOID TEMPERATURE EXTREMES	DRILLER / CONSULATANT

	BIOLOGICAL HAZARDS: INSECTS, SNAKES, WILDLIFE, VEGETATION	CAREFULLY INSPECT WORK AREA DURING SITE INSPECTION TO IDENTIFY HAZARDS	DRILLER / CONSULATANT
		USE INSECT REPELLANT	DRILLER / CONSULATANT
		OPEN ENCLOSURES SLOWLY	DRILLER / CONSULATANT
		SURVEY SITE FOR PRESENCE OF BIOLOGICAL HAZARDS AND MAINTAIN SAFE DISTANCE	DRILLER / CONSULATANT
		WEAR APPROPRIATE PPE INCLUDING LEATHER GLOVES, LONG SLEEVES AND PANTS AND SNAKE CHAPS AS REQUIRED	DRILLER / CONSULATANT
	UNDERGROUND SERVICES	PROFESSIONAL CABLE LOCATOR TO LOCATE AND IDENTIFY ALL SERVICES IN POTENTIAL DRILLING AREA.	CONSULTANT
		ALL SOIL BORINGS TO BE EITHER HAND AUGERED OR AIR-KNIFED FOR THE FIRST 1.5 METRES (5 FEET) TO CLEAR ANY UNDERGROUND SERVICES.	DRILLER / CONSULTANT
	WORKING AT HEIGHTS	NO WORK TO BE CONDUCTED ON RIG AT HEIGHTS GREATER THAN 2M (6 FEET) WITHOUT FALL RESTRAINT / ARREST SAFETY EQUIPMENT.	DRILLER / CONSULTANT
	UV EXPOSURE	WEAR CORRECT PPE (NECK TO TOE CLOTHING & SUNBLOCK)	DRILLER & DRILLER'S OFFSIDER
	PRODUCT / HAZARDOUS VAPOURS	2 X 9 KG (20 LB) FIRE EXTINGUISHERS AT WORK AREA AT ALL TIMES. COVER WITH SAND BAGS OR WET HESSIAN SACKS ALL PITS (DIP POINTS, REMOTE FILLS, ETC) WITHIN 3m (10 feet) RADIUS OF DRILLING / CORING (OR AS DEFINED BY HAZARDOUS AREA MAP).	DRILLER / CONSULTANT
SOIL BORING / DRILLING (Cont'd)	WIND BLOWN DUST	MINIMISE DUST FROM DRILLING BY USE OF COVERS / SHIELDS OR WATER WHEN POSSIBLE. WEAR PROTECTIVE GLASSES OR GOGGLES AS REQUIRED.	DRILLER / CONSULTANT
	LEAKAGE OF FUEL OIL AND HYDRAULIC FLUID	HAVE READY ACCESS TO SPILL ABSORBENT MATERIALS TO SOAK UP ANY SPILLED HYDRCARBONS	DRILLER / CONSULTANT
	LIFTING HEAVY EQUIPMENT	DO NOT LIFT OR MOVE HEAVY EQUIPMENT WITHOUT ASSISTANCE	DRILLER

		USE PROPER BENDING / LIFTING TECHNIQUES BY LIFTING WITH ARMS AND LEGS AND NOT WITH BACK. KEEP BACK STRAIGHT WHILE LIFTING	DRILLER / OFF-SIDER
		IF POSSIBLE, USE POWERED LIFT TRUCK, DRUM CART, OR OTHER MECHANICAL MEANS	DRILLER / OFF-SIDER
		TAKE BREAKS IF FEELING FAINT OR OVER EXERTED	DRILLER / OFF-SIDER
	PRODUCT / HAZARDOUS VAPOURS	ISOLATE BOWSWERS / PUMPS WITHIN 8 METRE (26 FEET) RADIUS OF DRILLING LOCATION	CONSULTANT / SITE MANAGER
		ALL WORK TO CEASE WHEN FUEL DELIVERING TANKER IS ON SITE. WORK CAN ONLY COMMENCE 15 MINUTES AFTER TANKER HAS LEFT SITE AND SITE IS AGAIN FREE OF EXPOLSIVE CONDITIONS	DRILLER / CONSULTANT
	MUSCLE STRAIN INJURY	USE CORRECT MANUAL LIFTING METHODS. WEAR CORRECT PPE.	DRILLER'S OFFSIDER
	ENTANGLEMENT WITH ROTATING DRILLING RODS AND ASSOCIATED EQUIPMENT	STAND CLEAR OF ROTATING EQUIPMENT. NO LOOSE CLOTHING TO BE WORN. DRILLER TO MANAGE SOIL SAMPLING.	DRILLER / CONSULTANT
	DROPPING DRILLING LOAD	ENSURE ROD IS PROPERLY CONNECTED TO WINCH ROPE.	DRILLER
SOIL SAMPLING	HANDLING CONTAMINATED MATERIALS / SOILS / GROUNDWATER	WEAR APPROPRIATE PPE INCLUDING NITRILE GLOVES, SAFETY GLASSES AND NECK TO TOE CLOTHING.	DRILLER / CONSULTANT
	SHARP SAMPLING TOOLS	USE CORRECT TOOLS FOR OPENING SPLIT SPOON SAMPLER / PUSH TUBES	DRILLER / CONSULTANT
	VAPOURS	WEAR APPROPRIATE PPE INCLUDING RESPIRATOR IF REQUIRED	DRILLER / CONSULTANT
SOIL SAMPLING (Cont'd)	VAPOURS (Cont'd)	WORK UPWIND OF SAMPLING AREA IF POSSIBLE	DRILLER / CONSULTANT
OPERATION OF AIR COMPRESSOR	EXCESSIVE NOISE LEVEL	WEARING OF PPE (EAR MUFF).	DRILLER
	WHIPPING OF AIR LINE(S)	WHIP CHECKS TO BE APPLIED CORRECTLY & TO BE IN ACCORDANCE WITH THE OPERATIONS MANUAL DEVELOPED BY THE DRILLERS.	DRILLER
		DRILLER TO HAVE FULL VIEW OF AIR COMPRESSOR OPERATOR TO ENSURE CONSTANT COMMUNICATION.	DRILLER

REINSTATEMENT	FIRE / HAZARDOUS VAPOURS	AREA TO BE DEEMED GAS FREE BEFORE STARTING GROUTING PUMP	DRILLER / CONSULTANT
ANY CHEMICAL USE	INJURY OR ADVERSE EFFECTS FROM CHEMICAL EXPOSURE	ALL CHEMICALS TO BE PROPERLY STORED & LABELLED	DRILLER / CONSULTANT
		CURRENT MSDS TO BE AVAILABLE FOR EACH CHEMICAL ON-SITE	DRILLER / CONSULTANT
		EMPLOYEES TRAINED ON CHEMICAL HANDLING	DRILLER / CONSULTANT
		APPROPRIATE PPE FOR HANDLING CHEMICALS	DRILLER / CONSULTANT
Use space provided below to add any additional site or drilling rig specific risks and conditions that exist and are not covered above.			

4.6.6. Journey Hazard Assessment

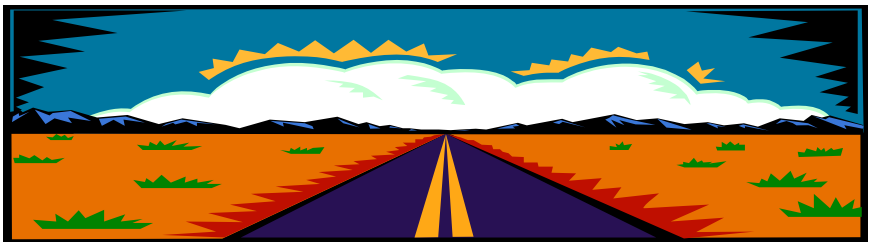
4.6.6.1. Applicability

RM endorses the Group Functional Standard – Personal Safety - Driving and requires that all RM employees and contractors ensure that all vehicle engineering and driving behaviors are aimed at reducing the number and frequency of driving related accidents.

When planning to make a journey, each employee or contractor should complete a risk assessment to determine whether the journey is required and then planned accordingly.

A Journey Hazard Assessment must be completed for each to the Leviathan Mine Site.

REMEDIATION MANAGEMENT
JOURNEY HAZARD ASSESSMENT CARD



STOP! THINK! GO!

Name _____ **Date** _____

STOP

Do I need to make this journey? ❑ **Yes** ❑ **No**

STOP

Where am I traveling? How long will I be driving? And do I have an ETA with a contact person and have communicated area hazards and safest mode of transport?

_____

_____

THINK

How can I ensure that I have a safe journey?

_____

_____

THINK

Am I well rested an alert for the journey? ❑ **Yes** ❑ **No**

THINK

Have I done a vehicle walk around and ensured that the vehicle is safe and ready for travel?

❑ **Yes** ❑ **No**

HAVE A SAFE TRIP!

DRIVING IS RISKY BUSINESS!

ELEMENTS OF THE DRIVING STANDARD

- **Has vehicle been inspected?** ❑ **Yes** ❑ **No**
- **Will passengers be transported?** ❑ **Yes** ❑ **No**
- **Has cargo been secured?** ❑ **Yes** ❑ **No**
- **Driver's License is current?** ❑ **Yes** ❑ **No**
- **Appropriately rested and alert?** ❑ **Yes** ❑ **No**
- **Journey risks have been identified?** ❑ **Yes** ❑ **No**
- **Seatbelts are in working order?** ❑ **Yes** ❑ **No**
- **Medically fit for driving?** ❑ **Yes** ❑ **No**
- **ATV Helmet is correct?** ❑ **Yes** ❑ **No**

GO

COMMENTS

_____

_____

_____

_____

_____

DRIVE TO THE BP DRIVING STANDARD!

DRIVE SAFELY!

4.6.7. Lifting

4.6.7.1. Applicability

Hoisting & Lifting of goods, machinery or structures utilizing cranes, hoists, or other mechanical lifting devices carries many potential hazards.

All lifting operations must be properly assessed by competent workers and equipment must have current certification.

Loads should never exceed the dynamic and/or static capacities of the lifting equipment and all safety devices installed on lifting equipment are operational while the lift is being undertaken. Deviations or alterations to any equipment outside of design specification are strictly prohibited.

Hoisting & Lifting Operations Safety Procedures

SAFETY METHOD STATEMENT

It is imperative that all workers understand that no task is so important or so urgent that it cannot be done safely.

SEQUENCE & SAFE METHOD OF WORK

- Mobile Crane - Required Inspection Form must be filled out prior to performing hoisting operations (see Appendix C)
- Complete a pre-task Job Safety Analysis (JSA) (see Appendix A) prior to any hoisting operation to evaluate potential safety hazards associated with the lift, including, but not limited to:
  - Overhead electrical
  - Lock out, tag out
  - Weather conditions
  - Working at heights
  - Forecourt safety
  - Condition of equipment
  - Completion of Daily Equipment Inspection
- All hoisting must be performed with lifting devices specifically capable of safely lifting the load required depending upon:
  - Size and weight of equipment (such as a tank or sign)
  - Height of lift required (i.e. in or out of the excavation, on or off a truck, on or off a sign post)
  - Lateral reach required for situating the lifting device on a stable surface
- If lifting operations must be done in the vicinity of overhead power sources, these sources must be locked-out or a remote control crane must be used. If a remote crane is used, then additional steps must be taken to ensure that personnel stand clear and can not be harmed if the vehicle comes into contact with power source
- Hoisting shall not take place while any person is standing on any part of an object to be lifted, or in a tank excavation
- Personnel must never stand under an object suspended by a lifting device or in the travel path of the object
- Only properly rated and maintained slings and rigging may be used to lift items
- The crane rope must never be wrapped around an object or its container and lifted, or threaded through a lifting lug or in any way be used as a sling
- Mobile lifting equipment provided with outriggers/stabilizers must have the outriggers set out for all lifting operations
- Frequent and periodic inspections of the lifting equipment must be conducted in compliance with regulations. Inspection documentation must be readily available for inspection by BP personnel. This requirement applies to rental equipment as well. The rental agency must provide documentation of completed inspections; otherwise, the equipment shall not be rented.
- Lifting devices of the types referred to in this procedure must never be used for personnel retrieval devices. Only devices designed for personnel retrieval may be used for that purpose.

PURPOSE & SCOPE

The purpose of this procedure is to assure an *Incident and Injury Free Workplace* when personnel use hoisting and lifting equipment at BP sites. BP requires all employees and contractors performing work on behalf of BP to follow these procedures. These safety requirements are to be considered a minimum requirement and are mandatory. Additional safety measures may be required on a site or job specific basis by BP or by government regulations such as the OSHA standard (29 CFR 1926.251, 1926.550, 1926.552, 1926. 553, 1926.554, and 1926.453) on using lifting and hoisting equipment which may be obtained from the OSHA web site at http://www.osha.gov/index.html. Below is a summary of BP's safety requirements. The OSHA standard (29 CFR 1926.251, 1926.550, 1926.552, 1926. 553, 1926.554, and 1926.453) on using lifting and hoisting equipment may be obtained from the OSHA web site at http://www.osha.gov/index.html. It is the responsibility of the parties conducting the work to understand and follow all required safety regulations and practices.

These Hoisting and Lifting Safety Procedures establish minimum standards for general hoisting and lifting operations and contain special provisions for the following activities:

- Storage tank removal and installation
- Sign installation or removal and maintenance operations, excluding hi-rise signs
- All high-rise sign operations must be conducted utilizing site and operation specific safety procedures, pre-approved by a BP representative
- Hoisting performed with small maintenance service truck hoists

DEFINITIONS

Load (working) - The external load, in pounds, applied to the hoisting mechanism, including the weight of load-attaching equipment, such as load blocks, shackles, and slings.

Competent person – a person who is capable of identifying existing and predictable hazards in the surroundings, or working conditions that are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

REQUIRED SAFETY PRACTICES

OPERATOR CERTIFICATION

Employees operating powered lifting equipment must be certified for that piece of equipment. Certification must be available on the jobsite at all times for the operator.

RESPONSIBILITY

It is the responsibility of the contractor performing the hoisting or lifting operation to do so in a safe manner and in compliance with applicable regulations. If unsure about the safety of a lifting or hoisting operation, it is the contractor's responsibility to STOP the operation until the issue has been clarified, and the operation can be performed safely. The contractor should not begin work with lifts utilizing cranes, hoists, or other mechanical lifting devices, until the following steps have been taken:

- An assessment of the lift has been completed and the lift method and equipment has been determined by a competent person
- Operators of powered lifting devices are trained and certified for that equipment
- Rigging of the load is carried out by a competent person(s)
- Lifting devices and equipment have documented records of frequent and periodic inspections and have been certified for use within the past 12 months,
- Load does not exceed the dynamic and / or static capacities of the lifting equipment,
- All safety devices installed on the lifting equipment are operational
- All lifting devices and equipment have been visually examined before each lift by a competent person(s)

SPECIAL ISSUES FOR STORAGE TANK REMOVAL AND INSTALLATION

- During storage tank removal, work area shall be barricaded to eliminate entry by the public. If the tank removal operation can be accomplished in a single workday, traffic cones draped with orange snow fencing may be utilized as a barricade system. If the tank removal operation will take more than a single workday, a minimum 6-foot chain link fence shall be installed around the work area.
- Storage tank installations shall always be fenced.
- Cranes, excavators, and trackhoes are examples of devices that may be used to lift storage tanks to and from excavations and trucks, as long as they may be used safely and meet the requirements of the lift. Backhoes and mini-excavators may be used to remove small (550 gallon) storage tanks as long as they can be used safely and meet the requirements of the lift.

INCIDENT REPORTING

All incidents involving personal injury or property damage, or which had the potential to cause significant injury or damage, must be promptly reported to BP according to the RM Incident Notification Guidance Manual.. All information and assistance must be made available upon request to assist with an incident investigation, if necessary.

