Emergency Response and Contingency Plan

Doris North Project, Nunavut

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North Vancouver, BC

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April 2007

NT-NU 24-HOUR SPILL REPORT LINE

TEL: (867) 920-8130

FAX: (867) 873-6924

EMAIL: spills@gov.nt.ca

Organization/Personnel	Contact Information
NT-NU 24 Hour Spill Report Line	867-920-8130 FAX: 867-873-6924 EMAIL: spills@gov.nt.ca
Environment Canada – Environmental Protection Emergency 24 Hrs.	867-920-6060
RCMP	867-983-1111
Emergency Measures Organization Nunavut	867-979-6262 After hours 800-693-1666
Department of Fisheries and Oceans	867-979- 6274
Miramar Mining Corporation Head Office, North Vancouver #300 – 889 Harbourside Drive North Vancouver, BC, V7P 3S1	Phone: 604-985-2572 FAX: 604-980-0731 1-800-663-8780
General Manager, Environment – Corporate Office in North Vancouver – Larry Connell	Direct Line: 604-904-5579 Cell: 604-374-4142 Home 604-467-3717
Manager of Environmental Permitting & Compliance Monitoring – Corporate Office in North Vancouver, Terri Maloof	Direct Line: 604-904-5564 Cell: 604-836-4355
Exploration Manager – Corporate Office in North Vancouver – Darren Lindsay	Direct Line: 604-904-5563
President – Miramar Mining Corporation – Corporate Office in North Vancouver – Tony Walsh	Direct Line: 604-904-5590 Cell: 604-377-7780
General Manager, Northern Operations – Scott Stringer - Yellowknife	867-766-5311 FAX 867-873-6357
Purchasing Manager, Northern Operations in Yellowknife – Dave Jarvis	867-766-5304 FAX 867-873-8492
Site Superintendent at Windy Camp	604-759-2286 After Hours 604-759-2288
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Logistics at Windy Camp	604-759-2287 FAX 604-759-2283
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Site Medic at Windy Camp	604-729-2285
Discovery Mining Services in Yellowknife – Rod Brown, Steve M., Chris	867-920-4600 FAX: 867-873-8332
Mine General Manager at Doris North	Not Yet Hired
Environmental Manager at Doris North	Not Yet Hired
Manager Community Relations in Kugluktuk – Alex Buchan	867-982-3200
Community Relations Coordinator – Natasha Neglak	867-983-7507
Kitikmeot Inuit Association Lands Manager	867-982-3310

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1.0 PREAMBLE

This Emergency Response and Contingency Plan was developed prior to the start of project construction and is intended to provide a framework and general guidance for emergency response and spill contingency planning at the Doris North Project site during both the construction and operational phases of the project. This Plan is intended to be an integral component of the overall Environment Protection Plan (EPP) for the proposed Doris North Project and will be periodically reviewed and updated as the Project moves through construction, operations and final closure and reclamation.

This Plan was prepared prior to the start of construction, and consequently it can only provide a generic chain of command and response information. Miramar Hope Bay Ltd. (MHBL) will update this Plan once a construction management team has been hired and a communication system developed to support the planned construction activity. MHBL will again update this Plan once the operational management team has been hired and a permanent mine communication system constructed.

Each of these revisions will be implemented on site at the start of each project phase. Implementation will involve training of the site personnel on the procedures contained within this plan. A copy of each revision will be submitted to the Nunavut Water Board (NWB) and the Nunavut Impact Review Board (NIRB) Monitoring Officer for inclusion on the public registry for the Doris North Project at each agency. Copies of each revision will also be submitted to the Nunavut Department of Environment and to Environment Canada in Iqaluit for distribution to their response staff.

This Management Plan is a component of the Doris North Environmental Management System (EMS) and will be updated after the water license has been issued to incorporate any new commitments made by MHBL during the license process and to incorporate any conditions contained within the water license relating to emergency response and spill contingency planning at the Doris North site. This Plan is a “living document” and will be reviewed and updated periodically during the mine life to ensure that site experience with water management procedures are captured and shared amongst all operating staff (adaptive management).

At a minimum, this Emergency Response and Contingency Plan is to be reviewed annually during the first quarter of each calendar year by the mine’s environmental staff and updated as needed to reflect changes in operating procedures. The revised Plan will be made available to the appropriate mine operating staff with appropriate refresher training and sent to the NWB and to the NIRB Monitoring Officer for inclusion in the public registry. Copies of each revision will also be submitted to the Nunavut Department of Environment and to Environment Canada.

2.0 GLOSSARY & DEFINITIONS OF TERMS USED IN THIS PLAN

Adverse effect – Impairment of or damage to the environment, human health or safety or property.

Emergency – Any unplanned occurrence either resulting in, or having the likely potential to result in environmental or human health impact or posing a threat to on-site personnel or the public, or interruption in company operations.

Emergency Log – A detailed written account of times, events and actions taken during an emergency.

Emergency Response Procedures – An outline of specific tasks required to implement the countermeasures called for in the Emergency Response Plan. These tasks are often part of existing operating procedures for the facility.

Spill Response Coordinator – The supervisor or designated individual assigned to coordinate the deployment personnel for the purpose of spill clean up.

Spill Response Team – A predetermined group of individuals whose purpose is to provide on-site expertise and manpower to assist the on scene commander in bringing the emergency to an early, successful conclusion.

Hazard Area – Any area where hazardous conditions exist, either during or as the result of an emergency. All non-essential personnel should be excluded from this area.

Levels of an Emergency – A subjective measure of the overall severity of the emergency.

Risk Assessment – Characterization of the nature, magnitude and likelihood of adverse effects on human health or ecosystems from exposure to one or more contaminating substances through various routes of exposure.

Spill Contingency Plan – A plan providing guidance on the countermeasures needed to minimize or eliminate the consequences of specific hazards affecting the environment, facilities or operations. It also identifies the resources and their locations that are needed to implement the countermeasures**.**

3.0 RESPONSE ORGANIZATION AND REPORTING PROCEDURES

The responsibility for the administration of the Emergency Response and Contingency Plan will rest with the Mine General Manager. The Environmental Coordinator will support the Mine General Manager, and shall, in conjunction with the Safety, Health and Training Superintendent, review the plan on a regular basis and update as needed. The plan will also be reviewed periodically by the mine Occupational Health and Safety Committee.

3.1 Purpose

The purpose of this document is act as a general resource for each member of Management and all employees to enable them to react to emergencies at the Doris North site. The plan is intended to be a tool to facilitate immediate and effective handling of any on-site spill or other emergency. Prompt, effective and organized emergency response by the company will enhance safety for all employees, help minimize the effects of spills and other emergencies on the environment and help maintain effective communication with the appropriate regulatory agencies and the general public.

The Emergency Response and Contingency Plan is intended to provide the mine's operating staff with a summary of emergency response and spill contingency procedures for the Doris North Project facilities that were developed through the environmental assessment and project design process. It similarly provides a summary of the same to the regulatory agencies and to the land owner who have regulatory interest over the mine facilities.

A focus of this Emergency Response and Contingency Plan is to provide:

- A clear chain of command, contacts and reporting procedures to be followed for all responses to spills and other emergencies;
- A framework to be followed to ensure that accountability for the performance of the spill and emergency response activities is defined and communicated to site staff before an event occurs;
- A defined list of responsibilities to be followed in conducting spill clean up and emergency response activities established and communicated to site staff before an event occurs;
- Information on available resources and potential operational hazards/risks that may be encountered during spill clean up and emergency response activities; and
- Reporting and record keeping requirements for spill and emergency response to facilitate tracking of response progress and incident investigation and mitigation planning after the event.

3.2 Site Layout

The Doris North Project is located on the mainland in the West Kitikmeot region of Nunavut approximately 125 km southwest of Cambridge Bay and 75 km northeast of Umingmaktok. The Project is located on Inuit Owned Lands at 68 deg. 09 min. N x 106 deg. 40 min. W, 5 km south of Roberts Bay, an extension of Melville Sound which connects with Bathurst Inlet about 80 km west of the Project. The location of the key surface facilities at the Doris North site are shown in Figure 3.1.

3.3 Prevention

MHBL is committed to a prevention strategy of ongoing maintenance, inventory control, staff training and vigilance of all aspects of the work. The following will be standard practice on the Doris North site:

Inventory control: All hazardous materials will be subject to strict inventory control from the time they enter the site. Logs will be kept as required for inspection by the regulatory agencies.

Storage: All hazardous goods will be stored in a manner that is required for the individual product as set out in the manufacturers' Material Safety Data Sheets (MSDSs) (see Appendix B for list of chemicals and fuels on site).

Daily inventory Balance: All liquid products will be checked on a daily basis and a balance sheet of inflow and outflow maintained.

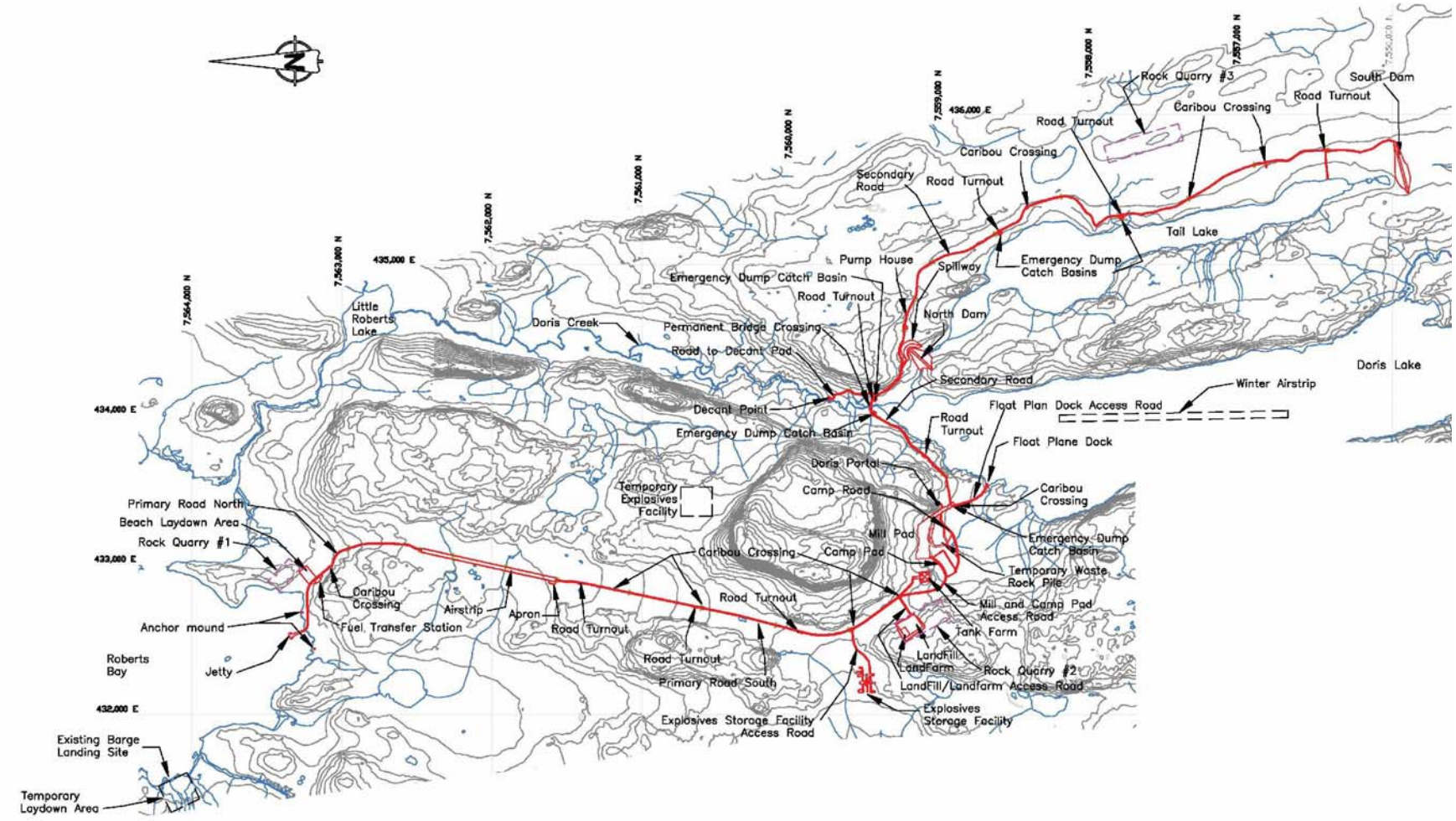
Disposal: All hazardous materials will disposed in strict compliance with the laws and regulations of Nunavut. If such laws and regulation do not exit, use similar regulations for other provinces within Canada (for specific products etc).