SPECIAL GUIDELINES FOR SIGN INSTALLATION, REMOVAL, AND MAINTENANCE

- Work area shall be barricaded to eliminate entry by the public. Because sign installation, removal, and maintenance operations typically take less than a single workday, traffic cones draped with orange snow fencing may be utilized as a barricade system.
- If the sign installation or removal operation will take more than a single workday, all equipment and material must be removed from the area of the sign and stored elsewhere on or off-site until the work begins again. Sign components may only be left in the general sign work area if the facility or portion of the facility is closed to the general public and a minimum 6-foot chain link fence has been installed around the work area.
- All cranes used for sign work at BP locations must be situated on paved surfaces with outriggers in place, if so equipped. Cranes used for sign work may not be situated on grassy or dirt areas without specific prior authorization of the Area Maintenance Manager or Global Alliance Project Manager.
- Line trucks, other truck-mounted or wheel-mounted cranes (wagon cranes) are examples of devices that may be used to lift signs, as long as they may be used safely and meet the requirements of the lift.
- Aerial lifts (bucket trucks, cherry pickers), scissor lifts and ladders are examples of devices that may be used to perform maintenance operations on signs, as long as they may be used safely and meet the requirements of the lift:
- Aerial lifts must be electrically isolated and meet the requirements for insulated aerial devices in OSHA 29 CFR 1926.453.
- A full body harness shall be worn and a lanyard attached to the boom or aerial lift basket when working from an aerial lift.

SPECIAL ISSUES FOR PERFORMING MAINTENANCE OPERATIONS WITH TRUCK MOUNTED CRANES

These safety rules apply to all maintenance service trucks with small boom cranes on the rear of the vehicle.

- The truck shall be placed so as to perform the hoisting operation as safely as possible.
- The truck engine shall be turned off during the entire maintenance work operation.
- The work area shall be barricaded to eliminate entry by the public and to provide a high visibility demarcation of the work area for safety of the person performing the work. When there is a choice as to truck location, the truck shall be placed so as to become a primary element of the barricade system.

APPENDIX A – JOB SAFETY ANALYSIS (JSA) – HOISTING & LIFTING HAZARD CONTROLS

JHA	HAZARDS	CONTROLS
Hoisting and lifting operations	• Electrocution from overhead electrical hazards • Equipment failure •Adverse Weather • Fall from heights • Vehicle impact • Electrocution from lighting signs/lights	• Conduct pre-task hazard evaluation • Use remote control crane as necessary • Assure all frequent and periodic inspections have been performed: Review inspection records as necessary, especially for rental equipment, • Complete Required Inspections/Permit to Work form prior to performing hoisting operations • Do not start work under threat of electrical storm. Stop work if adverse weather is encountered, • All workers in a bucket truck or scissors lift must wear a full body harness and lanyard, and tie off to bucket truck or scissors lift, • Refer to Working on the Forecourt method statement: Be sure that base of hoists, bucket trucks and ladders are protected from vehicular impact • Assure that all LOTO procedures are followed. Refer to LOTO method statement. All signs must be locked-out prior to performing maintenance services.

APPENDIX B - PERSONAL PROTECTIVE EQUIPMENT (PPE)

PERSONAL PROTECTIVE EQUIPMENT (PPE)

When a hazardous situation is recognized, steps should be immediately taken to eliminate the hazard either by engineering revision or by changing work methods. If it is not practical to eliminate the hazard, then personal protective equipment (PPE) must be used.

PPE Requirements

11. High visibility vest: Always
12. Safety Glasses: Always
13. Ear plugs or muffs: when working in close proximity to loud noises (jack hammer, vacuum trucks, lawn care)
14. Hard hat: Always
15. Fall protection harness: when working at heights greater than six feet from the ground or within six feet from an exposed edge
16. Gloves (chemical resistant): when working with gasoline or other solvents or corrosive chemicals
17. Gloves (leather or cotton): when working with sharp or abrasive materials
18. Long pants and long-sleeve work shirt: during any work at BP facilities
19. Steel-toe Boots or shoes (leather): during any work at BP facilities
20. Fire resistant clothing: when working where there is a risk of a flash fire

APPENDIX C – MOBILE CRANES REQUIRED INSPECTION FORM – PERMIT TO WORK

Location: _____ Vehicle ID_____
Audited by: _____ Date: _____

CHECK BOXES ONLY FOR EACH ITEM IN COMPLIANCE:
DAILY EQUIPMENT INSPECTION (FREQUENT)

- ❑ Crane has been visually inspected prior to use each day.
- ❑ Air or hydraulic systems inspected and in compliance for adjustment problems that may interfere with proper operation (deterioration or leakage in lines, tanks, valves, drain pumps, and other parts of systems)
- ❑ Hooks, hoist chains, and end connections checked for signs of wear, twist, cracks, distorted links, or excessive stretch and are in compliance

MONTHLY EQUIPMENT INSPECTION (PERIODIC)

- ❑ Running ropes checked at least monthly
- ❑ Deteriorated running ropes have been replaced
- ❑ Running ropes are of nominal diameter
- ❑ Outside wires in good condition, not worn or broken
- ❑ Running ropes free from corroded or broken wires at end connections
- ❑ End connections in good condition (not corroded, cracked, bent, or worn)
- ❑ Wires are properly placed, without excessive kinking, crushing, cutting, or unstranding
- ❑ Ropes that have been idle for one month or more (due to shutdown of crane) inspected thoroughly and in good condition
- ❑ Operating mechanisms with excessive component wear in good working condition
- ❑ Manufacturer's recommendations for rope reeving are met

ADDITIONAL INSPECTIONS

- ❑ Deformed, cracked, or corroded components replaced
- ❑ Loose bolts or rivets tightened
- ❑ Cracked or worn sheaves and drums replaced
- ❑ Worn, cracked, or distorted parts such as pins, bearings, shafts, gears, rollers, locking and clamping devices replaced
- ❑ Worn brake system parts, linings, pawls, and ratchets replaced
- ❑ Inaccuracies in load, wind, and other indicators over their full range set right
- ❑ Performance and safety of the machine's engine or motor meets manufacturer's requirements
- ❑ Chain drive sprockets inspected for excessive chain stretch and replaced if necessary
- ❑ Electrical controller contacts, limit switches, and pushbutton stations checked for signs of pitting or deterioration and replaced as necessary

IDLE OR STAND-BY EQUIPMENT INSPECTION

- ❑ Cranes that have been idle for up to one month have had frequent and periodic inspections before use
- ❑ Cranes that have been idle for over six months have met requirements of frequent and periodic checklist before use
- ❑ Stand-by cranes inspected using the frequent and periodic checklist every six months

INSPECTION DOCUMENTATION

- ❑ Frequent and periodic inspections have been documented
- ❑ Inspection documentation includes the following:
    1. Signature of the person conducting the inspection
    2. Date of the inspection
    3. Identification of the parts inspected

REPAIRS OR CORRECTIONS IDENTIFIED ON THIS FORM MUST BE COMPLETED BY:

(DATE)_____

Routed to: _____ Date _____

REPAIRS OR CORRECTIONS IDENTIFIED ON THIS FORM HAVE BEEN COMPLETED

Supervisor: _____ Date _____

4.6.8. Lockout/ Tagout

4.6.8.1. Applicability

All Lock Out/Tag Out - energy isolation will be in strict accordance with RM's Lockout Tagout Procedure.

Lock-Out / Tag-Out Remediation Management Lock, Tag, and Try Safety Procedures

SEQUENCE & SAFE METHOD OF WORK

1. Prior to the start of any job where hazardous energy may be encountered, all sources of such energy must be isolated. Sources of hazardous energy include electrical, pneumatic, mechanical, hydraulic, thermal, chemical and other forms of energy.

2. A Qualified Electrical Contractor must perform high voltage and electrical work on switchboard circuits.

   Prior to conducting an on-site isolation inform the site manager that work is about to get underway and that the planned sequence and site layout program (detailing work zones, delivery and storage, and work areas) are confirmed.

3. Lock-out / tag-out procedures are:
   - Identify all potential energy sources or situations where a release of product may occur.
   - Include the isolation requirements on any work permits or job instructions.
   - Positively isolate equipment from all sources of potential energy or potential product releases.
   - Inform all who may be affected.
   - Drain and depressurize.
   - Lock-out / tag-out energy source and tag-out equipment.
   - Test to confirm that equipment cannot be started and/or that hydraulic or mechanical energy is controlled.
   - Complete work.

4. When work is complete:
   - Check that all people involved in the work have finished.
   - Inform all people who have been affected.
   - Check system integrity.
   - Ensure all equipment and personnel are clear.
   - "Unlock " lock-out system, remove tags and re-commission.
   - Test equipment function and place back into service

5. Only a qualified electrician, as per local and national codes, will perform electrical disconnections, connections and terminations.

6. Upon completion, test for electrical safety and then re-commission the power supply, removing the lock-out / tag-

It is imperative that all workers understand that no task is so important or so urgent that it cannot be done safely.

PURPOSE AND SCOPE

The purpose of this procedure is to assure an *Incident and Injury Free Workplace* where personnel work on equipment at BP sites that can and shall have its energy source locked-out and/or tagged-out. BP requires all employees and contractors performing work on behalf of BP to follow these procedures. These safety requirements are considered as a minimum requirement and are mandatory. Additional safety measures may be required on a job or site-specific basis by BP or by government regulations such as the OSHA regulations (29 CFR 1910.147, 29 CFR 1926.417). Below is a summary of BP's lock-out/tag-out safety requirements. It is the responsibility of the parties conducting the work to understand and follow all required safety practices.

DEFINITIONS

Lock-out: A device that provides positive isolation using a lock to hold an energy-isolating device in the safe position. The lock shall be identified with the name of the person who applied the lock and who holds the key.
For any line that has the potential to contain fuel, it must be locked and /or tagged on both ends.
Multiple Locks: If more than one individual is required to lockout equipment, each shall place their own lock on the energy-isolating device.
Tag-out: A prominent warning that is securely attached to equipment with a tie having a minimum of 40# of bursting strength. The warning forbids the operation of equipment and bears the name of the person who applied the tag.

REQUIRED SAFETY PRACTICES

Removal of Locks and Tags

Lock-out locks and tags must only be removed by the person who applied them.
Exceptional Circumstances: Lock and/or tags may be removed by Job Supervisor (authority not to be delegated) after complying with the following procedure:
Verify that the person who placed the Lock and Tag is not on- site.

- Make all reasonable efforts to contact the person.
- Ensure that the site is in a safe and operable condition.
- Remove lock-out/ tag-out.
- Re-commission (start-up) equipment.
- Ensure that the person who applied the tag and lock knows the equipment has been returned to service.

Control

For more complex isolations (requiring isolation devices in more than one physical location) a lock-out and tag list should be prepared listing where all locks and tags are to be placed. These should be checked off as they are placed and when they are removed at the end of the work.

Equipment

Each Contractor should equip themselves with a commercially available "lock-out station" containing lock-out tags, padlocks, multiple lock hasps etc. The locks should be "master keyed " and be individually keyed.

All incidents involving personal injury or property damage, or which had the potential to cause significant injury or damage, must be immediately reported to BP per the RM Incident Notification Guidance Manual. All information and assistance must be made available upon request to assist with an incident investigation, if necessary.

Appendix A – Job SAFETY Analysis (JSA) – lock-out / tag-out

PRINCIPLE WORK STEPS	HAZARDS	CONTROLS	PERMITS/ TRAINING
Safety Requirements		• Contractor shall perform all work in accordance with BP Safe Work Conditions and/or local regulations	
Work Control	• General	• Contractor shall advise Site Manager of all electrical isolation to ensure site personnel do not remove any isolations devices that have been p in place.	

Protection of the Public/Workforce	• Injury
	• Property Damage
		• Every worker will be made aware that:
		  • Our greatest responsibility is assuring that no harm come to any employee or member of the public.
		  • The need for pre-planning work activities and having all the necessary protective equipment available is essential to conducting business.
		  • All work will be conducted in barricaded controlled work areas to ensure that an effective protective buffer zone between construction activities and the public will be maintained at all times. (See next item)	

Establishing a Controlled Work Area	• Vehicle impact • Unauthorized entry	• The Contractor shall adequately barricade their work location.	
Overhead power lines	• Electrocution • Power failure to neighbors	• Where overhead power lines are in close proximity and restrict the safe access to the work, the relevant utility supplier is to be contacted. Work will not proceed until the lines are isolated, removed or shielded.	
Electrical Work:	• Electrocution / Electrical shock • Burns	• Notify all affected employees that a lock-out / tag-out system will be used and why. • An electrician will ensure electrical lock-out / tag-out of equipment. • The electrician will ensure electrical safety prior to re-energizing the equipment.	Contractors are required to instruct their employees to recognize and avoid unsafe conditions that require lock-out and/or tag-out.
Electrical Power and Tools	• Electrocution • Burns • Customers tripping over power cords.	• The use of battery-operated tools is the preferred option only in non-hazardous atmospheres. Air tools should be used in hazardous areas. • Where this is unachievable, power shall be obtained from an isolated grounded outlet. Electrical cords must not be routed through hazard zones and must be contained within industrial grade covers wherever traffic or pedestrian contact is possible. • This power supply must be connected to a Ground Fault Circuit Interrupter (GFCI) (Earth Leakage protected). An assured grounding program is not acceptable. The power supply must meet BP and electrical authority minimum requirements. • All cords, tools, GFCI, to be checked on a daily basis. Any electrical tool or power cord found to be defective, damaged, or otherwise unserviceable shall be immediately removed from service until repaired or must be replaced.	A competent person is to perform all electrical repairs.

Appendix B Personal Protective Equipment (PPE)

PERSONAL PROTECTIVE EQUIPMENT (PPE)

When a hazardous situation is recognized, steps should be immediately taken to eliminate the hazard either by engineering revision or by changing work methods. If it is not practical to eliminate the hazard, then personal protective equipment (PPE) must be used.

PPE Requirements

1.	High visibility vest:	Always
2.	Glasses,	Always
3.	Goggles, or face shield:	When working with high voltage electrical equipment, drilling, hammering, handling hazardous liquids
4.	Ear plugs or ear muffs:	When working in close proximity to loud noises (jack hammer, vacuum trucks, lawn care)
5.	Hard hat:	Always
6.	Fall protection equipment:	When working at heights above six feet and/or within six feet from an exposed edge
7.	Long pants and long-sleeve work shirt:	During any work at BP facilities
8.	Steel-to Boots or Shoes (leather):	During any work at BP facilities
9.	Gloves, electrical insulated:	When working with high voltage electrical equipment greater then 240 volts

4.6.9. Management of Change

4.6.9.1. Applicability

Work arising from temporary or permanent changes to organization, process or field work within RM shall be subject to a fit-for-purpose MOC process. The MOC process shall be undertaken by personnel with relevant experience and required degree of competency. The process should involve an assessment of the risks, a work plan to mitigate the risk and be authorized by the designated responsible person.

4.6.9.2. Management of Change Procedure

Authority:	RM HSSE	**Custodian:**	Global HSSE Manager
Scope:	All RM Projects	**Issuing Dept.**	RM HSSE
Issue Date:	26/08/2005	**Last Revision Date:**	
Control Status:	Unified Controlled Document	**Next Revision Date:**	

Scope and Applicability of Procedure

The purpose of an MOC procedure is to identify and control risks, both real and potential, associated with change. An MOC procedure ensures that the impact of changes which affect the health and safety of personnel or impact the environment are recognized, reviewed, approved, communicated and documented.

Management of Change applies to changes in operating parameters, equipment, maintenance practices, product compositions, chemicals used, procedures, equipment and personnel. There are also regulatory changes to consider which may impact permit limits or other operating parameters. These changes could take the form of new or emerging regulations, or changes to existing regulations. Changes may be permanent, or temporary in nature.

Scope of Responsibility

The MOC Owner is typically the project manager or other designated responsible person who is driving implementation of the proposed change. The reviewers will likely be technical experts familiar with the impacts that could be caused by the proposed change. The approver is a sufficient level of management to authorize the change, given the potential impacts. Input from the appropriate Regional HSSE Coordinator should also be sought. The HSSE Manager's input should be sought for changes that would impact the entire business unit or are determined to be of high potential risk.

The MOC proposal document must clearly spell out;

- who is responsible for initiating the MOC (the MOC Owner),
- who needs to review and approve the MOC,
- who manages the MOC process,
- how the MOC is communicated to affected personnel and what review/audit process is in place.

Scope of Training and Qualification

All persons involved in the MOC proposal, screening, review and approval must be competent in the MOC process. Competency will be assessed through either the specific training completed, or level of experience, in the operations or business process undergoing the change.

Scope of Procedures

MOC is a step-by-step process with several distinct actions to be considered. There are no detailed

procedures for these actions, however below is guidance on how they should be completed.

Change Proposal

The process starts when a proposed change is identified. The originator of the proposed change must clearly communicate and document a description of the proposed change and the reason for the change to the appropriate level of authority. The merits of the change are evaluated and any additional action required to properly address the change are determined. An individual (MOC Owner) is appointed to own the MOC process for the change (typically the originator, but not necessarily). Input from Operations and Maintenance personnel, consultants, contractors, the appropriate Regional HSSE Coordinator and others should be solicited as appropriate to confirm the conceptual basis for the change.

Screening

Once the need for the change has been verified, the change must be screened to see if the formal MOC process is required. In general, if health, safety, the environment, or regulatory compliance is potentially impacted, the MOC process will need to be employed. If a change is determined to not require the formal MOC process, this conclusion needs to be documented. A series of five (5) questions has been prepared to help in the screening process. Answering "Yes" to any of these questions will require a formal MOC review.

1. Does the change have the potential to adversely affect performance in any of the key HSE performance areas (Injuries, Spills, etc.)?
2. Is there a change in the materials of construction, physical layout, or control logic, or is it a new installation?
3. Is there a change in operating conditions beyond currently established limits?
4. Is there a change in legal, regulatory or company policy requirements?
5. Does the change involve significant organizational or personnel changes?

Review

Once a change has been confirmed to require entry into the formal MOC process, the first step is to evaluate potential health, safety and environmental implications. A review must be conducted to assess risks associated with implementing the proposed change, as well as the potentially hazardous effects that the change could have on the process, procedures and personnel. This review should also ensure that all applicable codes, standards, design specifications, compatibility assessments, permit requirements and generally accepted engineering practices have been followed. Feedback from affected parties should be considered as well. Applicable sign-off must be obtained prior to the change implementation.
The MOC Owner should enlist qualified individuals to perform the necessary reviews. The number and qualifications of these reviewers will depend on the nature of the change under consideration.
The level of detail for each review should reflect the complexity of the proposed change and the potential impacts the change poses. A risk analysis checklist may be prepared to verify compliance with standards.

Results of the MOC review process must be documented. The MOC Owner should maintain a record of the review, with signatures as required. This should be done even if no substantive comments arose during the review.

Authorization

A defined authorization process must be in place and documented. Approvals must be received before the change is actually implemented. Authorization should not be given until all reviews have been conducted, consequences identified in these reviews have been addressed, any regulatory requirements have been addressed, all affected personnel are trained and all documentation related to the change process has been completed.

Implementation

The implementation phase covers proper communication of the change including documentation. Training must be identified, then completed and documented prior to implementation. Following implementation, verification is necessary to ascertain that the change was made as intended and is functioning as anticipated. All drawings, procedures, etc. should be updated in a timely fashion.

Condition Limits

If the change is temporary, there must be a prescribed time limit set. Any extension beyond the intended time frame or modification to the stipulations of a temporary change requires another MOC review. If a change is approved within given physical parameters, another MOC review is required if any of these parameters are to be exceeded.

Emergency Changes

A provision for changes of an emergency nature may be described. Typically this would provide a mechanism for authorizing an emergency change and a requirement to have the change formally reviewed in a prompt fashion.

Record Retention

A record retention policy should be spelled out that is in concurrence with RM policy. Typically this will define how long the MOC forms and supporting information are to be kept and where they are located. Permanent changes require permanent updates to any existing documentation (drawings, procedures, training materials, etc.) in a timely fashion.

4.6.10. Practice for Working in or Around Water Bodies

4.6.10.1. Applicability

Work near water is primarily defined as that work which involves a potential danger of drowning. As a guide it is generally considered that work conducted within 6 feet of water that is more than 3 feet deep or has a soft bottom of sufficient thickness to become an entrapment hazard can pose a danger of drowning. Use of BP-approved fall protection systems (including guard rails between the work area and the water) may replace the need for personal flotation devices, rescue skiffs and other work near water health and safety procedure requirements identified in the follow guidance.

At the Leviathan Mine Site, working around water is a potential at many locations both onsite and off. Personnel working over or near water where a drowning hazard exists will be provided with U. S. Coast Guard-approved life jackets or vests. The life preservers will be inspected before and after each use. Throw rings will be available for employee rescue. See Appendix D for BP's Working Around Water Guidance Document.

Guidance on Practice for Working in or Around Water Bodies

Insert the Technical Guidance for Working in or Around Water bodies here and perform the following procedure to correct the page numbers.

1. Select the footer on the next page and make sure that “link to previous is NOT selected”
2. Click format page number;
3. In the page number section, select “Start at”; take the number after the 4- at the bottom of this page and add 19 for the number of pages in the incident reporting procedure, place that number in the “Start at” area.

4.6.11. Working at Heights

4.6.11.1. Applicability

Fall protection is required for all work at heights as defined in the Working at Heights procedure. All such work will be completed meeting the requirements of the RM Working at Heights procedure.

Remediation Management
Working at Heights
Safety Procedures

SEQUENCE & SAFE METHOD OF WORK

1. Fall prevention systems must always be used as the primary method of working safely at heights. If fall *prevention* systems are not practical, then fall *protection* systems must be used.
2. Prior to working at heights, the Site Supervisor is to be informed that the work is beginning. The planned work sequence, details of site layout and work zones, product delivery & storage areas, and location of storage tank vents must be confirmed. Planned tanker delivery schedules at Retail sites must be confirmed, so that there will be no conflict with elevated or hot work.
3. All work at heights on structures or buildings to which storage tank vent pipes are attached MUST STOP during actual fuel deliveries.
4. Before work is to occur at any height, a specific JSA must be conducted for each work situation. JSA must address all safety aspects of the task and assure that correct procedures are applied and appropriate equipment is available. Refer to Appendix B for Personal Protective Equipment PPE) requirements, as a guide to determine necessary PPE for the task. Rescue methods must also be specified.
5. Working high and accessing areas above six feet:
   a) Ladders may only be used for access to areas that are protected by a Fall Arrest System. Ladder use must conform to standards such as the OSHA requirements (29 CFR 1926.1053).
   - Ladder must be tied off to fixing point by the first user
   - No work over six feet shall be performed from a ladder. Ladder is to be used for access only. Ladder may only be used for short-term work less than six feet from the surface. Any exceptions need to be noted in the "special instructions" section of the permit.

   b) Scaffolding must be erected by a competent person in accordance.
   - Scaffolding may be used for high work and also for access to other high work areas that are protected by a Fall Arrest System

   c) Aerial lift (cherry picker) may be used for access to roofs and canopies (excluding new Harmony solar canopies). The aerial lift basket can only be lowered onto the roof when it is more than six feet from the edge. Body (restraint) harness must be worn at all times while in the aerial lift basket. The use of an aerial lift must conform to the requirements.

   d) Scissor lift may be used for high work and access to other high work areas protected by a Fall Arrest system. If a scissors lift is used for access, a ladder must also be present for emergency exit
6. Working within six feet of an exposed edge:
   - Fall Arrest System must be installed whenever work is to occur within six feet of an exposed edge. An exposed edge is any edge where a fall of over six feet can occur.
   - Fall Arrest System shall not be used as the main protection system unless there are no alternatives.
   - If a Fall Arrest System is used, then rescue must be assured within 10 to 15 minutes.
   - Scheduled maintenance tasks must be performed using a permanently installed Fall Arrest System for work that is to occur within six feet of an exposed edge. A task that is repeated at regular intervals is considered scheduled maintenance.
   - Unscheduled tasks that occur within six feet of an exposed edge can be done using a temporary Fall Arrest System.

It is imperative that all workers understand that no task is so important or so urgent that it cannot be done safely.

PURPOSE AND SCOPE

The purpose of this procedure is to assure an *Incident and Injury Free Workplace* where personnel work at or above heights of six feet at BP sites. BP requires all contractors performing work on behalf of BP to follow these procedures. These safety procedures are to be considered a minimum requirement and are mandatory.

Additional safety measures on a site or job specific basis may be required by BP or government regulations such as the OSHA standard (29CFR 1926.1053, 1926.453, 1926.500, 1926.501, 1926.104)) which may be obtained from the OSHA website at http://www.osha.gov/index.html. Below is a summary of BP's safety requirements for contractors working at heights above six feet. It is the responsibility of the parties conducting the work to understand and follow all required safety regulations and practices. In all cases where OSHA regulations or job conditions require more stringent safety requirements than stated in this procedure, the more stringent rules shall be applied.

DEFINITIONS

Fall Prevention - Engineering controls, systems, design elements, construction standards, or equipment intended to provide a safe work platform and to eliminate the risk of falling. Examples of fall prevention are: parapet walls; properly constructed safety guardrail systems; properly constructed scaffolding; edge warning and demarcation systems; and scissor lift with protective railing installed.

Fall Protection - Personal protective gear and systems designed, installed, and worn for the purpose of preventing injury in the event of a fall from heights greater than six feet. An example of fall protection is a full body safety harness with properly sized shock absorbing lanyards attached to properly designed and installed anchor points or static lines.

Fall Arrest System - A system used to arrest (stop) an employee in a fall from a working level. It consists of an anchorage, connectors, a body belt or body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these.

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

REQUIRED SAFETY PRACTICES

The following minimum requirements shall be applied when working at heights at RM Project Sites. BP defines "working at heights" as work performed where the lowest part of the body is above six feet high, or within six feet of an edge where a fall of six feet or greater may occur. When working at any height lower than six feet, a Job Safety Analysis (JSA) must be completed. Refer to Appendix A as a guide for completing a JSA. A completed Permit to Work (see Appendix C) must be prepared by each contractor and submitted to the RM EBM or Project Manager for review prior to beginning each task involving working at heights above six feet.

Incident Reporting

All incidents involving personal injury or property damage, or which had the potential to cause significant injury or damage, must be immediately reported to BP per the RM Incident Notification Guidance Manual. All information and assistance must be made available upon request to assist with an incident investigation, if necessary.

Appendix A - Job SAFETY Analysis (JSA) – working at heights hazard controls

TASK	HAZARD	CONTROL
Working elevated while others are below	Materials or tools falling onto persons below.	• Place barriers and signage (and spotter, if necessary) below work area to warn others away from the area • Clear area of other workers while handling loose material or tools.
Working below elevated workers	Overhead pipes, cables, or others working overhead.	• Isolation / protection of all services. • Do not work beneath others working overhead. Strict sequence of work agreed with BP area manager
Accessing the elevated work area	Worker falling to ground	• Provide secure ladder access • Provide work platform (aerial lift, scissor lift, scaffolding) • Provide and require use of safety harness and other fall protection equipment.
Routine work process	Worker not following established procedures	• Provide daily briefing on procedures, prior to starting work • Remove worker from task to review why non-compliance.
Working from mobile elevated platform	Over turning of scissor lift / cherry picker	• Only trained personnel to operate. Out-riggers to be fully extended where fitted. Surface must be 'leveled' for operation.
Working near customer access areas	BP Customers walking into work area	• Erect barriers & signs to isolate and warn others from coming into work area. • Provide a "spotter" to ensure no unauthorized entry if necessary. • Schedule work to avoid busy times.

Appendix B - Personal Protective Equipment (PPE)

PERSONAL PROTECTIVE EQUIPMENT (PPE)

When a hazardous situation is recognized, steps should be immediately taken to eliminate the hazard either by engineering revision or by changing work methods. If it is not practical to eliminate the hazard, then personal protective equipment (PPE) must be used.

PPE Requirements

1. High visibility clothing: Always
2. Safety glasses, goggles, or face shield: Always
3. Ear plugs or ear muffs: When working in close proximity to loud noises (jack hammer, vacuum trucks, lawn care)
4. Hard hat: Always
5. Fall protection equipment: When working at heights above six feet and/or within six feet from an exposed edge
6. Long pants and long-sleeve work shirt: Always
7. Steel-toe Boots or Shoes (leather): Always

Appendix C - Working at Heights - Permit to Work

WORKING AT HEIGHTS - PERMIT TO WORK		
SITE IDENTITY:	CONTRACTOR:	
DATE OF WORK:	PLANNED DURATION of WORK	
WORK TO BE COMPLETED: (DESCRIBE TASK TO BE UNDERTAKEN, I.E. REPLACEMENT OF CANOPY LIGHT BULBS; SERVICE TO HVAC ROOF UNIT, ETC.)		

PERSONNEL	
NAME OF SUPERVISOR IF ON-SITE PART TIME, INDICATE VISITING FREQUENCY	NAMES OF OTHER PERSONNEL

SEQUENCE & SAFE METHOD OF WORK (DETAIL THE SEQUENCE OF WORK AND THE SAFE WORKING PROCEDURES TO BE USED. ALSO ANY NEED FOR SPECIALIST SUB-CONTRACTOR METHOD STATEMENT & RISK ASSESSMENT)	YES	NO (n/a)
1. AGREE WITH SITE MANAGER THE EXACT LOCATION OF INTENDED WORK.		
2. Ensure work does not create risk to persons below. Barriers / signage to be erected as required.		
3. Ensure no hazards overhead e.g. power cables, service pipes etc.		
4. Ensure isolation and sequence of work is approved with site manager.		
5. Access ladders are to be: a. Secured at top b. Extends a minimum of four rungs above stepping off point c. Positioned on level, firm base capable of supporting anticipated load d. Positioned at a 1:4 angle. e. Where ladder access is not practical, an approved mechanical means may be used (cherry picker, scissor lift, JLG etc)		
6. Working platforms (scaffolding) provided wherever possible. All must be: a. Minimum of 24 inches wide b. Fitted with double guardrails and toe boards when working above 6 feet. c. Top rail must be min 36 inches above the platform. d. Toe boards are to be min of 6 inches high. e. Secondary guardrail positioned to ensure no unprotected gap between top rail and toe board in excess of 18 inches. f. Type of platform used, erected, operated		
Note – All roofs and cherry pickers / scissor lifts are to be treated as working platforms		
7. Fall Prevention equipment only to be used where working platforms are impractical a. Instruction and training given to personnel in equipment use b. Maintenance and inspection schedule for fall prevention equipment c. Anchorage points must be connected to the structure d. Lanyards fitted with shock absorbers, which limit potential falls to a maximum of six feet e. Emergency rescue procedures		
8. PPE: (list all that is to be used)		

EQUIPMENT (list) Operator	YES	NO or N/A	Trained
1. Mobile elevating equipment (scissor lift or aerial lift)			
2. Scaffold platforms erected by competent person			
3. Traffic barriers, cones, flags, snow fencing.			

SPECIAL INSTRUCTIONS & WORK INSTRUCTIONS

AUTHORISATION TO CARRY OUT WORK

I CERTIFY THAT THE ABOVE EQUIPMENT/SITE IS SAFE TO CARRY OUT WORKING AT HEIGHTS BY PERSONS SUBJECT TO THE SPECIFIED REQUIREMENTS

ISSUED BY: ……. PERMIT VALID FROM DATE ……/……/…… …….AM/PM

COUNTERSIGNED: …… TO DATE ….…/……/…… ……. AM/PM

I UNDERSTAND THE NATURE OF THE WORK AND CERTIFY THAT THE ABOVE CONDITIONS WILL BE OBSERVED AT ALL TIMES

RECEIVED BY – CONTRACTOR/EMPLOYEE …….. DATE ……/……/……

WORK COMPLETED **WORK HAND BACK**

Time ..... Contractor/Employee Time ..... Received by Site Manager

Date …..... ……. Date ..... ……

4.7. Site Specific Procedures

The following safe work procedures have been developed by Geomatrix for work at this Site.

4.7.1. Heat Illness Prevention Program

All contractors have outdoor work environments in support of Leviathan Mine superfund site operations. These procedures will be triggered when the ambient temperature of 80ºF is reached (Figure 1). The procedures can help reduce the risk of work related heat illnesses among our employees.