Staff Reminders: Pre-Job meetings/safety meetings will contain a component to constantly remind employees to be on the look out for innovative ways to improve environmental and safety performances.

3.4 Distribution

This document will be available at strategic areas on the property (through your supervisor as this is a controlled document) to all employees for reference. The Safety, Health and Training Superintendent, is responsible to keep the information current and distribute updates to all participants as required. Copies of this report will be distributed to all stakeholders including the Nunavut Water Board, the Nunavut Impact Review Board, the Kitikmeot Inuit Association (KIA), Environment Canada (EC), Fisheries and Oceans Canada, RCMP Cambridge Bay and the Nunavut Department of Environment (GNDoE).

Figure 3.1: Doris North Project Site Infrastructure Layout Map



3.5 Organization and Responsibility

In the event of an onsite spill or emergency incident the Mine General Manager will have the overall control of the site and all aspects of the response plan. The Mine General Manager will be assisted and supported by the Surface/Maintenance Superintendent who is responsible for the fuel handling and storage, the powerhouse and the mechanical shop. The Safety, Health and Training Superintendent and the Environmental Coordinator will also play a supporting role by keeping current with regulations and providing advice during incidents as well as providing liaison with the regulatory agencies. If necessary, the Mine General Manager can also call on the Underground Superintendent and the Mill Superintendent. The following charts present the planned normal chain of command within MHBL (Figure 3.2 – Corporate Office) and at the Doris North Project site (Figure 3.3):

Figure 3.2: MHBL Chain of Command

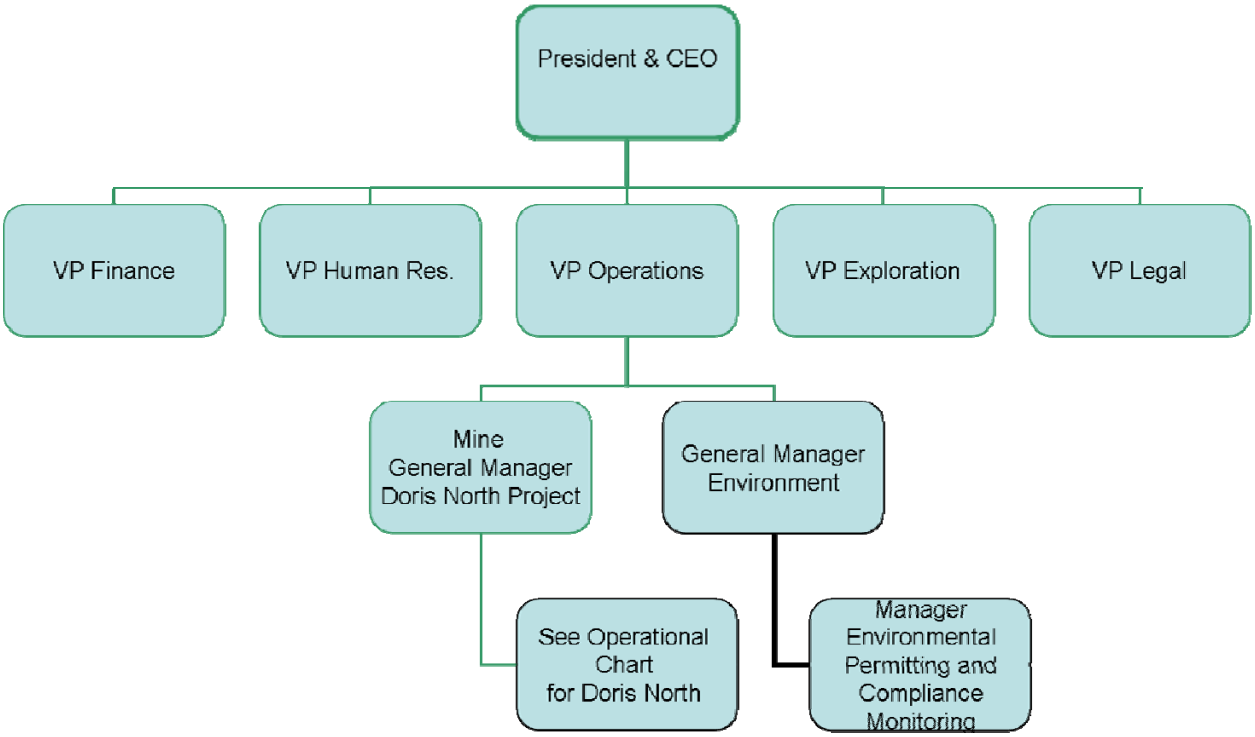
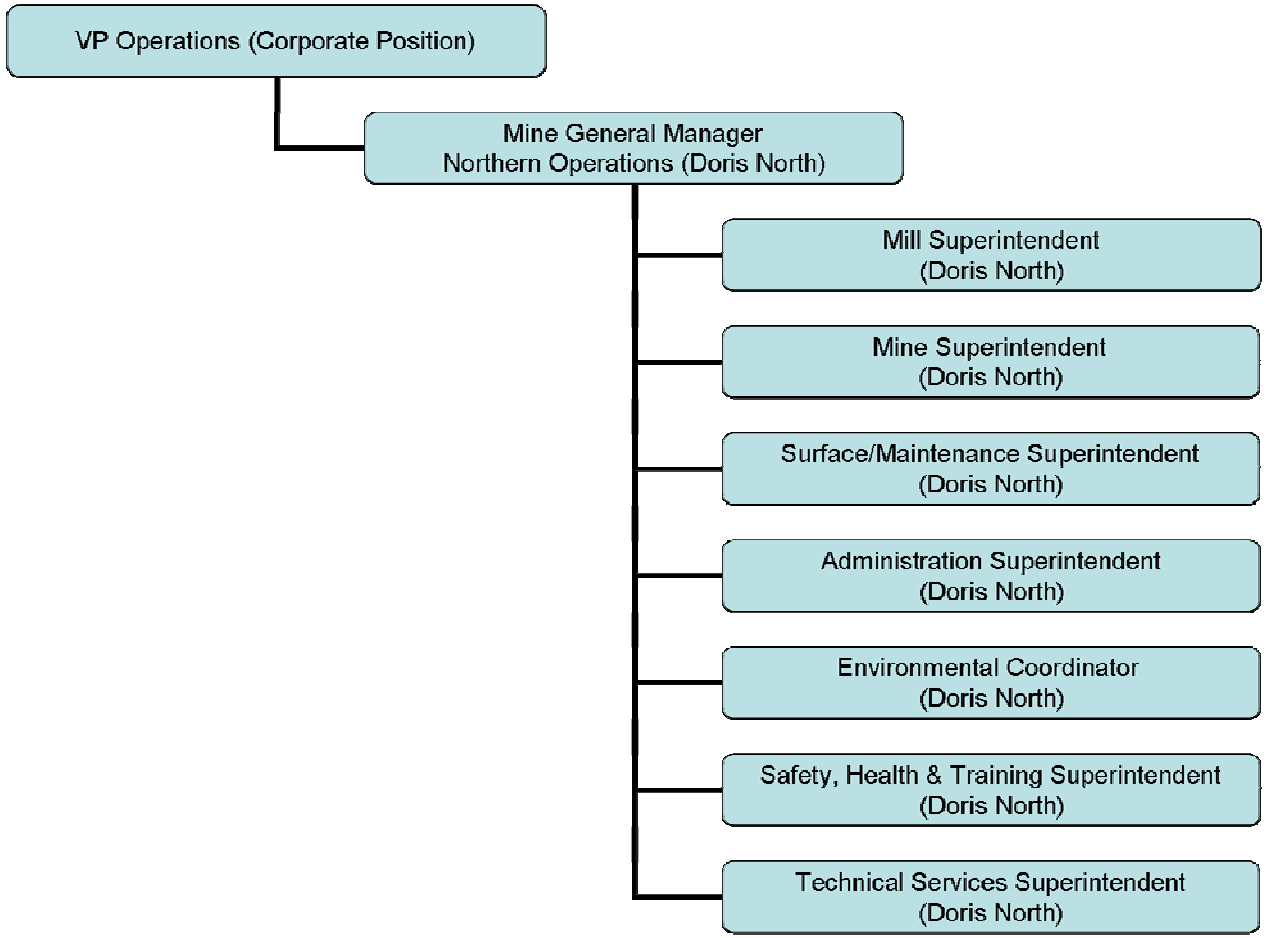


Figure 3.3: Proposed Doris North Responsibility & Accountability



3.6 Communications

During a spill or emergency incident, staff on site will report through their chain of command to the Mine General Manager. The Mine General Manager will maintain regular contact with the Corporate office.

During such an event, no on-site staff should communicate directly with regulatory agencies, the press or other parties off the mine site. All external communication is to be through the Mine General Manager or through a communications representative designated by the Mine General Manager. This is to prevent inaccurate information being spread during an emergency that could lead to inappropriate response, cause undue stress to family members awaiting word, or cause undue panic to members of the general public.

The site will be equipped with a satellite receiver and phone system as well as portable radios and a base station at the site office. All front line supervisors will carry a portable radio while working on site. Independent satellite phones will be available for crews working off site and for emergency communications if the phone system fails.

3.7 Training

3.7.1 Orientation and Training

All employees, contractors and visitors will be introduced and instructed on the policies and procedures established within this plan. Area specific inductions will be given to individuals working in high risk activity areas such as the mill, underground or in handling hazardous materials.

Safety and environmental concerns and awareness will also be discussed at every safety meeting and at the start up of any new operations that may affect the environment. If an incident happens all employees will be informed and re-instructed and retrained as deemed necessary.

The training for spill response will be part of the worker orientation at Doris North. All personnel will be made aware of the products present on site through the orientation program and the availability of Material Safety Data Sheets (MSDSs) in prominent locations. Supervisors who may be called upon to fill the roll of Spill Response Coordinator, Spill Response Supervisor and personnel who will be called on to act as the Clean up Crew will receive additional training allowing them to respond quickly and safely to any spill on the mine site. All employees on site will have valid WHMIS certificates and will be familiar with the layout and content of MSDSs for the hazardous materials to be used on site.

Each employee will be made aware of the locations of storage facilities and the locations of spill containment and recovery equipment.