Figure 1 – Apparent Temperature – Heat Stress Index (HSI)*

Environmental Temperature °F

Relative Humidity %										
	70	75	80	85	**90**	**95**	**100**	**105**	**110**	**115**
0%	64	69	73	78	83	87	**91**	**95**	**99**	**103**
10%	65	70	75	80	85	**90**	**95**	**100**	**105**	**111**
20%	66	72	77	82	87	**93**	**99**	**105**	**112**	**120**
30%	67	73	78	84	**90**	**96**	**104**	**113**	**123**	**135**
40%	68	74	79	86	**93**	**101**	**110**	**123**	**137**	**151**
50%	69	75	81	88	**96**	**107**	**120**	**135**	**150**	
60%	70	76	82	**90**	**100**	**114**	**132**	**149**		
70%	70	77	85	**93**	**106**	**124**	**144**			
80%	71	78	86	**97**	**113**	**136**				
90%	71	79	88	**102**	**122**					
100%	72	80	**91**	**108**						

Category	Apparent Temperature (°F)	Dangers
Extreme Danger	Greater than 120	Heat stroke imminent
Danger	105-120	Heat exhaustion likely
Extreme Caution	90-105	Heat cramps, exhaustion possible
Caution	80-90	Exercise more fatiguing than normal

*Apparent temperature, Heat Stress Index (HSI): A measure of how hot it really feels in degrees Fahrenheit when relative humidity is factored with the actual air temperature. This chart has been adapted from the National Weather Service's "heat index" and an adjustment has been made with the apparent temperature categories to match more closely working in full sunshine. This guideline should be followed for employees not wearing protective clothing. **Five degrees should be added to the environmental temperature when wearing protective clothing.**

The SSC or designated representative will monitor the ambient air temperature hourly from the start of the workday. When the Heat Stress Index (HSI) of 80 is reached actions to additionally stress heat stress prevention and vigilance will be under taken.

These procedures provide the minimal steps applicable to most outdoor work settings and are essential to reducing the incidence of heat related illnesses. In working environments with a higher risk for heat illness (e.g., during a heat wave, or other severe working or environmental conditions), exercise greater caution and additional protective measures as needed to protect their employees.

I. OVERVIEW AND OBJECTIVES

Employees who work in outdoor places of employment or on job tasks in other areas at those times when the environmental risk factors for heat illness are present, are at risk for developing heat illnesses if they do not protect themselves appropriately. The objective of this program is employee awareness regarding heat illness symptoms, ways to prevent illness, and what to do if symptoms occur.

This program is based on the California Code of Regulations, Title 8, Section 3395.

II. SCOPE

The Geomatrix Heat Illness Prevention Program applies to the control of risk of occurrence of heat illness and applies to all outdoor places of employment when the environmental risk factors for heat illness are present.

III. POLICY

It is the policy of Geomatrix that any employee participating in job tasks when environmental risk factors for heat illness are present will comply with the procedures in this document and in the Injury and Illness Prevention Program.

IV. PURPOSE

To ensure that all employees of Geomatrix are protected from heat illness while working on job tasks where environmental risk factors for heat illness are present and to establish the minimum requirements for working in this environment.

V. DEFINITIONS

The term “acclimatization” means temporary adaptation of the body to work in the heat that occurs gradually when a person is exposed to it. Acclimatization peaks in most people within four to fourteen days of regular work for about two hours per day in the heat.

“Environmental risk factors for heat illness” means working conditions that create the possibility that heat illness could occur, including air temperature, relative humidity, radiant heat from the sun and other sources, conductive

hear sources such as ground, air movement, workload severity and duration, protective clothing and personnel protective equipment worn by employees.

The term “heat illness” means a serous medical condition resulting from the body’s inability to cope with a particular heat load, and includes heat cramps, heat exhaustion, heat syncope, and heat stroke.

“Personal risk factors for heat illness” means factors such as an individual’s age, degree of acclimatization, health, water consumption, alcohol consumption, caffeine consumption, and use of prescription medications that affect the body’s water retention or other physiological responses to heat.

“Preventative recovery period” means a period of time to recover from the heat in order to prevent heat illness.

The term “shade” means blockage of direct sunlight. Canopies, umbrellas, and other temporary structures or devices may be used to provide shade. One indicator that blockage is sufficient is when objects do not cast a shadow in the area of blocked sunlight. Shade is not adequate when heat in the areas of shade defeats the purpose of shade, which is to allow the body to cool. For example, a car sitting in the sun does not provide acceptable shade to a person inside it, unless the car is running with air conditioning.

VI. RESPONSIBILITIES

A. The Geomatrix SSC is responsible for:

1. Preparing and maintaining a written program, which complies with the requirements of applicable Cal/OSHA requirements.
2. Assisting with providing training to all potentially impacted employees and their supervisors on the risks and prevention of heat illness, including how to recognize symptoms and respond when they appear.

B. Managers, Supervisors, Superintendents, Foremen are responsible for:

1. Identifying all employees who are required to work outdoors where potential heat illness could occur and identifying the supervisor of the employees.
2. The On-Site Coordinator, or designee, will ensure all subcontractors are aware of and either have their own Heat Illness Prevention Program or follows our program.
3. Assuring that adequate water and shade are available at a job site at all times
4. Ensuring that all affected employees have received proper training on heat illness prevention.
5. Ensuring that the requirements in this document are followed.

6. Contacting Emergency Medical Response services to request emergency medical services in the event medical assistance is required.
7. Direct Emergency Medical Response to the work site.

C. Affected employees are responsible for:

1. Complying with the provisions of the Heat Illness Prevention Program, as describe in this document and in the training sessions they attend.
2. Ensuring they notify supervisor/foreman if they do not have adequate drinking water available at all times.
3. Ensuring they know where to go for access to a shaded area to prevent or recover from heat related symptoms.
4. Reporting heat related illness symptoms to the supervisor/foreman.

VII. BASIC REQUIRMENTS

The following basic requirements apply to all employees while working when environmental risk factors for heat illness are present.

1. All employees shall be identified who are required to work where environmental factors for heat illness are present.
2. Training shall be provided for all potentially impacted employees working where environmental risk factors for heat illness are present and their supervisors. Training information shall include but not be limited to the topics listed in the training section of this written program. All potentially impacted employees and supervisors who supervise these employees must be trained on the risks and prevention of heat illness, including how to recognize symptoms and respond when they appear.
3. Drinking water in the quantity of 1 quart per hour (Figure 2) shall be available at all times for each employee for the duration of the entire shift while working outdoors in the heat. Supervisors/foremen shall remind employees to drink frequently and this topic will be addressed at tailgate meetings.
4. Employees shall have access to a shaded area or air-conditioned vehicle (Figure 2) to prevent or recover from heat illness symptoms and where they can take a rest break of at least 5 minutes. The importance of taking rest breaks and recognizing when a preventative recovery period is needed allowing employees to cool shall be addressed at tailgate meetings.
5. Heat Stress Monitoring Techniques

Site personnel should regularly monitor their heart rate as an indicator of heat strain by the following method: Radial pulse rates should be checked by using fore-and middle fingers and applying light pressure top the pulse in the wrist for one minute at the beginning of each rest cycle. If the pulse rate exceeds 110 beats/minute, the next work cycle will be shortened by one-third and the rest period will be kept the same. If, after the next rest period, the pulse rate still exceeds 110 beats/minute, the work cycle will be shortened again by one-third.

6. In the event an employee feels discomfort from the heat, a preventative recovery period of not less than five minutes is needed to allow the employee to cool down and prevent the onset of heat illness.
7. Supervisors/foremen will ensure, at each worksite, there is a cell phone, radio, or other means of communications to ensure that emergency services can be called. Verification that the cell phone, radio, or other means of communication are functional at all worksites shall be carried out prior to each shift.

Figure 2

1. PROVISION OF WATER

Water is a key preventive measure to minimize the risk of heat related illnesses.

Employees will have access to potable drinking water. If the supply of water is not plumbed or otherwise continuously supplied, bottled water will be provided. A sufficient quantity of water will be on hand at the beginning of the work shift to provide one quart (32 ounces) of water per employee of each hour of the shift.

Project Managers/Supervisors will encourage employees to frequently consume small quantities of water under **all** weather conditions and up to 4 cups per hour (32 ounces), when the work environment is hot and employees are likely to be sweating more than usual in the performance of their duties.

Project Managers/Supervisors will maintain sufficient supplies of water in their vehicles to replenish levels when more than half the supplies on hand at the start of the shift for each team has been consumed. Project Managers/Supervisors will monitor water containers every 60 minutes, and employees are encouraged to report to supervisor/foreman low levels or dirty water.

When drinking water levels within a container drop below 50%, the water shall be replenished immediately; or water levels should not fall below the point that will allow for adequate water during the time necessary to effect replenishment.

Project Manager/Supervisor will provide frequent reminders to employees to drink frequently, and more water breaks will be provided.

Every morning there will be short tailgate meetings to remind workers about the importance of frequent consumption of water throughout the shift.

Place water containers as close as possible to the workers, not away from them and preferably in shaded areas away from direct sunlight.

Noise making devices, such as double blasts of vehicle horns, may be used to remind employee's to take their water break. Insure the signal is briefed during the tailgate meeting and that all employees understand the signal.

2. ACCESS TO SHADE

Access to rest and shade or other cooling measures are important preventive steps to minimize the risk of heat related illnesses. These are especially critical when ambient temperatures are at or above 80°F and/or employees are not acclimatized.

Employees suffering from heat illness or believing a preventative recovery period is needed, will be provided access to an area with shade that is either open to the air or provided with ventilation or cooling for a period of no less than five minutes. Such access to shade shall be permitted at all times.

If air conditioned vehicles are not available at a site the Project Manager/Supervisor will set-up an adequate number of; umbrellas, canopies or other portable devices, at the start of the shift and will locate them close to the crew, within 100 feet.

Employees have access to office or construction trailer, other building, or vehicles with air conditioning.

Every morning there will be short tailgate meetings to remind workers about the importance of rest breaks and the location of shade.

VIII. TRAINING

A. LEVELS OF TRAINING

Training shall be provided for employees working on job tasks where environmental risk factors for heat illness are present, and training for their respective supervisors.

B. EMPLOYEES

All employees working on job tasks where environmental risk factors for heat illness are present shall receive instruction before being assigned to work tasks. Training topics shall include the following:

1. Environmental and personal risk factors for heat illness.
2. Procedures for identifying, evaluating, and controlling exposures to the environmental and personal risk factors for heat illness.
3. Employees who experience excessive sweating require frequent consumption of small quantities of water, 1 quart (3 ounces) per hour when working in extreme conditions of heat.
4. Importance of acclimatization.
5. Different types, signs, and symptoms of heat illness. (Figure 3)
6. Importance of immediately reporting symptoms or signs of heat illness in themselves or in coworkers to their supervisor.
7. Procedure for responding to symptoms of possible heat illness, including how emergency medical services will be contacted and provided, should they become necessary.

C. SUPERVISORS OF AFFECTED EMPLOYEES

Supervisors or their designees shall receive training on the following topics prior to being assigned to supervise outdoor employees.

1. Information as detailed above in employee training requirements.
2. Procedures that supervisors shall follow to implement the provisions of this program.
3. Emergency procedures specific to the supervisor shall follow when an employee exhibits symptoms consistent with possible heat illness, including emergency response procedures.

Figure 3 – Response Procedures to Heat-Related Illnesses

The following information will be available at each job site where heat-illness hazards are present. Driving directions to the work site will also be available at the job site.

Heat-Related Illness	Signs and Symptoms	First Aid
Sunburn	- Red, hot skin - May blister	- Move to shade, loosen clothing - Apply cool compresses of water
Heat Rash	- Red, itchy skin - Bumpy skin - Skin infection	- Apply cool water or compresses - Keep affected area dry - Control itching and infection with prescribed medication
Heat Cramps	- Muscle cramps or spasms - Grasping the affected area - Abnormal body posture	- Drink water or sport drinks - Rest, cool down - Massage affected muscle - Get medical evaluation if cramps persist
Heat Collapse (Fainting)	- Rapid & unpredictable lose of consciousness	- Acclimatize to heat
Heat Exhaustion	- High pulse rate - Extreme sweating - Pale face - Insecure gait - Headache - Clammy and moist skin - Weakness - Fatigue - Dizziness	- Move to shade and loosen clothing - Initiate rapid cooling - Lay flat and elevate feet
Heat Stroke	- Any of the above but more severe - Hot, dry skin (25-50% of cases) - Altered mental status with confusion or agitation - Can progress to loss of consciousness and seizures (syncope) - Can be fatal.	- Call 911 - Immediately remove from work - Start rapid cooling - Lay flat and elevate feet - If conscious give sips of water - Monitor airway and breathing – administer CPR if needed

IX. PROGRAM AUDITS

A. RESPONSIBILITIES

Supervisors and the Geomatrix SSC shall perform audits of the Heat Illness Prevention Program.

B. FREQUENCY

Audits of the Heat Illness Prevention Program shall be performed annually

C. CONTENTS

1. The audit shall review the program to ensure that heat illness prevention procedures are in place and are being properly followed.
2. The audit process and findings shall be documented.

X. RECORDS

All training, audit, and other records prepared in association with the Heat Illness Prevention Program shall be managed in accordance with the requirements of the Geomatrix Injury and Illness Prevention Program.

4.7.2. Cold Stress/Winter Access Protocols

Alpine County is susceptible to extreme weather and storm conditions. The altitude allows for extremely heavy snowfalls, sometimes exceeding 100 inches in a single season. Winds can also reach 100 mph or more. Temperature records range from 10 °F to 98 °F. The county is also subject to frequent and fast moving storms that push over the summit. In the winter months (November through May), the Site may experience snow pack of five to ten feet or more and temperatures well below freezing.

There were 44 weather related near misses and 7 potential injuries due to heat stress were reported at Remediation Management sites in 2007. As stated above, due to the location of the Site, there is potential for weather related hazards year round.

All Site personnel will be responsible for determining if field activities can be continued in a safe manner. High winds, heavy precipitation (rain or snow), electrical storms, and visibility-impairing conditions may make Site operations difficult. If the team determines that conditions pose a potential safety hazard, they will advise the On-Site Health and Safety Coordinator that further outdoor activities will be terminated until conditions improve. Certain activities can be conducted during moderately inclement weather (e.g., light to moderate rain or snow), but personnel should be alert to an increased likelihood of slip-trip-fall injuries and should limit non-essential activities accordingly, particularly when fall hazards are present. Always err on the side of caution.

In case the field crew is not able to leave the Site due to adverse weather conditions, the Aspen Seep equipment shed will contain, at a minimum, the following as a part of a survival kit for a 4-person crew for 3 days:

- First aid kit
- Personal hygiene kits (Including waste disposal bags w/toilet paper)

- Self generating flashlights
- Tent – all season
- Sleeping pads
- Sleeping bags – rated for sub-zero temperatures
- Emergency thermal blankets
- Hot packs to warm hands and feet
- Cliff bars
- Meals Ready to Eat (MREs)
- Jetboil Cooking Stove [1.5 L Group Cooking System]
- Jetboil Fuel Cell [100g]
- Utensils and plates
- Waterproof storage containers for supplies
- Multiple sets of spare dry clothing kept in an enclosed area in the event workers become wet (with extra gloves)
- Snow shovels
- Propane heater
- Ropes (to tie off if necessary)
- Matches and fire starting supplies
- Duraflame log
- Smoke bombs for guiding the helicopter in low visibility conditions
- Towels

Weather Monitoring

Weather monitoring will provide Site employees with up-to-date information to enable safe decisions regarding Site access. The National Oceanic and Atmospheric Administration (NOAA) website will be utilized to evaluate weather conditions at the Site and monitor weather alerts. The NOAA Weather forecasts will be reviewed on the website starting 48 hours, 24 hours, 12 hours and one hour prior to a Site visit.

In order to use the weather monitoring information from the NOAA weather forecasts, the following weather terms must be recognized:

Winter Storm Warning: issued when hazardous winter weather in the form of heavy snow, heavy freezing rain or heavy sleet is imminent or occurring. Winter storm warnings are usually issued 12 to 24 hours before the event is expected to begin.

Winter Storm Watch: alerts the public to the possibility of a blizzard, heavy snow, heavy freezing rain or heavy sleet. Winter storm watches are usually issued 12 to 48 hours before the beginning of a storm.

Winter Storm Outlook: Issued prior to a Winter Storm Watch. The Outlook is given when forecasters believe winter storm conditions are possible and are usually issued 3 to 5 days in advance of a winter storm.

Blizzard Warning: Issued for sustained or gusty winds of 35 mph or more, and falling or blowing snow creating visibilities at or below ¼ mile; these conditions should persist for at least three hours.

Wind Chill Warning: Issued when wind chill temperatures are expected to be hazardous to life within several minutes of exposure.

Wind Chill Advisory: Issued when wind chill temperatures are expected to be a significant inconvenience to life with prolonged exposure, and, if caution is not exercised, could lead to hazardous exposure.

Winter Weather Advisories: Issued for accumulations of snow, freezing rain, freezing drizzle, and sleet which will cause significant inconveniences and, if caution is not exercised, could lead to life-threatening situations.

Snow Flurries: Light snow falling for short durations. No accumulation or light dusting is all that is expected.

Snow Showers: Snow falling at varying intensities for brief periods of time. Some accumulation is possible.

Blowing Snow: Wind-driven snow that reduces visibility and causes significant drifting. Blowing snow may be snow that is falling and/or loose snow on the ground picked up by the wind.

Sleet: Rain drops that freeze into ice pellets before reaching the ground. Sleet usually bounces when hitting a surface and does not stick to objects. However, it can accumulate like snow and cause a hazard to motorists.

Freezing Rain: Rain that falls onto a surface with a temperature below freezing. This causes it to freeze to surfaces, such as trees, cars, and roads, forming a coating or glaze of ice. Even small accumulations of ice can cause a significant hazard.

Caution will be exercised when a Winter Storm Outlook, Wind Chill Advisory, Winter Weather Advisories, Snow Flurries, Snow Showers, Blowing Snow and Sleet are issued.

If a Winter Storm Warning, Winter Storm Watch, Blizzard Warning, Wind Chill Warning or Freezing Rain Warning is issued within four hours before the Site visit, the Site visit will be postponed until Site conditions warrant safe travel.

The following are conditions that can be determined from the NOAA weather reports:

Blizzard Conditions: Site visits should be postponed and personnel on site should evacuate when wind speed is 25 mph or wind gusts are 35 mph or greater and there is significant snow cover at the Site, including blowing and drifting snow.

Freezing Rain: Freezing rain is most commonly found in a narrow band on the cold side of a warm front, where surface temperatures are at or just below freezing. If freezing rain is observed and a Freezing Rain Warning is issued per NOAA Weather forecasts, the Site visit should be postponed.

Wind Chill: The wind chill can be determined using the current temperature and wind speed. Caution should be exercised when the wind chill falls within the blue areas and outdoor activity should cease when the wind chill falls within the pink area, as shown on the following Wind Chill Index Chart.

Chill Index Chart:

WIND CHILL INDEX °F								
	WIND SPEED (MPH)							
TEMP (°F)	5	10	15	20	25	30	35	40
-25	-40	-47	-51	-55	-58	-60	-62	-64
-20	-34	-41	-45	-48	-51	-53	-55	-57
-15	-28	-35	-39	-42	-44	-46	-48	-50
-10	-22	-28	-32	-35	-37	-39	-41	-43
-5	-16	-22	-26	-29	-31	-33	-34	-36
0	-11	-16	-19	-22	-24	-26	-27	-29
5	-5	-10	-13	-15	-17	-19	-21	-22
10	1	-4	-7	-9	-11	-12	-14	-15
15	7	3	0	-2	-4	-5	-7	-8
20	13	9	6	4	3	1	0	-1
25	19	15	13	11	9	8	7	6
30	25	21	19	17	16	15	14	13
35	31	27	25	24	23	22	21	20

Cold Stress Hazards

Early morning or late night temperatures near or approaching freezing, high winds and periods of rain and possible snow flurries will be encountered during the fall/winter/spring months. Cold stress resulting in hypothermia (i.e., when the body core temperature drops below 96.8 °F) and frostbite are possible when individuals work for extended periods at ambient temperatures of 30 °F to 40 °F (4 °C) or less. Symptoms include:

- Shivering;
- Pain in the extremities, and
- Drowsiness or disorientation.

If any of these symptoms are experienced, the affected personnel should immediately get out of the cold conditions and warm up in the equipment shed, emergency shelter tent or in a vehicle. Adequate insulating clothing should be worn whenever field activities are performed in temperatures below 40 °F.

When the body is unable to warm itself, serious cold related illnesses and injuries may occur, and permanent tissue damage and death may result. Wear loose, lightweight, warm clothes in layers; trapped air insulates. Outer garments should be tightly woven, water repellent, and hooded.

Hypothermia
Hypothermia is a condition brought on when the body temperature drops to less than 95 °F. Warning signs include:

- Uncontrollable shivering;
- Memory loss;
- Disorientation;
- Incoherence;
- Slurred speech;
- Drowsiness;
- Weak pulse;
- Low blood pressure, and
- Apparent exhaustion.

If medical care is not immediately available, warm the person slowly, starting with the body core. Remove wet clothing and wrap person a warm blanket covering the head and neck.

Frostbite
Frostbite is damage to body tissue caused by extreme cold. A wind chill of -20 °F will cause frostbite in just 30 minutes. Redness and a burning sensation are the first indications of frostbite. Frostbite causes a loss of feeling and a white or pale appearance in extremities, such as fingers, toes, ear lobes, or the tip of the nose. If symptoms are detected, get medical help immediately. If medical care is not immediately available, slowly warm affected areas. However, if the person is showing signs of hypothermia, warm the body core before any extremities.

In addition to the winter operation hazards discussed previously, there are hazards due to the remote nature of this Site.

Communication limitations, especially in an emergency situation, present the possibility of a significant hazard and are discussed further in Section 18. This limited communication presents challenges for treatment during any medical emergencies which is further complicated by the limited emergency medical supplies on site.

Travel over the remote unpaved access roads also is a hazard and requires extreme caution during travel in and out of the Site.

Due to the nature of the hazards at this Site, the buddy system will be employed at all times during operations. No work alone will be authorized.

4.7.3. Winter Access

Throughout most of the year the Site is accessible by 4-wheel drive vehicle. However, access to the Site in the winter is often limited by snow and mud covered roads. These conditions can inhibit the use of conventional transportation to and from the Site. On a dry year, 4-wheel drive vehicles can drive safely within one mile of the Site most of the year and further access to the Site can be attained via snowshoe or hiking. On a wet year, snow depth can prevent safe access to within up to 12 miles from the Site via 4-wheel drive vehicle for several months. During these times, travel will be guided by Lake Tahoe Adventures (LTA) or other approved guide for the safest means of access to the Site. In addition to the items listed below, a satellite phone and mobile phone should be carried by the field team during any mode of travel.

Point of Access

Depending on weather and road conditions, technical staff will enter the site from the Nevada side at the intersection of Highway 395 and Leviathan Mine Road or Highway 89 and Leviathan Mine Road. These will also be the primary staging areas for all winter operations venturing into Leviathan Mine.

Check In / Check Out Procedures

Broadbent & Associates, Inc. (BAI) field technical staff will phone in with Alpine County Sheriff's Department and BAI Reno office from the staging area on the day of operations and give details as to the names and number of personnel as well as radio frequencies, satellite phone numbers, emergency access numbers, and specific GPS Lat/Long coordinates that correspond to the technical staffs' specific location that they will be performing work within the mine operations area. The Reno BAI office will then email Alpine County Sheriff's Department to confirm check in.

Prior to leaving Reno, the BAI field technical staff will conduct a RM Journey Hazard Assessment. BAI field technical staff will also check in with the BAI Reno office once they have reached the site. As soon as operations have concluded and just prior to departure from the site, the BAI field technical staff will again check in with the BAI Reno Office. This contact will also verify that weather and road conditions back to Reno are passable.

Once the entire team has returned to the staging area, BAI technical staff will contact Alpine County Sheriff's Department and the BAI Reno office and give them roll call and check out of the area.

Emergency Locating Equipment

There will be a maximum of two technical staff teams. Each team will have a personal locating beacon. Every person of the technical staff teams will have an avalanche beacon. All team members shall be trained in the use and operation of the avalanche and personal locator beacons. The product support manuals for the avalanche and personal locator beacons are attached to this addendum.

Emergency Position Indicating Radio Beacons (EPIRB)

Technical staff teams will be using the AquaFix™ 406 GPS P-EPIRB. The EPIRB is designed to be manually activated when personnel find themselves in an emergency situation and means of self-rescue have been exhausted and outside rescue services are required. Once activated, the alert signal transmits to the Cosmicheskaya Sistyema Poiska Avariynich Sudov – Search And Resure Satellite-Aided Tracking (COSPAS-SARSAT) network and the Geostationary Search and Rescue (GEOSAR) network that includes GPS latitude and longitude coordinates. The message transmitted by the internal GPS receiver is unique for each EPIRB. Once the signal is relayed through the GEOSAR network, the nearest Search and Rescue force (Alpine County Sheriff's Department) is immediately notified that a rescue is required. The emergency signal is tracked via the homing frequency for intermediate and short-range location.

The EPIRB contains a self test button, GPS I/O test button, GPS Interface (GPS I) button, green and red LED lights, and an off button. To activate the EPIRB follow the instructions below:

1. Unfasten the antenna from the case or holster into the upright position. Be sure the antenna is positioned facing the sky and avoid submerging in water
2. Depress the "self test" and "GPS I/O" buttons simultaneously for at least ½ second and less than 5 seconds.

The EPIRB is now activated. While transmitting your emergency signal, the red LED will flash once every 2 seconds alerting you that your EPIRB is activated. The unit is also equipped with a GPS; therefore, the red LED will turn off and the green LED will take over flashing once every 2

seconds. To turn off the EPIRB, press the red OFF button for more than 1 second. Once off, all blinking LEDs will stop.

Should there be an accidental activation or false alarm, it must be reported to Alpine County Sheriff's Department. The information that should be reported includes the EPIRB Unique Identifier Number, Date, Time, duration and cause of activation, as well as location of EPIRB at the time of activation. Additionally, false alarms must be reported to the United States Air Force Rescue Coordination Center (AFRCC) at (800) 851-3051.

A self test of the EPIRB will be conducted at the staging area during the safety tailgate meeting. Details of conducting a self test of the EPIRB are located in Section 4.5, page 7 under **Self Test** in the attached EPIRB manual. Details of emergency activation of the EPIRB are located in Section 4.2, page 5 under **AquaFix™ 406 GPS P-EPIRB Emergency Activation**.

Avalanche Beacon

Technical staff personnel will be using either the Tracker DTS or Ortovox d3 Digital avalanche beacons. Each technical staff team member will have an avalanche beacon on their person. This unit is designed to be turned on and left on to continuously transmit a signal. The avalanche beacons will be turned on at the staging area and tested during the safety tailgate meeting. Upon return to the staging area and notification to the Alpine County Sheriff's Department and the BAI Reno office, the avalanche beacons will be turned off.

In the event a team member is buried in an avalanche, the avalanche beacons can be switched to a Search (Tracker DTS) or Receive (Ortovox d3) mode. In the Search/Receive mode, the avalanche beacon will be able to receive a transmitting signal from another beacon. Do not place cellular phones, communication radios, or any other electronic equipment within 6 inches of the avalanche beacon while performing a transceiver search.

The avalanche beacons contain directional lights, a speaker, a distance indicator/battery display, a search/transmit (DTS) or receive/transmit (Ortovox d3) button, a transmit light, and an on/off button.

Once the beacons are transmitting, a transmit light will flash. In the event of a burial, switch the avalanche beacon to Search/Receive mode.

If there is a "last seen point", start your signal search there, and search downhill. Otherwise, start your signal search at the top of the slide path. Slowly sweep your avalanche beacon back and forth and vertically until you engage a signal.

Once a signal is engaged:

1. Align the avalanche beacon to the strongest signal.
2. Make sure the number in the distance display is decreasing as you move towards the strongest signal.
3. Within three meters, use your beacon close to the snow surface and look for the smallest distance reading.
4. Begin probing at the smallest distance reading.

The direction arrows on the Ortovox will turn off at a distance of two meters or less from the victim.

Specific operating instructions for the Tracker DTS and Ortovox d3 Digital avalanche beacons are located in the attached instruction manuals.

Winter travel safety precautions should include full vehicle checks and winterization. Each vehicle should have a packed winter storm survival kit, which includes:

- Emergency backpacks with 2 Liter Camelback Hydration System
- Wind monitor
- Snowshoes with poles
- Blankets/sleeping bags
- Flashlight with extra batteries
- First aid kit
- High calorie/non perishable foods

- Extra clothing
- Sack of sand for traction
- Shovel
- Windshield scraper
- MRE’s
- Tire chains
- Leather work gloves
- Tool kit
- Tow rope
- Jumper cables
- Water

When travel to the Site is guided by LTA, each person should carry an emergency backpack with Camelback Hydration System which includes:

- Water
- Change of clothes including extra gloves
- Portable first aid kit
- Matches
- Signaling mirror
- Thermal blanket
- Heat packs
- Head lamp
- Energy bars
- Avalanche beacon
- Small shovel for removing snow at gates or under tires
- Emergency whistle
- Large garbage bag

- Laminated emergency contact list
- Glow sticks
- GPS (one per group)
- 2-Way Radio

Lake Tahoe Adventures Guided Access to the Site

When Site access via 4 wheel drive vehicles is not possible, and LTA services are required for Site access, a representative of LTA may conduct a scouting Site visit the day prior to the Site visit to determine the best and safest equipment to use to access the Site based on road and weather conditions. This visit may consist of pre-running the road with the equipment that will be used. The LTA representative will notify the team as to what equipment will be used the next day so they can prepare an Authorization to Work that includes the equipment used.

Equipment that may be utilized includes but is not limited to:

- Large 4-wheel drive vehicle, with optional chains
- Snowmobiles
- Wide track snowmobiles with sled for carrying gear
- Snow Cat
- All-terrain vehicles (ATVs)
- 4-wheel drive vehicle with tracks

Regardless of the type of equipment used, the BP Driving Standard elements will be followed at all times. The Group Standard – Personal Safety – Driving Safety requires compliance with the following 10 Elements:

Vehicle Requirements:

1. The vehicle shall be fit for the purpose, and shall be maintained in safe working order, with seatbelts installed and functional.
2. The number of passengers shall not exceed the manufacturer's specification for the vehicle.
3. Loads shall be secure and shall not exceed the manufacturer’s specification and legal limits for the vehicle.

BP Driver and Passenger Requirements:

4. Drivers shall be appropriately assessed, licensed, trained, and medically fit to operate the vehicle.

5. Drivers shall be appropriately rested and alert.

6. Drivers shall not use a mobile phone or other two-way communication device while operating the vehicle.

7. In specific higher-risk countries risks of the journey shall be assessed and journey risk management policy & plans in place.

8. Seatbelts shall be worn by all occupants at all times whenever a vehicle is in motion.

9. Drivers shall not be under the influence of alcohol or drugs, or any other substance or medication that could impair their ability to drive.

10. Safety helmets shall be worn by rider and passengers of motorcycles, all terrain vehicles (ATVs), snowmobiles and similar types of vehicle.

The team will conduct a safety meeting including review of the ATW with special focus on the current weather conditions and equipment to be used. A Travel/Journey Assessment Checklist and vehicle inspection will be performed prior to travel. See Appendix B for appropriate forms.

Once on site, the LTA representative will wait for the work to be completed and lead the team off-site. During this time, the LTA representative may not go into the active work zone.

In case of equipment failure and the team needs to egress the Site, the LTA representative will instruct the team on how to proceed safely off the Site. In case of a medical emergency, the satellite phone(s) will be used to call the Alpine County Sheriff's Office.

The maximum on site speed limit for all equipment is 15 mph.