3.7.2 Responsibilities

The ultimate responsibility for up-to-date emergency training plans is with the Safety, Health and Training Superintendent. The Safety, Health and Training Superintendent and

Environmental Coordinator, in consultation with the Mine General Manager or designate, will review the emergency preparedness and response procedures on an annual basis or as required. Review of the emergency response procedures will include the periodic verification of any telephone number contacts for the various organizations that may be needed. Such verification shall be undertaken at a minimum of once per year (see frequency and timing as discussed in Section 1). Revisions will be made to the procedures where necessary to comply with changing site conditions and any new relevant legislation. Personnel will be notified of any changes and if necessary retraining will take place. In the case that someone other than the Safety, Health and Training Superintendent and the Environmental Coordinator conducts these reviews, findings of these reviews will be made available to the Safety, Health and Training Superintendent and the Environmental Coordinator for review, and for possible improvements in the procedures.

3.7.3 Drills and Practices

Personnel at the site will undertake periodic testing of the emergency response procedures. These tests will be undertaken on a twice-yearly basis. These intervals shall be more frequent if there is a high turnover of employees at the site. The outcome of each exercise is to be recorded, and reviewed for areas of improvement by the Responsible Person for the respective area. The findings will be forwarded to the Safety, Health and Training Superintendent and the Environmental Coordinator.

3.7.4 Areas Covered

Emergency preparedness training must, at a minimum, address the following:

- Medical emergency, accident or fatality;
- Fuel spill, chemical or reagent spill, spill of ANFO or Ammonium Nitrate, Tailings or effluent spills or leaks;
- Fire;
- Flood;
- Earthquake;
- Extreme cold emergency;
- Equipment or people falling through ice;
- Tailings or water containment overtopping or breach (if applicable);
- Aircraft missing or crash;
- Missing person(s); and
- Winter survival training.

3.7.5 Employee Safety Handbook

MHBL believes that all incidents and near misses are preventable. An employee safety handbook has been developed and will be given to each employee upon completion of the Site Induction process. The handbook will be updated from time to time as new information or experience comes available.

The Safety, Health and Training Superintendent is responsible for keeping the Employee Safety Handbook updated and making them available to each new employee upon arrival at any MHBL property along the Belt[1].

[1] A copy of the MHBL Occupational Health and Safety Program, including the employee indoctrination program and the employee safety handbook can be found as Appendix A to Environmental, Health and Safety Management System Outline, Supporting Document S9 to the Revised Water License Application Support Document, April 2007.

4.0 GENERAL SPILL RESPONSE PLAN

4.1 Introduction

The roles and responsibilities of Doris North Project personnel, contractors, and Government are described. Response and reporting procedures are also outlined.

4.2 Purpose

Recognizing that spills or leaks of petroleum products and chemical substances have the potential of posing a variety of hazards and can endanger both short or long term public health and the environment, MHBL has implemented this Spill Response Plan to address accidental releases of hazardous substances. Hazards that may exist at Doris North Project site include the release of toxic vapours, fire, spills, and explosions.

4.3 Objectives

Principal objectives of the Spill Response Plan are:

- To stop the ongoing release of a spilt hazardous material as quickly as possible;
- To contain any spilled material in as timely a manner as possible to minimize potential for the material to spread, especially into any water course or water body;
- To provide information to clean up crews, employees, contractors, KIA, and government agencies in the event of a spill;
- To provide information to clean up crews, employees, contractors, KIA, and government agencies in the event of a spill;
- To promote the safe and effective recovery of spilled materials;
- To comply with the MHBL environmental and safety policies;
- To comply with federal and territorial regulations pertaining to the preparation of contingency plans and reporting requirements; and
- To minimize the negative impacts of spills on the receiving environment (water/ice and/or land).

4.4 Scope

This Plan addresses the organization of the Doris North Project spill response and related emergency measures. Alerting and notification procedures and clean up strategies are outlined along with the duties and responsibilities of key spill response personnel.

In reaching decisions on containment and clean up procedures, the objectives of these procedures are to minimize the following:

- danger to persons;

- pollution to watercourses;
- area affected by the spill or fire;
- degree of disturbance to the area and watercourses during clean-up; and
- degree of disturbance to wildlife.

Notwithstanding contingency plans, MHBL will adopt a policy to implement preventative measures as its first line of defence against the possibility of accidents.

Hydrocarbon products will generally be stored at the fuel tank farm, at the plant site or at the powerhouse. The location of these facilities along with storage of other hazardous materials is shown on the site map in Figure 4.1 below[2].

4.4.1 Flammable Immiscible Liquids

These substances are all hydrocarbon-based and will ignite under certain conditions. Gasoline and aviation fuel pose the greatest fire (and safety) hazard and usually cannot be recovered when spilled on water. The remaining materials generally do not pose a hazard at ambient temperatures. They are all insoluble, float unless mixed into the water column and can be recovered when safety allows. They are:

- Gasoline Low Flash Point (burns easily);
- Jet A;
- Turbo B;
- Diesel Fuel;
- Waste Oil; and
- Lube Oil High Flash Point.

4.4.2 Flammable Compressed Gasses

- Usually highly explosive;
- May be heavier than air and therefore concentrate in low lying locations; and
- May be lighter than air and highly noxious or toxic.

Propane, acetylene and oxygen are the most likely flammable gases to be on site. Knowing the approximate amount of petroleum products and where they are located helps to determine the type and quantity of environmental emergency response equipment required to be stationed at each of the locations. Other factors crucial in containing an unexpected spill are slope elevations and whether or not AST tanks are contained in a lined secondary containment berm.

[2]The reader is referenced to Section 3 (Fuels), Section 4 (Explosives) and Section 5 (Mill Reagents of the Hazardous Materials Management Plan, Supporting Document S10e to the Revised Water License Application Support Document, April 2007.

4.4.3 Other Products

Because of the nature of the milling process, there are chemicals and reagents that are needed for use in the gold abstraction process. These products are:

- Reagents such as Sodium Cyanide, Sodium Hydroxide, Copper Sulphate, Frothing Agent, 3418A Promoter, Potassium Amyl Xanthate, Hydrogen Peroxide, sodium metabisulphate, Sulphuric Acid, Activitated Carbon, Smelting Flux (Borax Sodium Nitrate And Silica Sand).

In addition to the above, the underground mine will use explosives (ammonium nitrate fertilizer, emulsions and high explosive (stick Powder))[3].

There is also risk from spills from hazardous materials generated onsite, specifically:

- Domestic sewage; and
- Tailings.

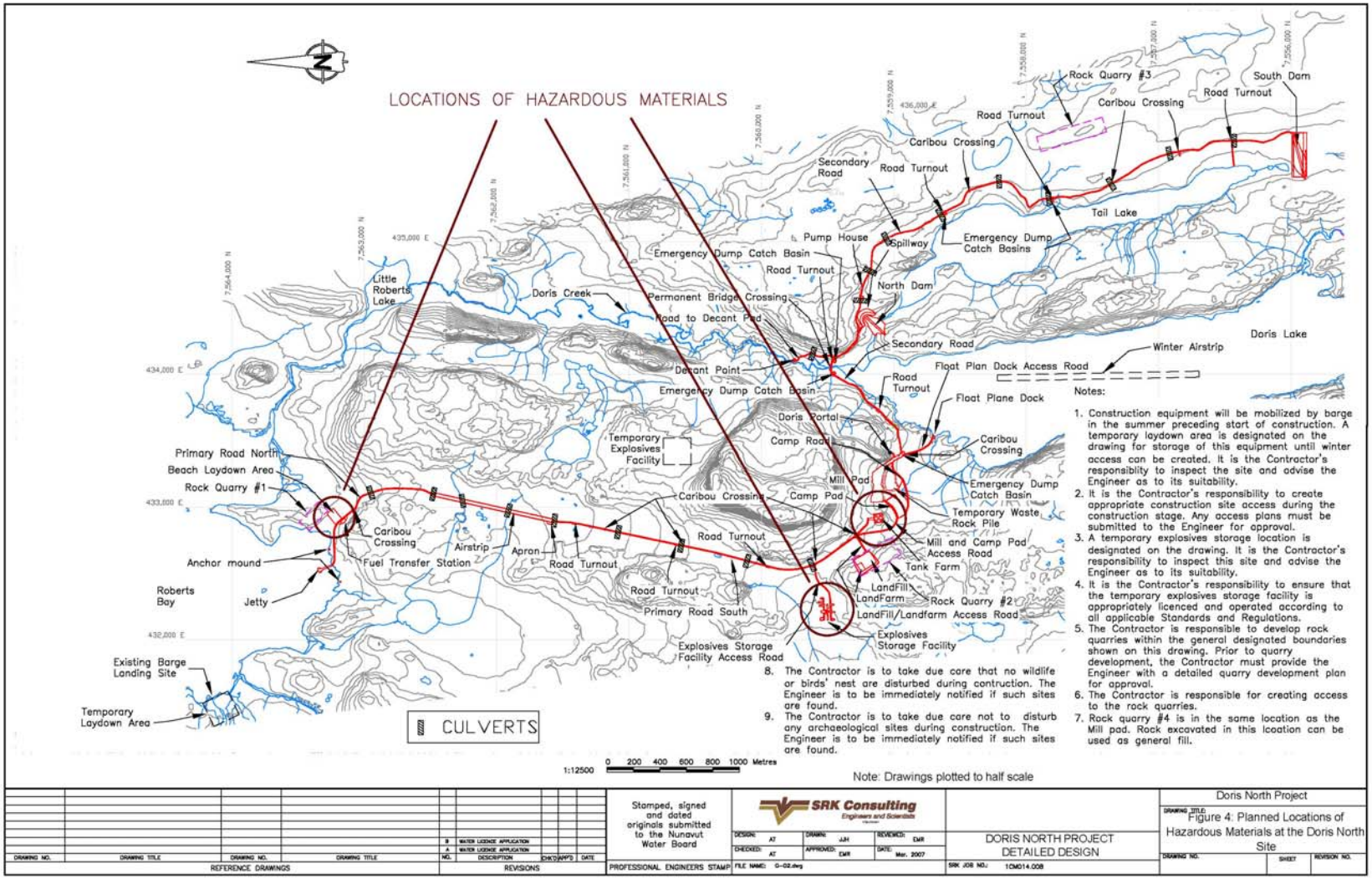
Specific response procedures are listed on each of the MSDS sheets which are attached as Appendix B to this Plan. Fuel and hazardous materials can be damaging to vegetation, soil, surface water, ground water, wildlife, aquatic organisms, historic resources and human health and safety. Details pertaining to the maximum volumes of fuel and chemicals that will be stored on-site during construction and operation activities are provided in the Hazardous Materials Management Plan[4].

Figure 4.1 is a site map that provides the following information in the event of a spill or emergency:

- Location of hazardous materials;
- Location of culverts;
- Topography of area; and
- Location of surface water bodies.

[3] See Explosives Management Plan, Supporting Document S10f to the Revised Water License Application Support Document, April 2007.
[4] Hazardous Materials Management Plan, Supporting Document S10e to the Revised Water License Application Support Document, April 2007.

Figure 4.1: Site Map Showing Planned Locations of Hazardous Materials at The Doris North Site



4.5 Spill Response Procedure

In the event of a fuel or hazardous material spill, the following general procedures will apply:

Spill clean up, short and long term remedial strategy and reporting process will conform to applicable legislated and permit requirements;

The individual who discovers the leak or spill if safe to do so will make a reasonable attempt to immediately stop the leakage and contain the flow; and

Spill location, type of fuel or hazardous material, volume and terrain condition at the spill site will be determined and reported immediately to the Site Superintendent, who will activate the MHBL Spill Response Procedure.