Preferred routes of entry

- Leviathan Mine Road – Nevada side access.

- Access Road 52 – Route A – California side access – Route A proceeds up Road 52 past Ponds 1-4 to the Leviathan Mine Road intersection.

- Access Road 52 – Route B – California side access – Route B proceeds up Road 52 and goes right before the Site gate to take the "high" route. This route is a last resort. If this route is being considered, the team should consider if the journey is necessary.

Training
LTA requires hands on snowmobile training for personnel using LTA snowmobiles. Employees must pass proficiency test to operate snowmobiles. This should be scheduled as soon as weather conditions allow. Training should be documented and kept onsite.

Winter Equipment Operation
Travel to and from the Site during winter operations may include the use of snowmobiles. The use of snowmobiles carries inherent hazards. The following procedures will be used during winter operations travel with the use of snowmobiles and snow cats:

- Drive at moderate speeds, and drive defensively. Speed limit is 15 miles per hour;
- Snow shoes and poles are to be carried in case of equipment failure;
- Emergency backpacks will be carried by each rider;
- Same routes to and from the Site will be utilized;
- Two portable Global Positioning Satellite (GPS) units such as the Garmin Rino 350 will be included as standard emergency equipment and be used in transit and on site for two-way communication;
- A satellite phone will be included as standard emergency equipment for use in transit;
- The Travel/Journey Assessment Checklist (Available in Appendix B) and vehicle inspections will be performed prior to travel;
- The Project Manager will be notified immediately before and after travel to the Site, and
- If the persons on site do not communicate with the Project Manager within two hours after dark, actions will be taken for search and rescue.

Snowmobiles
- Maintain a safe distance between snowmobile riders;
- Riders must wear helmets at all times;
- Clear snow off snowmobile tail lights at frequent intervals;
- Use caution on slopes. Follow the guide and lean into the slope;
- If pulling a tow sled, use a ridged tow bar, and
- Avoid the taking the snowmobile over flowing water.

Snow cats

- A seatbelt must be provided for all riders, and
- Only LTA may operate a snow cat.

ATV

- Riders must have appropriate training in order to ride ATV's;
- Helmets must be worn at all times;
- Use caution on uneven edges and slopes;
- Operate ATV's at speeds appropriate for the conditions;
- Only operate ATV's within the limits of your skill and training.

4.7.4. Traffic Control

The following section contains the traffic control plan that was developed and will be implemented by Geomatrix at the Site. In 2007, 68 near misses were recorded at Remediation Management Sites involving road hazards and 41 near misses were recorded that involved traffic control problems. The following procedures will be implemented at the Site to reduce the roadway and traffic control hazards. Geomatrix is responsible for coordinating, enforcing, and revising the Traffic Management Plan.

4.7.4.1. Traffic Management Plan

1.0 INTRODUCTION

On behalf of Atlantic Richfield (AR), Geomatrix Consultants, Inc. (Geomatrix) has prepared this Traffic Management Plan for medium (delivery) to heavy duty (tractor-trailer combinations) trucks accessing the Leviathan Mine Superfund Site located in Alpine County, California (Site). This Traffic Management Plan sets forth the guidelines to be employed and maintained throughout the project so that the shipment of materials and goods to and from the Site associated with this project can be done safely while minimizing impact to the surrounding community including public use of the roads and the environment.

1.1 HEALTH AND SAFETY CONSIDERATIONS

Geomatrix regards the health and safety of our employees and subcontractors, other Atlantic Richfield contractors, the public and the surrounding community, and the environment our highest priority on any project. We have selected a project team that has extensive experience in safely managing aggregate roadways located in mountainous terrain and traveled frequently by the public during the course of the work.

The primary safety document for implementation of all work at the site will be the Year Round Site Specific Health and Safety Plan (SSHSP), which has been prepared consistent with 29 CFR 1910.120 and California Code of Regulations (CCR) Title 8, Section 5192. This document should be referred to for all general safety issues involving implementation of this scope. In addition to the guidelines in the SSHSP, job specific control of work procedures will be implemented on this project including:

- Job Safety Analysis (JSA's) for each specific task;
- Authorization to Work (ATW);
- Driver Orientation Training for Geomatrix personnel (BP Group Standards, Driving Safety – 2nd Edition);
- Applicable portions of the BP Remediation Management Traffic Control Safety Procedures;
- Permits as required including: confined space, work at heights, ground disturbance, hot work and hoisting and lifting operations; and
- Management of Change procedures.

In addition to these control of work procedures, safety meetings will be held every day which will discuss new business from the day before, changes in operations, personal, protective equipment, and emergency response information.

1.2 MANDATORY REQUIREMENTS AND RECOMMENDATIONS FOR VEHICLES AND PERSONNEL

In addition to the above health and safety considerations, the following are mandatory requirements and recommendations that are to be followed:

- Compliance with the 10 elements of the BP Group Standards, Driving Safety – 2nd Edition requirements
    - Element 1 – The vehicle shall be fit for the purpose and shall be maintained in safe working order, with seat belts installed and functional.
    - Element 2 – The number of passengers shall not exceed the manufactures specifications for the vehicle.
    - Element 3 – Loads shall be secure and shall not exceed the manufactures specifications and legal limits for the vehicle.
    - Element 4 – Drivers shall be appropriately assessed, licensed, trained and medically fit to operate the vehicle.
    - Element 5 – Drivers shall be appropriately rested and alert.

- Element 6 – Drivers shall not use not a mobile phone or other two-way communication device while operating the vehicle.

- Element 7 – In specific higher-risk countries risks of the journey shall be assessed and the journey risk management policy and plans shall be in place.

- Element 8 – Seat belts shall be worn by all occupants at all times whenever a vehicle is in motion.

- Element 9 – Drivers shall not be under the influence of alcohol or drugs, or any other substance or medication that could impair their ability to drive.

- Element 10 – Safety helmets shall be worn by the driver and passengers of motorcycles, all terrain vehicles, snowmobiles and other similar types of vehicles.

- Limited Dust Policy – regardless of the posted speed all vehicles are required to be respective of neighbors, off-road enthusiasts, hikers, etc. and minimize vehicle dust generation.

- Lights on Policy – all vehicles are required to drive with their lights on as soon vehicles leave paved roads.

A complete copy of the BP Group Standards, Driving Safety – 2nd Edition can be found at http://rmhsse.bpglobal.com/.

2.0 SITE LOCATION AND ACCESS

The Leviathan Mine Superfund Site is located in an unpopulated portion of Alpine County, California (CA), in the eastern portion of the Sierra Nevada Mountain Range approximately 20 miles southeast of the southern shore of Lake Tahoe, CA, five miles west of the California-Nevada border, and approximately 6 miles east of the town of Markleeville, CA. The Site is situated at an elevation of approximately 7,000-feet above mean sea level.

2.1 SITE ACCESS ROUTES

Access to the Site is provided by Leviathan Mine Road (also known as US Forest Service Road 52), which is an unpaved road that connects to CA State Route 89 (SR 89) over Monitor Pass to Interstate 395 (Hwy 395) in the Double Spring Flat area between Gardnerville, Nevada (NV) and Topaz Lake, NV (Figure 1). Leviathan Mine Road skirts the eastern boundary of the Site with access to the Site via a parallel on-site access road controlled by locked gates which are kept closed and locked at all times to prevent unauthorized access (Figure 2).

The elevation of Leviathan Mine Road varies from approximately 5,800 ft. above mean sea level (msl) to 8,000 ft. above msl with potential inherent extreme variations in weather. Fog and inclement weather may be encountered during the course of the work, including accumulation of ice and snow from

precipitation. In normal years, wheeled-vehicle access is limited to late spring through fall, with wheeled-vehicle travel discouraged during heavy rains or wet conditions due to potential road hazards.

Leviathan Mine Road is a public access road (except for the gated on-site access road) and is subject to recreational users such as campers, off-road 4x4 vehicles, all-terrain vehicles (ATVs), bikers, hikers and hunters. In addition, wildlife may also be encountered on the roadway during the course of the project.

2.2 ACCESS ROAD CONDITIONS

As noted above, access to the Site is via Leviathan Mine Road (also known as US Forest Service Road 52), from either Hwy 395 in Nevada (Nevada Side) or State Route 89 (SR 89) in California (California Side) (Figure 1). A summary of the access routes is provided below.

When two vehicles meet on a steep road where neither can pass, the vehicle facing downhill must yield the right of way by backing up until the vehicle going uphill can pass. The vehicle facing downhill has the greater amount of control when backing. Reference: http://www.dmv.ca.gov/pubs/hdbk/pgs16thru17.htm#mtn_rds

2.2.1 Nevada Side Access Road Conditions

Access to the Site from Hwy 395 in Nevada is via approximately 10.5 miles of single lane unpaved road (Figure 3). Some sections of this access route are very rough and rocky with unguarded curves that have steep embankments. In general the NV side access road is not as steep and the turns more broad than the CA side access. The NV side access road varies in width with limited shoulder widths. However, a few widened areas exist for relief to get outside of the main lane for passing. One tight hairpin turn is located on a steep grade just after the road crosses Leviathan Creek on the way into the Site (See area of Concern 'A'; Figure 3). This turn is the only paved section of the NV side access. The maximum speed limit on Leviathan Mine Road outside of the locked Site access gates is posted as 25 miles per hour (mph). This section of road may be used by the public. Wildlife, hikers, bikers and other vehicles may be encountered on the roadway during the course of the project. Rock slides are also possible.

2.2.2 California Side Access Road Conditions

Access to the Site from SR 89 in California is via approximately 3 miles of single lane gravel road (Figure 4). In general the CA side access road is steeper with tighter "S" turns than the NV side access. The CA side access road varies in width with limited shoulder widths with unguarded curves that have steep embankments. However, a few widened areas exist for relief to get outside of the main lane for passing (See Control Point areas 10 and 11; Figure 4). Two sections of the CA side access road are paved, the first being a windy stretch with a steep grade located just off SR89 and the second being a fairly straight section on a steep grade where the road crosses the summit (See Paved Areas; Figure 4).

The maximum speed limit on Leviathan Mine Road outside of the locked Site access gates is posted as 25 miles per hour (mph). This section of road may be used by the public. Wildlife, hikers, bikers and other vehicles may be encountered on the roadway during the course of the project. Rock slides are also possible.

2.2.3 On-Site Access Road Conditions

This section discusses the road conditions in the areas located within the locked Site access gates that are utilized to access the Aspen Seep bioreactor and the Pond 4 area as well as the RWQCB areas of responsibility.

2.2.3.1 Aspen Seep Bioreactor Access Road

Access to the Aspen Seep bioreactor inside the locked access gate is via a single lane dirt road (Figures 2 and 5). Sections of the road are relatively steep and narrow especially the stretch of road from the "upper shed area" down to the Aspen Seep Bioreactor. In addition, the road lacks drainage culverts to divert snow melt and stormwater runoff from flowing across the road and/or ponding on the road. During the winter months the road becomes impassible to most all traffic due to snow accumulation. During the spring the road becomes extremely muddy, slippery and severely rutted. The maximum speed on the Aspen Seep Bioreactor access road is 15 mph. This access road is closed to all public access.

Truck traffic to the Aspen Seep Bioreactor is only possible during the early spring to late fall months and is highly dependant upon the weather. Truck traffic to the Aspen Seep Bioreactor is only allowable when the road is dry. No truck traffic will be allowed to the Aspen Seep Bioreactor under muddy or other adverse road conditions.

2.2.3.2 Pond 4 Access Road

Access to Pond 4 between the CA access gate and the NV access gate is via a single lane gravel road (Figures 2 and 5). Sections of the road are very steep and may be difficult for trucks to negotiate especially the section between Pond 4 and the CA access gate (Area of Concern B; Figure 5). Continuous use of this road causes severe "wash boarding," thus prohibiting trucks from exiting under their own power. This condition is made worse by the oversized aggregate used as road base which rolls under load and does not allow for proper traction. The maximum speed on the Pond 4 access road is 15 mph. This access road is closed to all public access.

If the steep section of roadway between Pond 4 and the CA access gate becomes severely "wash boarded" all truck traffic exiting from the CA side access will be suspended and the road will be

barricaded (through use of traffic cones, delineators and signage) to prevent accident use until road conditions are improved.

2.2.4 Road Maintenance

Subject to RWQCB and US Forest Service approval, Geomatrix will hire a subcontractor to occasionally grade sections of the road as necessary to repair potholes, ruts, wash boarding and general road repair in order to maintain safe truck travel. Road grading may need to be supplemented by placement of Class II aggregate road base to improve traction in steep areas such as the section of the Site access road between Pond 4 and the CA access gate.

The RWQCB and US Forest Service will be notified of severe road deterioration issues, and if need be, a request for roadway repairs will be made through AR to the RWQCB and US Forest Service.

2.2.3 Changes in Road Conditions

Road conditions will be monitored daily by Geomatrix staff during travel to and from the Site for daily field activities. In addition to routine monitoring of road conditions for light vehicular traffic, monitoring will be increased during times of scheduled truck traffic to identify areas where the road surface may be degrading (e.g. eroding) or changing condition due to weather (e.g. muddy conditions, ice cover, snow). If road conditions indicate a hazardous or unsafe condition exists, truck traffic to and from the Site will be postponed until road conditions improve (i.e. after a storm large truck traffic will be delayed until snow/ice has melted and wet muddy sections have dried out) or traffic can be managed to avoid the unsafe condition. Weather forecasts will be monitored daily and integrated into site traffic management decisions.

3.0 COMMUNICATION AND COORDINATION

Geomatrix will continue to work very closely with vendors, suppliers, deliverymen and subcontractors to insure that all drivers are informed of Site access road conditions, appropriate trucks are utilized and that the lines of communication remain open.

3.1 TRUCK TYPE AND SIZE

Geomatrix will request all vendors limit the size of trucks delivering to the site to the extent possible and will inform all vendors of road conditions. Due to road conditions and the relatively tight “S” turns on the CA side, tractor-trailer combinations will be limited to access via the NV side. Only single unit trucks (i.e. – 12 wheel trucks or less) will be permitted to enter from the CA side access. In addition, total vehicle length of pickups and medium duty trucks towing trailers will be approximately 40 feet length overall.

Tractor-trailer combinations will be allowed to off-load equipment at one of two designated staging areas located in areas between 0.1 miles prior to the Leviathan Mine Road turn off SR89 to the crest of the access road (See Figure 4). Depending on the materials/equipment being transported loads will either be transferred to smaller trucks for Site deliver or wheeled equipment will be driven to the Site under its own power. All wheeled equipment mobilizing to the site under its own power will be escorted by a pilot vehicle. Depending upon the scheduled traffic for the day, traffic control flaggers may be used to assist in traffic control. Use of traffic control flaggers and pilot vehicles is described in detail in Section 4.1. Two way vehicle traffic control on the CA access route is described below in Section 4.2.

Tractor-trailer access via the CA access may be revisited in the future if roadway improvements are made to widen the problem corners on the CA side.

Tractor trailer combinations accessing via the NV side will be intercepted at the intersection of Hwy 395 and Leviathan Mine Road and will be escorted to the Site by a pilot vehicle. Depending upon the scheduled traffic for the day, traffic control flaggers may be used to assist in traffic control. Use of traffic control flaggers and pilot vehicles is described in detail in Section 4.1. Two way vehicle traffic control on the CA access route is described below in Section 4.2.

3.2 TRUCK DRIVERS

Geomatrix will also evaluate the experience level of the truck driver and request only safe seasoned personnel. Trucking companies that frequently provide delivery or pickup services will be required to use experienced drivers. Drivers who have not been to the Site before will be intercepted at a predetermined location and will be driven into the Site in a light duty vehicle to investigate and assess the nature of the road and the current conditions. Drivers who are not confident, or who Geomatrix determines are not qualified, that their truck can safely be driven to the Site will be redirected so that their load can be transported to the Site using qualified and competent drivers with shorter trucks or other transport methods.

One alternate option may be to offload trucks at United Rentals in Gardnerville, NV and have certain specified United Rental personnel, who are very familiar with the road and have safely negotiated it many times, make the delivery.