4.5.1 Responsibilities

During the training (see section 3.7) site personnel will learn their roles in a spill incident. The following are the roles for the Doris North and On-site Contractor Personnel.

On-Scene – First Respondent:

- Assess the initial severity of the spill and note any safety concerns;
- Report the incident to immediate supervisor immediately;
- Determine the source of the spill and stop or contain it, if possible; and
- Participate in spill response as member of clean up crew.

On-Scene Spill Response Coordinator

At Doris North, the Mine General Manager will typically designate a senior manager who is on site with the appropriate skills to assume the role of the On-Scene Spill Response Coordinator, who will then report directly to the Mine General Manager during the spill response and clean up, and:

- Decides if additional equipment is required to contain and clean up spills; and
- Oversees the clean up operation until it is completed satisfactorily.

Spill Clean Up Supervisors:

- Supervise spill clean up crew;
- Assist in initial and ongoing response efforts;
- With work crew, take initial action to seal off the source and contain spill;
- Continue actions until relieved or supplemented by other Supervisor;
- Decide with On-Scene Coordinator if mobilization of additional equipment from Spill Response Organization or Contractor is warranted; and
- Assess whether burning is a viable clean up measure specifically for a spill of diesel fuel on ice or in the marine environment. Burning off diesel fuel will only be

undertaken as a spill clean up measure after receiving approval from the Mine General Manager. The Mine General Manager will consult with the site management team including the on-site Environmental Coordinator if burning is being considered. The Mine General Manager will only authorize such an approach after consultation with regulatory authorities (GNDoE, EC, DFO and KIA) and upon reaching a general positive consensus.

Spill Clean up Crew (Emergency Response Team):

- Take appropriate response measures;
- Conduct clean up of spills under direction of Spill Clean up Supervisor(s);
- Deploy booms, sorbents and other equipment and materials as required; and
- Continue clean up as directed by Spill Clean up Supervisor until relieved.

Mine General Manager:

- Reports the spill to NT-NU 24-Hour Spill Report Line at (867) 920-8130;
- Records the time of the report, source of information and details on location, size, type of spill as well as any other information available on the Spill Report Form;
- Responsible for all communication with the media;
- Ensures that all press releases are accurate and in accordance with company policy;
- Ensures all reporting requirement are met to MHBL standard and regulative requirements; and
- Initiates Mutual Aid Agreements if response requires outside assistance.
- Notifies government agencies, Miramar head office, and Corporate Environmental Manager on spill details;
- Oversees completion and distribution of Spill Report; and
- Ensures investigation:
    - Identifies measures to prevent similar spills in future; and
    - ENSURES RESPONSE TEAM IS ADEQUATELY TRAINED IN SPILL RESPONSE.

4.6 Emergency Contacts

The Mine General Manager or his designate is responsible to:

- By phone, contact the regulatory authorities within 24 hours of a reported major spill; and
- Fax in the NT-NU Spill Report Form.

The Mine General Manager (using the NT-NU Spill Report Form – Appendix C) will be responsible to notify the NT-NU 24 hour Spill Report line **(867 920 8130) (FAX: 867 873 6924; EMAIL: spills@gov.nt.ca)** and the Kitikmeot Inuit Association Lands Manager **(867 982 3310)**. If the volume spilled required by mandatory reporting as specified in Schedule B from the Regulation R-068-93 Spill Contingency Planning And Reporting Regulations(July 22 1993) Consolidation Issued July 15 1998 (see Appendix C). Other key contact numbers are included in Table 4.1.

Table 4.1: Notification Contact List

Organization/Personnel	Contact Information
NT-NU 24 Hour Spill Report Line	867-920-8130 FAX: 867-873-6924 EMAIL: spills@gov.nt.ca
Environment Canada – Environmental Protection Emergency 24 Hrs.	867-920-6060
RCMP	867-983-1111
Emergency Measures Organization Nunavut	867-979-6262 After hours 800-693-1666
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Community Relations Coordinator – Natasha Neglak	867-983-7507
Kitikmeot Inuit Association Lands Manager	867-982-3310

In addition, to ensure compliance with Section 36(3) of the Fisheries Act and Section 35 of the Migratory Bird Regulations all spills of fuel or hazardous materials, regardless of quantity, will be reported immediately to the NT-NU 24-hour Spill Report Line where the release:

- Is near or into a water body (including frozen);
- Is near or into designed sensitive wildlife habitat; or
- Poses a threat to a listed species at risk or its critical habitat.

4.6.1 Log of Contacts

- The Mine General Manager or designate will maintain a log of all external contacts made which will include the date, time and organization contacted, essence of the notice or information transmitted/received, whenever possible the name and title of individuals receiving or issuing notification or instructions.

4.6.2 Communications

- The Mine General Manager will maintain a standby position at the site office, or designate some other competent person, in order to maintain spill related communications; and
- Depending on the severity of the spill, any outside help if required is the responsibility of the Mine General Manager.

The proposed chain of command for communication during a spill or emergency response event is presented in Figure 4.2.

4.7 Discovery and Response

- Any employee noticing an environmentally hazardous spill is required to notify immediately their supervisor or the Mine General Manager or the Spill Response Coordinator; and
- The person reporting will try to ascertain whether there is a danger to life and if it is safe attempt to stop the spill.

4.7.1 Response

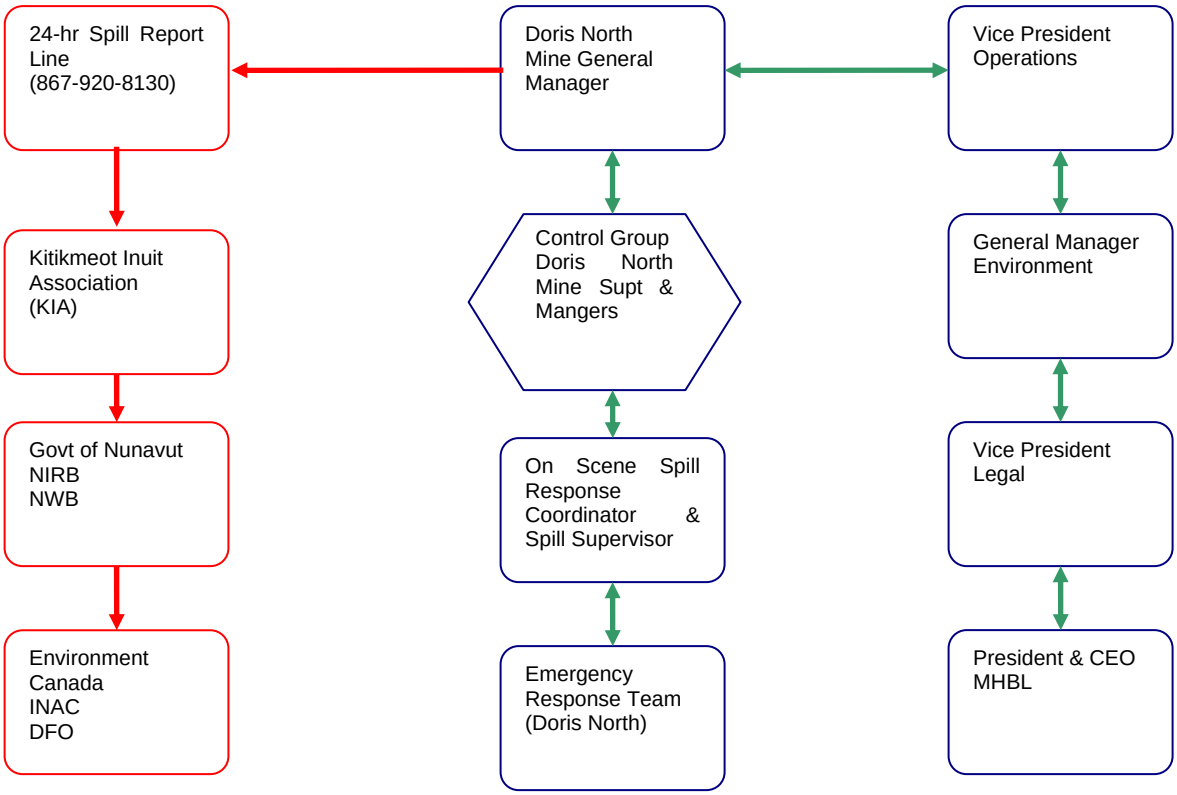
- The Mine General Manager (or the designated Spill Response Coordinator) shall proceed immediately to the scene where he/she will make an assessment of:
    - Specific hazards of an imminent nature that may endanger life of humans or animals;
    - The type of material spilled;
    - The estimated quantity;
    - The potential for further spillage; and
    - Criteria and equipment required to contain and clean up the spill.

- The Spill Response Coordinator will advise the Mine General Manager of any additional notifications that depend on the quantity (see Appendix C) that he/she feels is necessary. The Spill Response Coordinator will also advise if any additional outside equipment is needed.

- The Spill Response coordinator will then directly control all activities relating to the stemming of additional flow or escape, containment and extraction of spilled material and the restoration of the site.

- The Spill Response Coordinator will ensure that containment and recovery equipment is available on site in such quantities and character to sufficiently respond to the most serious spill condition identified through the materials inventory.
- The Mine General Manager will liaise with MHBL CEO, Vice President – Operations and General Manager Environment, regulatory agencies (GNDoE, EC, DFO, NWB) and the KIA to keep them informed as to the status of the ongoing operations.

Figure 4.2: Chain of Communication for Spill Response



4.8 Disposal

- The disposal of spilled material and/or contaminated soil is governed under the Waste Management Act and its regulations. A copy of the Act and the Special Waste Regulation and the Contaminated Sites Regulation will be maintained on site for reference.
- Clarifications and information regarding waste management and disposal issues can be obtained from the Nunavut government and DIAND. If appropriate, petroleum contaminated top soil will be removed and placed in the Doris North landfarm treatment area under the direction of the on-site Environmental Coordinator for treatment.

- The Spill Response Coordinator and Mine General Manager shall investigate the most appropriate disposal options for the spilled material. Disposal may include burning, disposal in waste areas or recycling.

4.9 Documentation and Reporting

- The Spill Response Coordinator or a designate will be responsible to attend the scene of any spilled materials or contaminated soils to photograph and measure the affected area. They shall be responsible to engage properly qualified personnel to collect samples of the materials or soils. No person should sample or handle spilled hazardous materials unless the person has received adequate training in safe sampling procedures, use/selections of protective clothing and identification of the hazards associated with the respective spilled material.
- The Mine General Manager will submit a detailed report to the appropriate agencies within thirty (30) days starting from the day of the reported spill. Progress reports are to be submitted regularly until the completion of remedial activities. The report will include but not be limited to:
    - Reporting person's name and telephone number;
    - Name and telephone number of the person/company who caused the spill;
    - Location and time of the spill;
    - Type and quantity of the substance spilled;
    - Cause and effect of the spill;
    - Details of action taken or proposed;
    - Description of the spill location and of the area surrounding the spill;
    - Details of further action contemplated or required;
    - Names of agencies on the scene;
    - Names of other persons or agencies advised concerning the spill;
    - Chronological sequence of events including internal and external notifications;
    - Copies of analytical results from external laboratories; and
    - Analysis of the events leading up to the spill, and a critique of the internal response and handling of the incident.