3.3 ACCESS SCHEDULING AND NOTIFICATION

Vendors and subcontractors delivering or receiving materials at the Site will be required to provide prior notice (24 hours) to the Geomatrix Site Operations Manager (Marc Lombardi or his designee) and

obtain information on current road conditions, traffic patterns, traffic levels (i.e. other deliveries), access route (i.e. - via the CA side or the NV side) and weather conditions.

If truck deliveries cannot be made due to weather or road conditions, arrangements will be made for the materials to either be delivered on a different date or for the truck to be off-loaded at United Rentals in Gardnerville. Materials off-loaded at United Rentals will be reloaded and transported to the Site by United Rentals, or other competent carrier, when conditions are determined safe for travel.

3.3.1 Site Access Coordination

Access for the shipment of all materials and goods to and from the Site should be coordinated through Geomatrix. Based on road conditions, scheduled traffic, and type of truck accessing the site, Geomatrix will provide instruction on whether access should be via the California side or the Nevada side, whether or not a pilot car is needed and coordination of the time and place to accept the truck. Site access coordination will be required to be made through one of the following contacts:

Marc Lombardi, Site Operations Manager
Office Phone: (916) 853-8903
Cell Phone: (916) 302-6326
(Note: voice messages should be left at the office number as they are retrievable in the field via satellite phone)
Email: mlombardi@geomatrix.com

Site management personnel can also be reached at the following numbers:

Satellite Phone #1
Dial 1-480-768-2500, when prompted enter satellite phone number 8816-4142-0219.

Satellite Phone #2
Dial 1-480-768-2500, when prompted enter satellite phone number 8816-4145-3319.

Voice Over Internet Protocol (VOIP)
Skype Phone: (530) 554-2599

3.3.2 Coordination with the RWQCB

Geomatrix will coordinate closely with the State of California Regional Water Quality Control Board (RWQCB) so that we may understand their delivery schedules and times in order to avoid head to head

truck encounters on the access roads. In addition, requests for roadway improvements will be made to the RWQCB through AR.

3.3.2 Communication with Site Personnel

Daily anticipated traffic loads and patterns will be discussed every morning with Site personnel during the safety briefings. Daily traffic loads and restricted or prohibited access notifications will be posted for all on-site personal to see at/near the Site sign-in on a large white board installed on the outside of the office trailer.

3.3.4 Communication with AR and Copper Environmental

Geomatrix will continue to evaluate and discuss the road condition with AR and Copper Environmental oversight personnel. All persons working at the Site and accessing the Site (including drivers, escort personnel, and client representatives) will all have stop work authority if unsafe or questionable behavior or conditions are observed. If a stop work issue is implemented the issuer will meet with members of Geomatrix and Copper Environmental staff and discuss the issue and collectively decide what measures, actions, and or remedies may be applied. Once the controls are in place and the issue resolved, the stop work order may be lifted by collective consent of each party.

4.0 OPERATIONS/EXECUTION

Traffic Controls will be properly implemented so that the work associated with this project can be accomplished while protecting our employees and subcontractors, other Atlantic Richfield contractors, the public and the surrounding community, and the environment, by managing the interaction between all vehicles entering the active work areas and traveling on the access roads.

4.1 USE OF TRAFFIC CONTROL MEASURES

This section describes the use of traffic control flag persons (flaggers) and pilot vehicles to assist in traffic control operations.

4.1.1 Flag Persons

During periods of heavy scheduled truck traffic flag persons will be deployed at predetermined control points along the access routes to control the flow of traffic (Figures 3 and 4). All traffic control persons will be required to don the minimum required PPE for the Site. Traffic flaggers will be equipped with "slow/stop" signage and two way radios. All traffic will be stopped at each of the designated control points by the flag person. The flag person will then call the next contol point to check for opposing traffic. When clear, the flag person will notify the next control point of the oncoming traffic and will direct the next control point to hold all traffic until the vehicle reaches their control point. This

communication will continue along the entire access route. Control points are indicated on Figures 3 and 4.

4.1.2 Pilot Cars

Tractor-trailer combinations will be escorted to the site using a pilot vehicle. Pilot vehicles will be driven by persons knowledgeable about the access road conditions. The pilot vehicle will lead the tractor-trailer so that the tractor can be stopped prior to reaching a significant risk area (e.g. – the paved hairpin turn; Area of Concern A, Figure 3) so that the pilot driver can exit the vehicle and show the driver the area(s) of concern. Geomatrix personnel operating the pilot vehicles will not direct the tractor driver as to how to negotiate the risk area(s), rather will point out the hazard and rely on the trained professional drivers to negotiate the area(s) of concern. Pilot drivers will assist the tractor drivers through the risk area(s) by standing >25 feet in front of the tractor (and watching the entire tractor-trailer including the rear wheels of the trailer) and using hand signals to notify the driver of clearance issues. After the tractor-trailer makes it safely past the area of concern, the pilot car driver will return to the pilot car and continue to escort the tractor-trailer to the Site.

4.1.3 Traffic Control Points

Traffic control points will be established in areas that permit ample room for passing and at locations where radio communication can be established between the individual control points (Figures 3 and 4). Due to the rugged terrain and distance along the access route, communication between the individual control points will have to be in series with communications passed from one control point to the next.

4.2 CONTROLLED TRAFFIC

During periods of heavy truck traffic, sentry type access points, manned traffic control points and/or one-way traffic patterns may be employed to safely maintain the flow of traffic to and from the Site.

4.2.2 Sentry Access Points

During periods of heavy traffic Site access may be controlled through the use of sentry type access points. During these designated periods, the Site gates may remain unlocked and open during the day with sentry type access points manned by flaggers on each side of the Site to prevent public access and coordinate delivery traffic. This single point entrance will serve as a place to stop public access to the construction Site and serve as a catch point for the trucks. A radio dispatch will go out to the Site advising of incoming traffic and those trucks will be escorted by designated site personnel. The escort vehicle will be equipped with a CB type radio to communicate with the driver and two way radios to communicate with Site personnel. The truck will be escorted onto the site and back down to the check points then released.

4.2.3 Control Points

During periods of heavy truck traffic, traffic flow on the access roads may be controlled through use of control points to allow passing lanes and avoid head-to-head vehicle encounters. If employed, traffic will be controlled through the use of flag persons in radio contact at predetermined control points. At all locations where traffic is stopped for control purposes, safety cones/candles are placed to prevent unauthorized vehicle departures.

During periods when control points are employed, all vendors will be notified in advance of the control point locations and the planned traffic flow pattern.

4.2.4 One Way Traffic Pattern

If necessary, during periods of heavy traffic Site access may be controlled through the use of one-way traffic pattern. During use of one-way traffic patterns all vendors and subcontractors will be notified in advance of the traffic pattern (i.e. - all trucks enter the Site from the CA side and leave the Site via the Nevada side). If one-way traffic control measures are use Site personnel will be posted at either end of the access route to monitor and control traffic flow.

4.3 TRAFFIC SIGNAGE

Geomatrix will construct and install signage to notify trucks of upcoming road conditions, turn-outs for passing, stop locations to wait for pilot cars and to warn the public of truck traffic. Examples of signage that may be deployed include, but are not limited to, the following:

- Caution Truck Traffic
- Steep Grade
- Truckers Advise Low Gear
- Sharp Left (or Right) Turn Ahead
- Tight “S” Curves Ahead
- Road Narrows
- Designated Trucks Stop Here for Pilot Car
- Turn-Out Area #1 (Areas will be designated by number and controlled by radio dispatch)

On-Site traffic signage may include but will not be limited to:

- Turn On Headlights

- Check Headlights
- Speed Limit 15 MPH
- Steep Grade
- Congested Area
- Trucker Stop Here. Drivers Report to Office Before Proceeding

4.4 TOWING SERVICES

In the event a truck gets stuck, the following tow companies offer heavy duty towing services:

- Valley Towing
  (775) 882-3800

- Capitol Towing Inc.
  (775) 882-8260

[End Geomatrix Traffic Management Plan]

4.7.5. Wildlife

Due to the size and location of the Site, Site workers are at risk from several wildlife hazards including:

- Hazardous Plants
- Poisonous snakes
- Ticks
- Insects
- Bears
- Wild Cats

In 2007, 27 near misses were reported for potential biohazards at Remediation Management Sites. The near miss data indicate that Bees, Wasps and Spiders posed the greatest risks, making up over half of the near misses recorded at Remediation Management Sites during the year.

Hazardous Plants

Common poisonous Plants in the U.S. that cause allergic reactions include 1) poison ivy, 2) poison oak, and 3) poison sumac. Plant descriptions and photographs to aid in the identification of these Plants are shown below.

Hazardous Plant Identification Guide

Poison Ivy • Grows in West, Midwest, Texas, East. • Several forms – vine, trailing shrub, or shrub. • Three leaflets (can vary 3-9). • Leaves green in summer, red in fall. • Yellow or green flowers. • White berries.	 
Poison Oak • Grows in the East (NJ to Texas), Pacific Coast. • 6-foot tall shrubs or long vines. • Oak-like leaves, clusters of three. • Yellow berries.	 
Poison Sumac • Grows in boggy areas, especially in the Southwest and Northern states. • Shrub up to 15 feet tall. • Seven to 13 smooth-edged leaflets. • Glossy pale yellow or cream-colored berries.	 

If you have been exposed to poison ivy, oak, or sumac, act quickly, because the toxin in the Plants penetrates the skin within minutes. If possible, stay outdoors until you complete the first two steps:

1) Cleanse the exposed skin with generous amounts of isopropyl alcohol.

2) Wash the skin with water.

3) Take a regular shower with soap and warm water. Do not use soap until this point because it will pick up the toxin from the surface and move it around.

4) Wash clothes, tools, and anything else that may have been in contact with the toxin, with alcohol and water. Be sure to wear hand protection during that process.

Signs and symptoms of exposure include redness and swelling that appears 12 to 48 hours after exposure. Blistering and itching will follow. If you have had a severe reaction in the past, you should see

an occupational physician right away. Otherwise, according to the Federal Drug Administration (FDA), there are quite a few effective over-the-counter products to help with symptoms, including Cortaid and Lanacort, baking soda, Aveeno oatmeal bath, and calamine lotion. ENSR's occupational care consultant, or a pharmacist, can help you make an educated choice.

Snakes

Venomous snakes native to the U.S. include rattlesnakes, copperheads, and cottonmouths (water moccasins). Precautions to lower the risk of being bitten:

- Leave snakes alone. Many people are bitten because they try to kill a snake or get a closer look.
- Stay out of tall grass unless you wear thick leather boots, and remain on paths as much as possible.
- Keep hands and feet out of areas that you can't see.
- If you encounter a snake, walk around it, giving it a berth of about 6 feet.

If someone is a snakebite victim, the following first aid should be administered:

- Wash the bite with soap and water.
- Immobilize the bitten area and keep it lower than the heart.
- Get medical help immediately.

There is a lot of false advice about how to treat snakebites. Do not ice or cool the bite, apply a tourniquet, or cut into the wound!

Ticks

Ticks in North America can be carriers of several diseases, including Lyme Disease, Rocky Mountain Fever, and ehrlichiosis.

Limiting exposure to ticks reduces the likelihood of infection when you're exposed to tick-infested habitats. Here are some measures that you can take to prevent tick exposure:

- Remove leaf litter and brush in areas where you will be working prior to tick season.
- Wear light colored clothing so that ticks are visible.
- Tuck your pant legs into your socks.
- Apply repellents, such as permethrin to clothes and deet to skin, to discourage tick attachment.
- Promptly inspect your body and remove crawling or attached ticks when you leave a tick-infested area.

If a tick bites you, use the following procedure to remove it:

- Use fine-tipped tweezers or shield your fingers with tissue, paper towel, or rubber gloves.
- Grasp the tick as close to the skin surface as possible and pull upward with steady, even pressure. Do not twist or jerk the tick; this may cause mouthparts to break off and remain in the skin.
- Do not squeeze, crush, or puncture the body of the tick because its fluids may contain infectious organisms.
- Do not handle the tick with bare hands because infectious agents may enter through mucous membranes or breaks in the skin.
- After removing the tick, thoroughly disinfect the bite site and wash your hands with soap and water.
- You may wish to save the tick for identification in case you become ill within 2-3 weeks. Place the tick in a zip lock bag in the freezer, and mark the bag with the date of the bite.

Bees and Wasps

Most encounters with bees and wasps occur when nests in low human traffic areas are disturbed. Before entering an area or opening an enclosure that is not frequently disturbed, take a few moments to observe whether or not insects are entering or exiting. If they are flying to and from the area or enclosure, avoid it if possible. If you must be in an area where disturbing a nest is likely, be sure to wear long pants and a long-sleeved shirt. Stinging insects fly around the top of their target, so if you get into trouble, pull a portion of your shirt over your head and run away.

If you get stung, look for a stinger, and, if present, remove it within 15 seconds of the sting. Several over-the-counter products or a simple cold compress can be used to alleviate the pain of the sting. If the sting is followed by severe symptoms, or if it occurs in the neck or the mouth, seek medical attention immediately because swelling could cause suffocation.

If you need to destroy a nest, consult with the Contractor HSSE officer first. Commercially available stinging insect control aerosols are very effective, but could potentially contaminate the area. Once the nest is destroyed, fine mesh may be applied over the exit and entry points of an enclosure to prevent re-infestation.

Employees with a known bee sting allergy should carry an EPIpen prescribed by their personnel physician.

Mosquitoes

Mosquitoes in the U.S. have been known to carry West Nile Virus, St. Louis encephalitis, and Dengue Fever. To avoid mosquito bites:

- Apply insect repellent containing DEET (N,N-diethyl-meta-toluamide) when you're outdoors.

- Read and follow the product directions whenever you use insect repellent.

- Wearing long-sleeved clothes and long pants treated with repellent to further reduce your risk, as will staying indoors during peak mosquito feeding hours (dusk until dawn).

- Limit the number of places available for mosquitoes to lay their eggs by eliminating standing water sources from around the work area.

- Check to see if there is an organized mosquito control program near the project site. If no program exists, work with your local government officials to establish a program.

Spiders

The most dangerous spiders to humans in North America are black widows and brown spiders (also known as brown recluse or fiddleback spiders). A guide to identifying these spiders is presented below.

Hazardous Spider Identification Guide

Black Widow Spider

- Abdomen usually shows hourglass marking.
- The female is 3-4 centimeters in diameter.
- Have been found in well casings and flush-mount covers.
- Not aggressive, but more likely to bite if guarding eggs.
- Light, local swelling and reddening of the bite are early signs of a bite, followed by intense muscular pain, rigidity of the abdomen and legs, difficulty breathing, and nausea.
- If bitten, see physician as soon as possible.

Brown Spiders (Recluse)

- Central and South U.S., although in some other areas, as well.
- ¼-to-½-inch-long body, and size of silver dollar.
- Hide in baseboards, ceiling cracks, and undisturbed piles of material.
- Bite either may go unnoticed or may be followed by a severe localized reaction, including scabbing, necrosis of affected tissue, and very slow healing.
- If bitten, see physician as soon as possible.

Bird Droppings

Large populations of roosting birds may present a disease risk. The most serious health risks arise from disease organisms that grow in the accumulations of bird droppings, feathers, and debris under a roost—especially if roosts have been active for years. Among the fungal diseases associated with bird droppings, the two most common are Histoplasmosis and Cryptococcosis.

If you are working in an area where large quantities of droppings are present, follow certain precautions to minimize the risk from disease organisms in the droppings:

- Wear a respirator that can filter particles as small as 0.3 microns, such as a HEPA filter.
- Wear disposable protective gloves, hat, coveralls, and boots if you will be in close contact.
- Wash or shower at the work site after cleanup, if possible.
- In areas known to have snakes present wear snake chaps to protect the lower legs from snake bites.

- Modify the structure or use methods to prevent birds from reestablishing the roost.