4.10 Spill Equipment

- Spill kits will be placed in the following locations:
    - Tank Farm;
    - All refueling Stations;
    - Incinerator;
    - Power House;
    - Water Intake;
    - Reagent Storage area;
    - Float plane Landing Dock area;
    - Fuel Delivery truck;
    - Jetty area;

  - Maintenance workshop;
  - Airstrip;
  - Underground; and
  - Drill sites.

- Each spill kit will contain a minimum of:
  - 1 roll absorbent;
  - 2 plug and dyke kits;
  - 1 3mx 4m tarpaulin;
  - 2 Tyvek suits;
  - 4 mini booms;
  - 25 spill pads;
  - 2 pr of neoprene gloves;
  - 2 splash proof goggles.

- Earth moving equipment such as a front end loader, dump trucks and a backhoe will also be available on-site for constructing dykes and moving contaminated material. The fuel delivery truck will carry a spill response kit containing absorbent pads and material as well as large disposal bags for small spills.

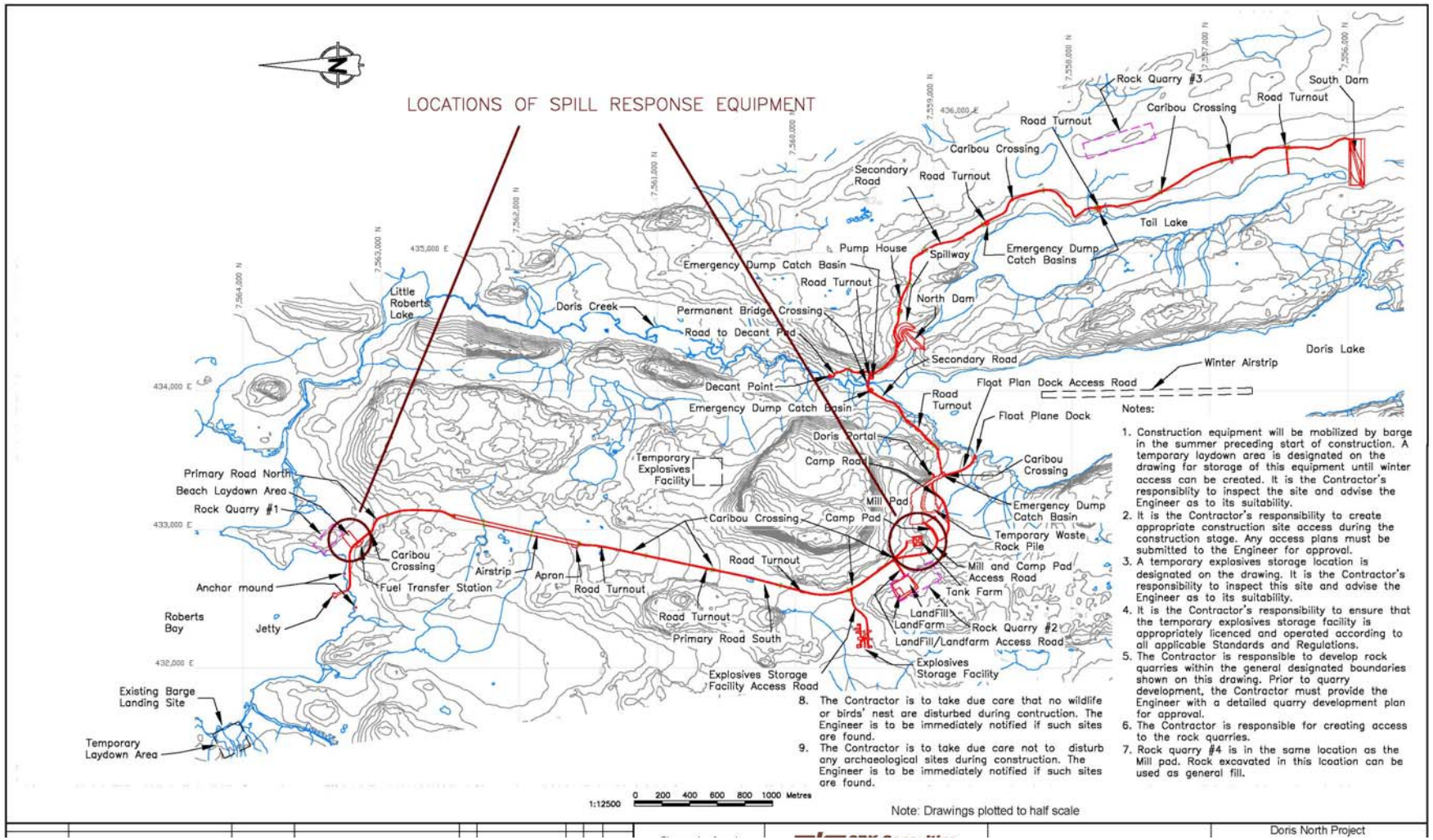
- MHBL will also maintain the following emergency spill response equipment within a moveable container:
  - 450 feet of 24" Solid Floatation Boom;
  - 34 lb Grapnel Anchors;
  - 4 Norwegian Anchor Buoys;
  - Anchor lines;
  - 150 feet Towline;
  - 20 foot Response boat, c/w 80 HP outboard motor;
  - 8 foot Zodiac;
  - 1TDS-118 Drum Skimmer;
  - 1 P10E Power Pack;
  - 1 Pump;
  - 175 L Drum Response Kits c/w lids;
  - POL resistant gloves;
  - POL resistant goggles;
  - Toolbox c/w assorted tools;
  - 2 - 6.5 Gallon (25 L) containers c/w lids;
  - 300 foot Nylon rope (3/8);
  - Bags of Oclansorb Peat Moss;
  - Bundles of Oil Sorbent Pads;
  - 20 Oil Sorbent Mini Booms;
  - 2 Rolls of Geotextile (12 ft length); and
  - 12 Boxes of Sorb Sox.

This emergency response container will normally be stored at the plant site pad but will be moved and stored at the Roberts Bay lay down area whenever the annual sealift barge is in Roberts Bay.

- An additional emergency field response kit will be maintained at the plant site for quick deployment as needed. This kit will contain the following at a minimum:
    - 50 feet of ½ Inch Rope;
    - 2 Spark Proof Shovels;
    - 1 Bundle of Oil Sorbent Pads (250);
    - 1 Drum Roll Kit;
    - 20 Emergency flags/markers;
    - 3 pairs Safety Glasses;
    - 3 Chemical Resistant Safety Gloves;
    - 5 Sorb Socks;
    - Emergency First Aid Kit;
    - Roll Fluorescent Tape;
    - 1 Container of Gap Seal Drum Sealant;
    - Axe;
    - Hammer;
    - 5 Hazardous Waste Bags;
    - Bag of Oil Sorbent Peat Moss;
    - 4 Rakes;
    - 4 Grubbers;
    - 2 Flashlights;
    - 2 Lifejackets;
    - 4 Suits of Rain Clothes;
    - Hip Waders;
    - Chest Waders;
    - Knee Rubbers; and
    - 1 GPS Unit.

The location of these two spill response equipment caches is shown on Figure 4.3.

Figure 4.3: Planned Location of Spill Response Equipment



4.11 Spill Response Action Plans

4.11.1 Spill Response Theory

Knowing what to do when spills happen is essential to employee safety as well as minimizing harm to the environment. Planning, training and drills are vital to ensuring everyone knows what to do and when to do it when an emergency arises.
The following steps are taken during any spill response:

- **Assess Spill Hazards and Risks:** Spill Response Coordinators, Spill Clean up supervisors, the Emergency Response Team (ERT) and other employees involved in spill clean up activity will be trained to not endanger themselves in order to identify a spilled material;

- **Notify Site Management:** is required any time a spill is observed or when a spill cannot be identified (no matter the volume), or when the spill response team will be needed. By notifying the proper people, efforts can be coordinated and initiated;

- **Protect Responders:** when a spill has been properly identified, appropriate personal protective equipment (PPE) is available to handle the hazardous materials on site. Ensuring the safety of the response team is critical;

- **Review Material Safety Data Sheets (MSDSs):** MSDSs are used to determine the necessary PPE required to respond to spill situations (e.g., protective suits, boots, gloves, respiratory protection, detection equipment and monitors, etc.);

- **Refer to Spill Response Action Sheets found in Appendix B;**

- **Check operating systems, spill response equipment and PPE,** on a regular basis;

- **Tend to injured personnel:** personal safety is the highest priority. Attending to injured personnel in the spill area is the first goal. Regular drills will be conducted to ensure ERT responders are trained to perform these functions quickly and efficiently;

- **Stop the source:** this could mean rolling or up-righting a drum so that the hole is on top, patching a leaking hole, or locating and turning off emergency valves. This step can occur at the same time as the spill is being contained;

- **Contain the spill:** the most common method is to place either absorbent or non-absorbent dikes around the perimeter of the spill;

- **Clean up the spill:** after injured personnel are removed from the spill zone, the perimeter of the spill is clearly marked and the source of the spill is stopped, responders will begin to clean up the spill. They will work from the outside edge of the spill toward the centre to ensure the spill has been cleaned up. Various tools

such as absorbent mats, socks and pillows are used to soak up small liquid spills, while vacuums and portable pumps can be utilized for larger spills. Heavy equipment can also be used for very large spills (e.g., bulldozers, gravel trucks, and forklifts. Neutralization of acidic spills using lime or soda ash is an option; and

- **Contain or bag spent response materials:** to facilitate recycling or disposal.

The following decontamination steps may be taken during a spill response:

- **Set up decontamination facilities:** responders are trained to do this before entering a spill response area. This is especially important if there are victims, as these persons will need to be decontaminated prior to triage and treatment;

- **Decontaminate the area where the spill occurred:** may include cleaning tools, spill response equipment, PPE and the responders themselves; and

- **Monitor the condition of responders:** on-site safety officers are trained to monitor the condition of personnel working on the decontamination lines, particularly if these people wear confined and bulky PPE (e.g., Level I suits). Decontaminating responders and tools can be labour intensive and workers can easily become fatigued from heat stress.

4.11.2 Spill Response Action Plans - General

For large volume hazardous materials on site, the spill response actions appropriate for each type of hazardous material and supplemental information on the chemical and physical properties is found in the MSDSs in Appendix B.

Respond Quickly

- Identify spilled material;

- Protect yourself and others (e.g., be alert and take all necessary precautions);

- Assess the hazards in the immediate vicinity of the spill or leak;

- Shut off ignition sources in the vicinity of the spill for flammable liquids, – NO SMOKING;

- Call for assistance IMMEDIATELY, if anyone is injured;

- Attend to injured, if possible;

- Assess the severity of the spill. Assess if the spill, leak or system failure can be readily stopped or brought under control;

- Call for assistance;

- Mobilize the ERT (the On-scene Coordinator does this);
- Keep people away from the spill site;
- Wear impervious clothing, goggles and gloves (appropriate for the material being dealt with);
- Approach spill from up-wind - ONLY IF IT IS SAFE TO DO SO;
- Stop product flow if possible; and
- Contain and recover spill as soon as possible.

Respond Safely

- Do not contain gasoline/aviation fuel as vapours might ignite;
- Allow gasoline or aviation fuel spills to evaporate;
- Follow specific spill response actions (see Appendix B for MSDSs and for chemical and physical properties of hazardous materials); and

Report spill to the 24 hour spill report line (**867) 920-8130** (Mine General Manager does this). Generic actions to be taken on land, water, snow and ice follow.

4.11.3 Action Plan for Liquid Spills on Land

Liquid spills on gravel, rock, soil and vegetation can be contained or cleaned up by:

- Placing soil berms in front of the leading edge of the spill, down slope of the spilled liquid. Plastic tarps can then be placed over the berm and at the foot of it to permit the liquid to pool on the plastic for easy recovery. Absorbents can also be used for this purpose. These pads can possibly be squeezed into empty drums and re-used. Larger pools can be pumped back into drums or empty storage tanks or a 'TIDY' tank, if readily available. It is very important to prevent the liquid from entering a body of water where it will likely have a greater environmental impact;
- Soaking up stained rock with granular absorbent materials or absorbent sheeting. Depending upon the volumes generated, the spent absorbent should be placed in drums for later disposal in dumpsters;
- Removing the contaminated soil and/or vegetation. Contact the Environmental Advisor for suggested approaches. This can be followed by contacting the government authority identified by the NT-NU 24-Hour Spill Report Line (867) 920-8130 to discuss the approach and to obtain approval to proceed with the approach; and

- Storing the contaminated soil or gravel in drums at the Hazardous Waste Storage Facility until they are shipped off-site for disposal.

4.11.4 Action Plan for Fuel Spills on Water

The following steps can be taken for spills on water:

- Limit the area of the spill on water;
- Recover small spills on water with absorbent pads and similar materials;
- Deploy absorbent boom(s) to contain the spill area. The effectiveness of this action can be limited by winds, waves and other factors. Absorbent booms can be drawn slowly in to encircle spilled fuel and absorb it. These materials are hydrophobic (absorb hydrocarbons and repel water). Sorbent booms are often relied on to recover hydrocarbons that escape containment booms; and
- Placing a large wide board (e.g., plywood) vertically across the culvert inlet to control the water level while retaining the spilled fuel. The board can be secured by stakes and absorbent materials used to recover the fuel on the water surface.

4.11.5 Action Plan for Fuel Spills on Snow

Fuel spills on snow can be contained and recovered by:

- Using the snow as a natural absorbent to collect spilled fuel;
- Compacting the snow into snow-berms and then placing a liner of plastic sheeting; and
- Scraping up and storing the snow-fuel mixture in a lined containment area or placing it in drums for later disposal or incineration.

4.11.6 Action Plan for Fuel Spills on Ice

Fuel spills on ice can be contained or cleaned up by:

- Compacting the snow around the edge of the spill to act as a berm. Time permitting; the berm can be lined with plastic sheeting. The underlying ice will prevent or reduce the rate of seepage of the fuel into the water below the ice;
- Scraping up contaminated snow/ice and placing it in covered drums or in a lined berm area on land;
- Deploying skimmers in open-water areas may be an option in the early fall or late spring. However, under normal ice-covered periods, this is unlikely in the Doris North Project area;

- Deploying skimmers in broken-ice conditions may be effective as spills tend to spread far less than in ice-free water;

- Pumping fuel spills through holes cut into the ice are extremely difficult under those conditions. Fuel that flows through breaks or cracks in the ice and gets trapped under the ice, is extremely difficult to recover; and

- Burning on-ice offers the potential to remove the majority of a spill with minimal residue volumes left for manual recovery. Burning on-ice has always been considered as a primary arctic spill countermeasure. Permission may be given from the government to burn off pools of fuel (contact the NT-NU 24-Hour Spill Report Line – see Sections 4.5.1.3 and 6.2.2.3).

4.12 Fuel Storage and Transfer Systems

The main fuel storage facility is made up of five steel single-wall tanks each containing approximately 1.5 million litres of diesel fuel. The tank area is lined and bermed.

Vehicles and equipment will obtain fuel either at pump stations, from trucks equipped with 'TIDY' tanks, or fuel service trucks. Fuelling is conducted in controlled areas. Fuel containers (including drums) are marked with the product type and organized according to a 'first in-first out' strategy. Products belonging to different owners (contractors) are segregated to avoid confusion.

4.12.1 Fuel Storage and Transfer System - Spill Preventative Measures

Fuel spills could occur from:

- Leaks in storage;

- Transfer between fuel storage and vehicles;

- Transfer between tanks;

- Broken pipes, leaking hoses or nozzles used at transfer facilities and pumping stations;

- Fuel transfer vehicle or equipment accidents and roll-overs;

- Helicopter fuel slinging; and

- Operator error.

The following measures will be in place to reduce the risks of spills and equipment failure:

- Scheduled inspection and maintenance of all fuel related systems;

- Double locking mechanisms on valves and transfer hoses and spring-loaded valves on loading nozzles;
- Careful measurement of fuel levels in tanks (particularly when transferring fuel);
- Fuel is distributed by service vehicles with small capacity tanks;
- Service vehicles are equipped with spill kits;
- Training in fuel handling operations (manned at all times);
- Spill response training;
- Restricted access to the fuel storage and handling areas;
- Strategic placement of spill kits;
- Use of absorbent pads during all vehicle and all operating machinery maintenance activities;
- Maintaining a supply of empty drums for storage of spilled materials; and
- Immediate clean up of all spills.

In the event of a large or environmentally significant spill, a sampling program for the collection and analysis of soil and/or water samples to identify and monitor possible contaminant levels would be developed with the advice of the Environmental Coordinator. The sampling program will be "spill-specific".

4.13 Hazardous Materials Handling and Storage Facility

MHBL has developed a Hazardous Materials Management Plan[5]. Information on classification, transportation, handling, disposal, inspections, record keeping and training are found within this referenced document. Information on how to deal with spills of these hazardous materials is found within the Emergency Response and Spill Contingency Plan (this document).

Potential soil and groundwater impacts may result from spills, leaks, and runoff from hazardous materials storage areas. Spills may occur during material handling and storage. Hazardous materials include flammable and non-flammable petroleum products (e.g., gasoline, aviation fuel, diesel, solvents, paints, oils and greases), ethylene glycol, process chemicals (e.g., cyanide, flotation collector, acids and refining fluxes) and water treatment chemicals (e.g., sulphuric acid, hydrogen peroxide and sodium metabisulphite), explosives and compressed gases (e.g., propane, acetylene and oxygen).

[5]Hazardous Materials Management Plan, Supporting Document S10e to the Revised Water License Application Support Document, April 2007.

All containers will be labelled according to the requirements of the WHMIS System.

Only persons authorized to enter these storage areas will have access. These individuals will be trained in waste handling procedures. The Doris North ERT will be informed of the types of hazardous materials located in these storage areas. Inventories will be conducted on a regular basis or as materials are added or removed. The ERT will be trained in emergency response procedures and will conduct drills and other training exercises on a regular basis.

4.13.1 Hazardous Materials Storage - Spill Preventative Measures

Hazardous materials spills and related incidents could occur from:

- Leaks in storage;
- Transfer between storage and work areas;
- Transfer between tanks;
- Mixing of incompatible materials (e.g., acids with bases);
- Broken pipes, hoses or nozzles in transfer facilities and at pumping stations;
- Vehicle or equipment accidents or roll-overs;
- Sources of ignition close to flammable or explosive materials; and
- Operator error.

The following measures will reduce the risks of spills and equipment failure:

- Secondary containment around mixing and stock tanks;
- Double-locking mechanisms on valves and transfer hoses and spring-loaded valves on loading nozzles;
- Restricted access to the hazardous materials storage areas;
- Smaller pressurized bottles/bullets will be stored in appropriate containers in the vertical and upright position and chained to prevent unexpected falling over. Protective caps will be used when not in service.
- Scheduled inspection and maintenance of all hazardous materials related systems;

- Careful measurement of levels in tanks (particularly when transferring hazardous materials); and

- Training in hazardous materials handling operations.

The following measures will reduce the effects of spills:

- Strategic placement of spill kits, absorbent pads and neutralizing agents;

- Maintaining a supply of empty drums for storage of spilled materials;

- Spill response training; and

- Immediate clean up of all spills.

4.13.2 Hazardous Materials Storage – Spill Response Actions

- Refer to Spill Response Action on MSDS Sheets (in Appendix B) for the hazardous material that has spilled (they are all located within this document);

- In the event of a spill, safety measures will be implemented whereby personnel will be removed from the area of the spill until the spill is contained. Suitable personal protective equipment (PPE) must be used by the first and all subsequent spill responders;

- Vapours cannot be contained when released. If pressurized tanks are damaged, the gas shall be allowed to disperse and no attempt at recovery will be made. Evacuation of the area will be mandatory. Select ERT members will don SCBA (self contained breathing apparatus) PPE as a precautionary measure only if they will be going to the leaking container to facilitate stopping the leak or some other purpose;

- When a spill of an oxidizing substance such as ammonium nitrate occurs, spills on land shall be contained by dyking or some other barrier, as required. As ammonium nitrate is water soluble, spills in water may be dammed or diverted, as appropriate;

- Corrosive materials will be neutralized with lime and/or soda ash prior to containment;

- Only those personnel specifically trained to handle hazardous materials will be allowed to deal with those types of spills, all unauthorized personnel will be evacuated from the spill area; and

- In the event of a large or environmentally significant spill, a sampling program for the collection and analysis of soil and or water samples to identify and monitor possible contaminant levels would be developed with the advice of the Environmental

Coordinator. The sampling program will be “spill-specific”.

4.14 Sewage Treatment System Response Procedures

System failures and/or spills may occur due to pipe blockage, electrical power outage, equipment malfunctions, operator error or foreign objects or material in the influent, which cannot be processed by the RBC sewage treatment plant.

4.14.1 Sewage Treatment System - Spill Preventative Measures

Sewage treatment plants (STPs) can and do malfunction as the result of human error, breakage of equipment, or unusual conditions in the raw sewage. At such times, raw or partially treated sewage may be discharged. Visual inspections of the STP are carried out daily. An alarm system is installed in the camp complex to provide immediate notice of system failure. If the main mine site electrical generators fail, the camp emergency power generator will be used.

A commitment to have trained personnel operate the STP ensures that the STP is monitored on a consistent basis and allows operations to respond to non-compliances in a timely manner. Response measures may include:

- Adjustment to the system would be made in consultation with the manufacturer’s technical expert;
- If unfavourable trends continue to appear in a monthly sampling result, on-site measurements of dissolved oxygen, total suspended solids, chlorine, temperature and turbidity will take place and additional samples for laboratory analysis will be collected until effluent quality is satisfactory. The sampling frequency will be based upon the nature and severity of the problem;
- If the non-compliance trend continues whereby the operators are unable to bring the plant back on line within a timely manner, action will be implemented to have the technical representative brought to site to assist the operations group; and
- Spare parts for certain system components are available on site in case of equipment failure.

4.14.2 Sewage Treatment Plant - Spill Response Actions

Spills of partially treated or untreated sewage that occur inside the plant would involve:

- The removal of spilled materials (spills of untreated waste will be contained using spill clean up materials and re-routed to the front end of the system);
- Site sanitation (by spreading hydrated lime over the area);
- Treatment of recovered sewage and any materials contaminated with sewage by washing and transfer to the tailings containment area through the mill tailings

pump box; and

- Decontamination of workers.

4.15 Auxiliary Systems (Pipelines)

A line break or malfunction along any of the pipeline systems could be caused from:

- Being struck by construction equipment;
- Internal wear;
- Uneven settlement along the line (frost or permafrost heave); and
- Poor materials or workmanship during installation.