Bears

Black Bears are native to the Site. It is important to note, that Grizzly bears are not native to the Site. This is an important distinction because the procedures for dealing with an encounter are different for each bear species. If you encounter a Bear at the Site:

- Don't run away or run past the Bear.
- If you are in a group, gather together and yell loudly.
- If you are alone, remain calm. If you are wearing a jacket, raise it above your head to make yourself appear larger or wave your arms above your head. Speak calmly and firmly. Do not make threatening gestures. Try to stay still until the bear leaves, or back away slowly until the bear is out of sight. Don't turn and run.
- DO NOT PLAY DEAD. Black Bears are scavengers and, unlike grizzly bears, will not leave something alone that appears to be dead.
- DO NOT CLIMB A TREE. Black Bears are good climbers and by attempting to climb a tree you can effectively trap yourself.
- DO NOT get between a bear and its cubs.
- If a bear appears to charge you, stand your ground. Many times, the bear will make a bluff charge prior to actually attacking. This charge is designed to make you back down before the bear has to actually attack. If a bear bluff charges you begin to back away slowly so that the bear can see you backing off.

If a bear attacks someone, take the following steps:

- If a bear charges you, stand your ground. Attempt to jump quickly to the side (far enough to be out of the bears reach) shortly before the bear reaches you. Bears are capable of reaching charging speeds of approximately 30 miles per hour (m.p.h.), but they are not able to stop quickly or change directions during a charge.
- If you are being attacked, fight back and attempt to strike the bear in the nose, it is one of the most sensitive parts of the bear's body.
- If the bear is still within view after the attack, tend to the victim, then look for features on the Bear that can be used to identify it such as an ear tag, scars, different colors areas of the body so that the bear can be identified at a later date.
- Check on the victim's condition. Call 911 if paramedic response is required.
- Call the EHS Department to arrange for medical treatment

Wild Cats

Bobcats, mountain lions, and other species of wild cats are native to the Site. While there are several different species of wild cats at the Site, the procedures for a wild cat encounter are the same. If you encounter a Wild Cat at the Site:

- Avoid working by yourself in an isolated area at either dawn or dusk, cats are most active between dusk and dawn.
- Do not approach a wild cat.
- Don't run away or run past the cat.
- If you are in a group, gather together.
- If you are alone, remain calm. If you are wearing a jacket, raise it above your head to make yourself appear larger or find anything to hold or raise above yourself to make yourself look as big as possible. Speak calmly and firmly, or attempt to yell for help, while remaining calm. Do not make threatening gestures. Try to stay still until the cat leaves, or back away slowly until the cat is out of sight. Don't turn and run.
- DO NOT CLIMB A TREE. Cats are good climbers and by attempting to climb a tree you can effectively trap yourself.
- DO NOT RUN. If you run, a wild cat may identify you as prey and it may actually encourage an attack.

If a cat attacks someone, take the following steps:

- If you are being attacked, fight back, use anything you can, rocks, a tree branch, tools, ect. Try to remain standing
- Check on the victim's condition. Call 911 if paramedic response is required.
- Call the EHS Department to arrange for medical treatment

4.7.6. Working at Elevation

The high elevation that the Site resides poses a potential worker risk for Altitude Sickness. Symptoms of altitude Sickness include:

- Headache;
- Malaise;
- Drowsiness;
- Nausea or lack of hunger;

- Shortness of breath;
- Muscle aches and pains;
- Dehydration, and;
- Lassitude and lack of energy

It is important to note, that while dehydration is one of the symptoms of altitude sickness, allowing yourself to become dehydrated can worsen the affects of altitude sickness. Therefore, it is important to stay **well hydrated,** especially during the winter months when workers tend to drink less water. Other techniques to prevent altitude sickness include:

- Arrive to the Site well rested;
- Limit activity during the first three days at altitude;
- Take aspirin, acetaminophen or ibuprofen, and ;
- Intake of a high-carbohydrate diet and avoid fatty foods.

If a worker or Site visitor begins to exhibit the symptoms of altitude sickness, have them drink water and get them to a lower altitude. Report the incident to the appropriate contractors Site HSSE officer and the Atlantic Richfield HSSE officer.

4.8. Site Security

4.8.1. Site Access

There is an access gate which prevents unauthorized personnel from accessing the Site. Site access will be restricted to contractors working at the Site and visitors approved by Atlantic Richfield. Access to the Site will be controlled by the Atlantic Richfield Site HSSE Officer. No Site access will be allowed prior to sunrise or after sunset. The "Buddy System" will be used at all times when on-Site.

4.8.2. Visitors

All Site visitors must check in at the Site trailer prior to conducting their Site visits. Visitors shall:

- Stop work as necessary to prevent incidents or impact to the environment;
- Follow the direction of Owner's Representative and team, the Site Coordinator, and/or Contractor HSSE Officer;
- Read and understand the requirements of this HSSE Program Document and any relevant contractor HASP and sign the Compliance Agreement (Included in Appendix C);
- Provide appropriate training and medical documentation;
- Participate in Visitor Orientation training;
- Be aware of and follow emergency procedures, and ;
- Sign in and out at the job trailer.

5.0 Contractor HASP requirements

The following section specifies the requirements for the Contractor specific HASPs.

5.1. Material Incorporated by Reference

The following material is included within this HSSE Program Document and may be incorporated by reference in the Contractor specific HASP:

- BP Company Requirements included in Section 2.2;
- Site wide COCs included in Section 2.4;
- Emergency Response Plan included in Section 3;
- Minimum required PPE included in Section 4.6;
- BP Procedures included in Section 4.7;
- Site Specific Procedures included in Section 4.8;
- Site Security Procedures included in Section 4.9;
- Relevant information from Tables within this document, and;
- Figures 1, 2, and 3 of this document.

5.2. Required Material

The following material is required to be supplied within each Contractor HASP.

5.2.1. Identifications of Task specific hazards

Each Contractor that performs work as the Site will be performing different tasks with different potential hazards. Therefore, it will be the responsibility of the contractor to analyze each task their personnel will be performing at the Site, determine the potential hazards associated with those activities, and incorporate the hazards into their HASP.

5.2.2. Controls for task specific hazards

Once each task specific hazard has been identified, it will be the responsibility of the contractor to provide their on-Site personnel with a safe working environment by developing controls for each hazard. These controls will be described within each Contractor's HASP and it will be the responsibility of each on-Site worker to understand and implement these controls prior to beginning and during each work task.

5.2.3. Training

The following additional training could be required depending on what activities personnel perform on site. If contractor specific tasks require specific training topics listed below, or any additional task not listed, it will be the Contractor's responsibility to develop training for the tasks. A discussion of required task specific training requirements must be included within each Contractor's HASP.

- Fall Protection Training;
- Control of Work Training;
- Tr@ction Training;
- Snowmobile/ATV Training;
- Defensive Driving Training with hands on driver evaluation;
- Respirator Training;
- PPE Training;
- Hazard Communication Training;
- Bloodborne Pathogens Training;
- Confined Space Training;
- Hydrogen Sulfide Training;
- Spill Response and Clean up;
- Excavation Competent Person Training, and
- Lock-Out/Tag-Out Training.

Each contractor shall maintain within their HASP, a list of ATW and PTW authorized permit writers for each task expected at the Site. Each contractor HASP shall also include other qualifications that may be applicable to perform work at the Site; such as a list of competent persons.

5.2.4. Constituents of Concern

The Contractor shall identify any COCs, other than those specified in Section 2.4 that could be potentially encountered by their on-Site personnel. This includes materials brought on site by the contractor. Each contractor HASP shall include a discussion of the additional COC's. This discussion shall include, at a minimum:

- Tasks during which the COC will pose a potential contact hazard;
- Exposure routes of the COC;

- Exposure symptoms of the COC; and
- Initial first aid measures to be conducted in the event of exposure.

5.2.5. PPE

Certain work tasks may require the worker to wear a level of PPE above the minimum PPE defined in Section 4.6. Each Contractor HASP shall include a discussion of all work tasks requiring, or having the potential to require, additional PPE.

5.2.6. Company Emergency contact info (phone numbers)

Each Contractor HASP will include a list of personnel (with phone numbers) to be contacted in the event of an emergency involving any of the Contractor's on-Site personnel. The list may define a primary contact person, but must list secondary contacts to be used in the event that the primary contact cannot be reached.

5.2.7. Task specific JSAs

Each Contractor will develop Job Safety Analysis forms for each task that they anticipate performing at the Site. The JSAs will be included in the Contractor HASP and will be updated as conditions in the field warrant.

5.2.8. Completed Authorization to Work forms

Each Contractor is required to maintain a record of completed ATW forms in their Contractor HASP.

5.2.9. Blank and completed Permit to Work forms

If a Contractor is expected to perform work activities which require a permit to work, or could potentially perform such activities; the Contractor HASP must contain blank permit to work forms for each task. Each Contractor is also required to maintain a record of completed Permit to Work forms in their Contractor HASP.

5.2.10. Task specific decontamination procedures

Each Contractor will develop task specific decontamination procedures that will be implemented at the Site and include a discussion of the procedures in their HASP.

5.3. MSDS

In addition to the requirements of section 5.2, each contractor must provide a copy of all the MSDS for each COC that they will encounter at the Site with the exception of those provided in Section 2.4. The MSDSs from each contractor will be combined with those provided in section 2.4 and kept in the Job Trailer located at Pond 4.

Appendix A
Daily Health and Safety Briefing Form

Leviathan Mine Site
DAILY HEALTH AND SAFETY BRIEFING FORM

Date: _____ Project Name/Location: Leviathan Mine
Company: _____ Person Conducting Briefing: _____

1. AWARENESS (e.g., special EHS concerns, pollution prevention, recent incidents, etc.):

2. OTHER ISSUES (HASP changes, new JSAs, attendee comments, etc.):

3. DISCUSSION OF DAILY ACTIVITIES/TASKS AND SAFETY MEASURES TO BE USED:

4. ATTENDEES (Print Name):

1.	2.
3.	4.
5.	6.
7.	8.
9.	10.
11.	12.
13.	14.
15.	16.
17.	18.
19.	20.
21.	22.
23.	24.
25.	26.
27.	28.
29.	30.

Appendix B
Blank Site HSSE Forms
Emergency Contact Form, JSA, ATW

Leviathan Project Site

Emergency Contact Information

Date: _____

Employee Name: _____

Office Location: _____

Office Phone #: _____

Home Address: _____

Home Phone #: _____

In case of Emergency, contact:

Name of Person: _____

Relationship: _____

Phone #: _____

Alternate Phone #: _____

Name of Alternate Person: _____

Relationship: _____

Phone #: _____

Alternate Phone #: _____

Allergy Information

Do you have medical conditions or allergies that could affect you at the Leviathan Mine Site:

_____
_____
_____
_____
_____
_____

If yes, do you have medication that you take with you (i.e. epinephrine for bee stings):_____

Doctor's Name and Phone Number:_____

REMEDIATION MANAGEMENT - AUTHORIZATION TO WORK

PRE-TASK HAZARD REVIEW

TASK	EQUIPMENT
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.
6.	6.

Chemical / Products / Material

1. ☐ Hydrogen Sulfide	2. ☐ Benzene	3. ☐ Diesel	4. ☐ Hydrocarbon	5. ☐ Acid	6. ☐ Lead
7. ☐ Carbon Monoxide	8. ☐ Asbestos	9. ☐ Caustic	10. ☐ Gasoline	11. ☐ Heavy Metals	
12. ☐ NORMS	13. ☐ Other:				

Hazardous Energy

19. ☐ Radiation	20. ☐ Electric	21. ☐ Pneumatic	22. ☐ Thermal-Steam
23. ☐ Hydraulic	24. ☐ Pressure	25. ☐ Mechanical	26. ☐ Fluids & Gases
27. ☐ Gravitational		28. ☐ Other:	

Other Potential Hazards

34. ☐ Walking / Working Surfaces	35. ☐ Traffic	36. ☐ Working at Heights	37. ☐ Pinch Points
38. ☐ Weather	39. ☐ Noise	40. ☐ Grinding	41. ☐ Heavy equipment	42. ☐ Sharp Edges
43. ☐ Hot Work	44. ☐ Security	45. ☐ Congested Area	46. ☐ Overhead Work
47. ☐ Body Position	48. ☐ Static Posture	49. ☐ Wind	50. ☐ Rotating Equipment	51. ☐ Lifting
52. ☐ Housekeeping	53. ☐ Spills	54. ☐ Underground Utility	55. ☐ Slopes and Terrain
56. ☐ Confined Space	57. ☐ Vibration	58. ☐ Ground Disturbance	59. ☐ Rigging
60. ☐ Vehicle Safety – Driving		61. ☐ Repetitive Motion	62. ☐ Container/Drum Labels
63. ☐ Waste	64. ☐ Heat/Cold Stress	65. ☐ Hand & Power Tools	66. ☐ Fitness to Work
67. ☐ Open Pipe	68. ☐ Boom Swing	69. ☐ Lighting	70. ☐ Exposure to poisonous plants / animals / bugs
71. ☐ Overhead Electrical		72. ☐ Auger/Drill Stem	73. ☐ Other:

Required Safety Precautions

79. ☐ Safety Glasses	80. ☐ Goggles	81. ☐ Face Shield	82. ☐ Ear Plugs	83. ☐ High Visibility Clothing
84. ☐ Hard Hat	85. ☐ Escape Pak	86. ☐ Steel Toe Shoes	87. ☐ Ear Muffs	88. ☐ Respirator:
89. ☐ FRC	90. ☐ Supplied Air	91. ☐ Topical Creams / Repellents	92. ☐ Gloves:
93. ☐ Fire Watch	94. ☐ Drip Pans	95. ☐ Plastic Sheeting	96. ☐ Vac Truck	97. ☐ Fall Protection
98. ☐ Barricade	99. ☐ Fire Blanket	100. ☐ Upwind Areas Checked	101. ☐ Warning Signs
102. ☐ Flag Off Area	103. ☐ Life Lines	104. ☐ Fire Extinguisher at Jobsite	105. ☐ Sampling Prohibited
106. ☐ Seal Manholes, Sewers, and Catch Basins		107. ☐ Communication Method	108. ☐ Welding Shields
109. ☐ Continuous Monitoring		110. ☐ Wet Down Area	111. ☐ Ladder Tie Off
112. ☐ Tag Lines	113. ☐ Active Site Hazard Communication		114. ☐ Fence Off Area
115. ☐ No Cell Phone	116. ☐ Long Sleeve Shirt	117. ☐ No Smoking	118. ☐ Other:

REQUIRED PROCEDURES

☐ Drilling	☐ MOC	☐ Traffic Control	☐ LO/TO/Blinding
☐ Hoist/Lifting	☐ Journey Hazard Assessment	☐ Ground Disturbance	

REQUIRED PERMITS

☐ Hot Work	☐ Trenching/Excavation	☐ Confined Space	☐ Working from Heights	☐ None

Contractor(s) / Employee(s) Signatures: I have reviewed and understand the conditions of this permit, and its attachments. I will report hazardous conditions or acts identified on this job site to my supervisor and / or BP representative so they can be corrected as necessary.	1.	2.
	3	4.
5.	6.	7.	8.
9.	10.	11.	12.

Onsite Manager: (Print Name)	Date:	Location of Site Work:
Site	Date/Time Issued: am/pm	Date/Time Expires: am/pm
☐ Is HASP onsite?	☐ Is ERP onsite?	☐ Is JSA onsite?
Authorization Signature:		
Exceptions/Comments		

Job Safety Analysis Worksheet

Contractor:		Date:		JSA No:	
Supervisor:		Permit to work required?	Yes ☐ No ☐	BP Permit No:	
Location of worksite:		JSA team members:	Name / Initials / Name / Initials		
Description of work:					

Activity List the tasks required to perform the activity in the sequence they are carried out.	Hazards Against each task list the hazards that could cause injury when the task is performed.	Risk control measures List the control measures required to eliminate or minimize the risk of injury arising from the identified hazard.	Who is responsible? Write the name of the person responsible (supervisor or above) to implement the control measure identified.

Appendix C
HSSE Program Document Acknowledgement Form

HSSE Program Document Acknowledgement Form
Leviathan Mine Site

I have reviewed a copy of the HSSE Program Document prepared for the above-referenced site and activities. I have read and understood its contents and I agree that I will abide by its requirements.

NAME	SIGNATURE	DATE	COMPANY

NAME	**SIGNATURE**	**DATE**	**COMPANY**