4.16 System Components (Pipelines) – Spill Prevention

Spills can be prevented by implementing the following precautions:

- Marking the locations of all lines;
- Ensuring employees and contractors are aware of the location of all pipelines in their work areas;
- Monitoring the flows and pressures in the lines; and
- Inspecting, maintaining and repairing the lines and related pumps, etc.
- System Components (Pipelines) – Spill Response

Refer to the Spill Response Action on the MSDSs for the specific chemical spill (in Appendix B).

The mine operational plan for a pipeline failure would be to:

- Shutdown the line;
- Contain and clean up the spill;
- Repair or replace the line;
- Reconnect and test the line; and
- Resume operations.

In the event of a spill, the On-Scene Spill Response Coordinator will initiate the process of shutdown and the ERT will be deployed. Immediate action to reduce and minimize

impacts to the tundra is required. Spill containment and recovery of the spilled material will be a priority. Personnel safety is first.

Any material that has escaped from the pipelines and deposited on the surrounding ground would be recovered and disposed of in the tailings containment area or in containment drums to be transferred to the TCA through the mill pump box. Any tailings that have escaped from the system to a water body would be left in place until further advice has been received on the clean up from the Environmental Coordinator.

In the event of a tailings spill or release to Doris Lake, attempts will be made to contain and recover as much of the spilled material as possible. A 'spill-specific' sampling and monitoring program will be established and implemented. Certain components of the Aquatic Effects Monitoring Plan (AEMP)[6] may be implemented to measure potential impacts to Doris Lake. The Environmental Coordinator will be consulted.

[6]See Section 8, Monitoring and Follow-up Plan, Supporting Document S10m to the Revised Water License Application Support Document, April 2007.

5.0 EMERGENCY RESPONSE

5.1 Natural Incidents

When a natural disaster such as a flood, earthquake or severe windstorm sufficient to cause damage occurs, site personnel should carry out the following steps immediately:

- Sound the alarm;
- Designate a Responsible Person;
- Evacuate to muster point or shelter as instructed by the Responsible Person;
- Hold a roll call and confirm everyone is accounted for;
- Report any missing personnel to the Emergency Response Team (ERT); and
- Call for outside help as required.

The safety of the individual takes precedence over all else.

Depending upon the nature of the natural disaster, and whether or not there is any warning, it may or may not be possible to use the designated muster point and shelter. If either or both of the muster point or the shelter are unavailable, then the responsible person shall make alternative plans on the spot, depending upon the circumstances.

5.2 Severe Weather

5.2.1 Severe Cold

All workers will be expected to be familiar with working in the cold weather that is prevalent on site. Workers will receive orientation and training on the proper methods while working in the cold. There will, however, be circumstances when work may be restricted because of extreme cold. Procedures will be established for the various work tasks to protect outside workers.

5.2.2 Whiteout Conditions

Physical work must cease. This is particularly important for persons using equipment or cutting tools, because any person suffering an injury may be unable to reach either the first aid post, or be evacuated to a hospital until the conditions improve. Personnel are to remain within shelter until the emergency has passed. Remote sites will be equipped with emergency rations and a heat source. Those people working at these sites will be informed to cease work and to remain inside the shelter until the severe weather has passed. No one will be permitted to operate any vehicle (truck or snowmobile) except in extreme emergencies and only with the consent of the Mine General Manager.

5.3 Human Caused Incidents

5.3.1 Facility Fire

Specific fire fighting procedures will be developed and special fire teams will be trained to deal with any special conditions that may be present in the mine mill or other processing facilities on site.

On discovering a fire, the following steps should be carried out immediately: Small fires that can be safely extinguished should be put out. Ensuring there is a safe exit or retreat and that you fight a fire from fresh air.

- If unable to put the fire out, initiate emergency procedures. Sound the alarm by using the radio;
- Remain calm;
- Report the fire to your Supervisor immediately and provide the following:
    - Your Full Name,
    - Your location(where you are calling from),
    - The Location and size of the fire, and
    - The Muster Station you are going to.
- Call out to people in your area to warn them of the danger;
- Evacuate all persons to the muster point;
- Do not pass through smoke;
- Feel all doors before you open them - if they are hot use another route. If no other route is available, return to the closest safe place and close the door;
- Go to the window and open it to get fresh air and call for help;
- Close (but do not lock) all doors behind you, as you leave the area;
- Report to the muster point;
- Hold a roll call and confirm everyone is accounted for; and
- Assign/Designate a Response Captain.

If you are able to put the fire out yourself, make sure the fire is completely out before leaving the scene. Use the radio to inform the site responsible person and inform them of the details. If you must leave the scene of the fire, make sure you or someone trained in fire fighting returns to the fire location to make sure it has not restarted. Maintain a fire watch until there is no chance that the fire will restart.

Once all persons are accounted for, arrange for their temporary shelter if required. The temporary shelter should be in a suitable place of refuge, separate from and away from the facilities involved, where there are emergency rations, blankets, a method of heating the shelter, and where there are also sufficient seats for everybody and an emergency means of communication to the outside world.

No one may re-enter a facility evacuated as a result of fire until the Mine General Manager, or his designate, gives the "All Clear" signal. He will ensure the building has been checked out to ensure adequate ventilation is restored and the structural integrity of the building was not compromised.

5.3.2 Ground Fires

Ground fires are an uncommon occurrence in the high arctic however fire fighting capability will be on hand in the form of pulaskis, back pack water fire extinguishers. In the event of a ground fire, the Nunavut Department of Environment will be contacted immediately. All available resources of the site will be used to assist the GNDoE to fight the fire.

5.3.3 Mine Rescue

The Mine Health and Safety Act and Regulations of Nunavut govern all mine activities. The mine rescue procedures are complex and require specific skills and training that are too detailed to be included here. MHBL will have a separate document for underground mine emergencies that will encompass all underground activities including mine rescue in place before any under ground activities start. MHBL will use the Mine Health and Safety Act as a guide for the Plan and consult with the Nunavut agencies responsible (See Appendix A).

5.3.4 Medical Treatment and Emergencies

During construction and throughout the life of the Project the site will have a full time medic with the appropriate level of training for the number of personnel. The medical treatment and emergency procedures will be developed by this staff in consultation with the Mine General Manager. All emergency procedures will comply with the Nunavut Mining regulations and the Workers' Compensation Board requirements.

5.4 Aircraft

Although most of the supply and re supply will be by sealift, there will be a large number of flights into the site carrying personnel and small cargo. Helicopter exploration flights may also use the site as a base.

5.4.1 Missing or Overdue Aircraft, and Aircraft Accident

Every aircraft transportation company has procedures for tracking overdue and lost aircraft. MHBL will follow these procedures and will integrate such into the final emergency response and contingency plan once a primary charter aircraft transportation company is contracted for the Doris North Project. The aircraft company's procedure will be a companion document to this plan.

However; in the event that a particular aircraft company has no procedure available, MHBL will act as follows:

Helicopters

Because of fuel load, helicopters will be working within approximately two hours of the site. For helicopters using the site as a base it will be necessary for the pilot to file a flight plan with the MHBL person responsible for aircraft on the site. The following procedure will be followed during helicopter use on site:

- If the helicopter is making short exploration flights to a number of areas then the pilot will radio to camp on a predetermined schedule as this will allow a faster response if an incident occurs;

- If there is no contact from the pilot at the predetermined time then the site person will attempt to contact the helicopter on the active frequency;

- Radio contact will be attempted every few minutes until 30 minutes has passed;

- If, after 30 minutes has passed, no contact has been established then the site person will call the helicopter company base to inform them and to ascertain whether the have heard from the pilot on another frequency;

- If other aircraft are in the area they can be asked to attempt to contact the missing aircraft. If the pilot or crew is carrying a satellite phone then this should be used to attempt contact; and

- When all attempts at contact are negative and the helicopter has been over due for 30 minutes the MHBL Responsible Person will inform the Mine General Manager and the helicopter company that a search should be initiated. The aircraft company will then use its standard operating procedures for overdue aircraft with the full cooperation and resources of MHBL. During this procedure, the MHBL Responsible Person will continue to attempt contact with the aircraft.

Fixed Wing Aircraft

For the most part the fixed wing aircraft coming to site will be carrying people or supplies. These flights will likely be on a prescribed schedule and most certainly have a defined flight plan filed with the originating airport. The MHBL person responsible for the landing strip will always know when an aircraft is scheduled to land. This is necessary to make sure that the landing area is free of debris and wildlife.

The following procedure is to be used for regular and extra ordinary fixed wing flights:

- After 30 minutes past scheduled arrival time with no contact from the aircraft and no information available, the MHBL Responsible Person will contact the aircraft company and the originating airport to advise them that the aircraft is overdue;

- If the site has the correct frequencies, the MHBL Responsible Person will attempt to

contact the overdue aircraft and will continue until the aircraft company initiates their search procedure or the authorities take over the communications and the search;

- If there are other aircraft available on site, these will be made available immediately to the organized search;

- Site personnel will be made available to the aircraft company as necessary for the search;

- The MHBL Responsible Person will inform the Mine General Manager as soon as the aircraft is deemed to be overdue; and

- Information will not be given out to unauthorized persons, and all queries will be referred to the aircraft company or the authorities.

5.5 Vehicle Incidents

There will be relatively few vehicles on site; however, vehicle incidents and accidents are possible. For mishaps involving other vehicles or stationary objects company procedures will be followed for insurance purposes. All vehicle incidents including near misses will be reported to the Mine General Manager. Vehicle impacts with wildlife have additional criteria. Wildlife encounters may occur at any time and it is everyone's responsibility to ensure the safety of people and animals on site. Wildlife has the right of way. The following procedures will be followed if there is a collision with any wildlife:

- The driver of the collision vehicle must immediately contact the Wildlife Response Team;

- If the vehicle has killed the animal, remove it from the roadway until it can be picked up;

- If the animal has been badly hurt but not killed you must kill it as quickly as possible to avoid suffering. Injured animals can be dangerous so no attempt should be made to handle a wounded animal; and

- The Nunavut Department of Environment must be informed immediately and consulted for direction on proper disposal.

5.6 Equipment or People Falling Through Ice

Travel and equipment over frozen lake or ocean will occur rarely at the site however, if accidents happen the following procedure will be the guide to response. These procedures are directed at all employees and contractor personnel, and are intended to be implemented by those immediately available at the time and place of the incident.

- First, ensure the safety and well being of personnel involved;

- Note that ice tends to fracture for a considerable distance away from any hole, and

a ladder or long plank may be required to spread the weight of any rescuers over a wide area;

- Any person(s) attempting to rescue any other persons who have fallen through the ice will be secured by a rope to a point well removed from the hole, so that they can be hauled to safety if necessary;

- Use a rope to assist anybody in the water to get out. It is difficult to climb onto ice from water in the extreme cold in wet clothes;

- Any persons who have fallen through the ice are to be removed from the ice and water and immediately treated for hypothermia as follows:
    - Move them as soon as possible out of the wind;
    - Get dry clothes on the person;
    - If dry clothing is not available, remove wet clothing and place the chilled person in a sleeping bag;
    - Use a second warm person to provide body heat within the sleeping bag to help warm up the chilled person if necessary;
    - Arrange for medical attention as soon as possible;
    - Where equipment had fallen through the ice, if it is still accessible, arrange for it to be lifted or towed out as soon as possible;
    - In most cases it will not be possible to remove fuel from a vehicle or piece of equipment that has gone through the ice. However, in some circumstances such as when the vehicle is in shallow water, much of the vehicle may still be exposed. In such an event, contact the on-site Environmental Coordinator who, together with other members of site management, will assess the situation and decide whether the vehicle or piece of equipment can be pulled back out or is best left in place until more conducive weather conditions allow for recovery. The Environmental Coordinator will attempt to take whatever steps are necessary to ensure that leaks of fuel or engine oils are minimized wherever possible by pumping the fuel from tanks into other containers where this can be safely done without danger of a spill; and
    - Where a vehicle has gone completely through the ice and is submerged, contact the appropriate government spills hot line and seek advice:

NT-NU 24 Hour Spill Report Line TEL: (867) 920-8130

FAX: (867) 873-6924)

EMAIL: spills@gov.nt.ca

The Environmental Coordinator together with other site managers will assess the situation and where necessary contact a specialist contractor (such as RTL Construction of Yellowknife) to assist or to undertake the recovery of the submerged vehicle.

6.0 SPILL RESPONSE ACTIONS FOR SPILLS IN THE MARINE ENVIRONMENT OF ROBERTS BAY

6.1 Introduction

This section was developed to provide MHBL personnel with petroleum product spill response guidance specific to the unique climatic and physiographic features of the Arctic environment. It provides general information on typical approaches to dealing with hydrocarbon spills in the marine environment.

All bulk fuels and the majority of hydrocarbon products will be shipped to the Doris North Project site by barges and tugs under the operational control of the shipping company. MHBL will ensure that the selected shipping company has an appropriate spill response plan in place, with trained responders and appropriate stores of spill response equipment and materials. At the current time, this shipping contractor is Northern Transportation Company Limited (NTCL – www.ntcl.com). MHBL will rely upon NTCL for spill response while bulk fuel and containerized shipments of hydrocarbon based products are in transit from Hay River to the Doris North site. NTCL have many years of experience with such shipping operations in the Arctic.

MHBL will maintain marine spill response equipment at the Roberts Bay jetty site stored within a sea-can container for use while barges are being off loaded. This equipment will include floating containment booms and a small skimmer unit designed to address potential spills during the off-loading process at the Doris North Project site (see Section 4.10 for list of proposed response equipment).

Consideration has to be given to the key features of the Arctic Region. Table 6.1 highlights such factors and considerations.

Table 6.1: Key features of Arctic regions

Environmental Factors
• high density of habitat use during summer seasons
• extreme seasonal ecological sensitivity variations
• unique shores types (ice shelves, glacier margins, ice foot features, tundra coasts)
• unique oceanographic and shoreline seasonal changes (open water, freeze-up, breakup, frozen conditions)
• slow weathering and longer persistence of spilled product
Operational Considerations
• remote logistical support
• need to improvise response using available means until support equipment arrives
• safety in cold, remote areas
• cold temperature effects on the efficiency of equipment and personnel
• boat operations in ice-infested waters during transition periods, winter dynamic ice conditions
• on-ice operations in winter
• seasonal daylight variation
• minimization of damage to permafrost during land-based staging and clean up operations
• need of aircraft for logistics, surveillance, and tracking

This section of the document applies to all sizes of petroleum product spills. For simplicity, the wide range of crude and refined oils have been grouped into three types, based primarily on viscosity (Table 6.2). Table 6.3 presents definitions for three "sea conditions" (calm water, protected water, and open water) for spills of hydrocarbons in the marine environment that are used in this document.

Table 6.2: Oil viscosity ranges

Viscosity Ranges		
Light	**Medium**	**Heavy**
Free flowing (like water)	**Slowly pouring (like molasses)**	**Barely flowing (like tar)**
• Diesel	• Bunker A	• Bunker B and C
• Gasoline	• Fuel Oil No. 4	• Fuel Oil No. 6
• Heating oil	• Lubricating Oil	• Weathered crude
• Kerosene	• Medium crude	• Bitumen

Table 6.3: Definitions of "Sea Condition" used in this document

Response Environment	Significant Wave Height (m)	Wind Speed (km/h)
• Calm water	• Less than 0.3	• Less than 10
• Protected water	• 0.3 - 2	• 10 - 30
• Open water	• 2 or greater	• 30 or greater

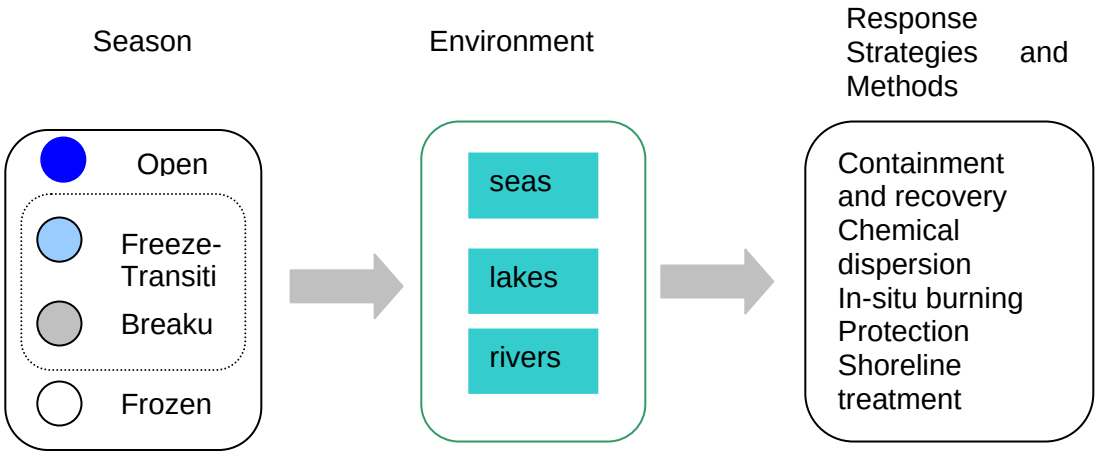
6.1.1 Objective

The section focuses on practical spill response strategies and tools for application to open water, ice and snow conditions in remote areas during cold weather. Information is provided relevant to the marine offshore and coastal environments, where bulk petroleum product is transported and where spills pose a threat to the environment and public health.
Marine offshore environments are of great ecological importance in Arctic Regions. MHBL will be moving its petroleum products to support its operation at Doris North using barges during open water season.

6.1.2 Practical Countermeasures

The following practical countermeasures are recommended for first responders, i.e. personnel with a range of technical experience who serve as onsite, trained MHBL employee responders and required to be first at the scene of a spill. Because the responder might receive very limited information when alerted about a spill, this section has been organized on the basis of season (open water, freeze-up and breakup transition, and frozen conditions as shown in Figure 7. Environment (seas, lakes and rivers) is a secondary index.

Figure 6.1: Diagram depicting seasons, environmental conditions and mitigations measures



Seasons are defined as follows:

- *Open Water* : Water is free of any ice form
- *Freeze-up*: New ice forming
- *Breakup*: Old ice melting
- *Frozen*: Solid, continuous ice is present

The methods of containment and recovery, chemical dispersion, in-situ burning and shoreline treatment are used in the context of the four response strategies:

- *Source control*: A spill is controlled at or near its release point to prevent slicks from spreading.
- *Control of free product*: Response operations focus on slicks that have spread some distance from the source.
- *Protection*: Measures are taken to prevent shoreline and other resources from being contaminated.
- *Shoreline treatment*: Product that has come ashore is treated.

6.2 Spills During Open-Water Season

6.2.1 General Guidelines

- MHBL personnel who respond to spills must be trained in the hazards of exposure

to low temperatures, accidental immersion in cold water and other causes of hypothermia.

- The most effective way to minimize environmental damage is to focus on source control and to prevent product from spreading.
- Slick tracking and surveillance should utilize locally available resources to determine optimum response strategies:
    - Locate brown-colour slicks to be skimmed, burned and/or dispersed;
    - Leave shiny, rainbow sheens to disperse naturally but plan for shoreline protection/treatment, if appropriate; and
    - In breaking waves higher than 1 m, surveillance and monitoring might be the only practical response options.

Table 6.4 presents description of countermeasures that are recommended for implementation in an uncontrolled environmental incident.

Table 6.4: Open water response at sea or coast water

Environment		Responses			
Response	**Product Location**	**Countermeasures**			**Feasibility**
		Contain/recover	**Burn**	**Disperse**	
Source control	On surface	• Mobile floating barriers • Stationary skimmers	Burn on water contained in booms	• Vessel dispersant application • Aerial dispersant application	Recommended
	Underwater	• Subsurface barriers			Not recommended
Control of free product	On surface	• Mobile floating barriers • Advancing skimmers	Burn on water contained in booms	• Vessel dispersant application • Aerial dispersant application	Recommended
	Underwater	• Subsurface barriers			Not Recommended
Protection	On surface	• Diversion booming	Burn on water contained in booms	• Vessel dispersant application • Aerial dispersant application	Recommended
	Underwater	• Subsurface barriers			Not Recommended

6.2.2 Response Strategies and Methods

Responding to spills from vessels and barges can involve controlling slick at source and removing product that escapes initial containment. The objective of both operations is to minimize the spreading of spilled product and subsequent environmental impacts. Control methods use similar approaches at source and to deal with remote slicks.

Containment and Recovery

Containment

- Use mobile floating booms best used down drift from the release point to contain and concentrate product;
- Deploy mobile floating booms in U, V or J configurations. Interception of free-floating, thick slicks is not as effective as containment and removal of product at surface; and
- Mobile floating booms are effective in currents less than 0.5 m/s (1 knot) and winds less than 35 km/h (20 knots).

Recovery

- Advancing skimmers (Oleophilic Skimmers – units with a recovery mechanism to which oil adheres) are useful: Disc, drum and rope mop skimmers can remove light and medium viscosity oils; brush and belt skimmers can collect heavy oils;
- Large volume advancing skimmers can be used when oil/water separators are available or when there are large accumulations of thick, emulsifying oil;
- Subsurface barriers should be used to contain spilled oil that might sink before it submerges, if possible. Locating submerged oil is difficult, and control and collection is even more difficult;
- If brush or belt skimmers cannot collect heavy, floating oil then trawl systems can be tried for recovery;
- Planning adequate storage capacity is critical to the entire response operation to avoid operation bottlenecks; and
- Storage options include barges, towable tanks, tankers and/or other means that are appropriate for the type and volume of oil being recovered.

Dispersion

- Within mobile floating barriers, spills must be assessed to determine if dispersants will be effective and then treated quickly by trained personnel:
    - The oil should have a viscosity less than 10000 cSt, i.e. it should be less viscous than molasses;
    - The temperature of the water should be above the pour point of the oil, i.e., the oil should be freely flowing;

  - Slick thickness should be no more than 0.1 mm thick; and
  - Spraying operations should be conducted within 2 -5 days of a spill occurring when the oil is unweathered and can be dispersed.
- Within mobile floating and stationary barriers, both vessels and aircraft can be used to apply dispersants. Operations should be directed from aerial vintage points:
  - Use stock piles of chemicals located strategically to the spill site at dispersant-to-oil ratios of 1:10 to 1:100;
  - Use fix-wing planes and helicopters on offshore spills;
  - Vessels are more practical for nearshore coastal waters; and
  - Record information on dosage rates, areas treated and apparent effectiveness so that the data can be transferred to subsequent responders.

In-situ Burning

- In-situ burning must be quickly implemented, usually by trained personnel. In a remote area, the decision to burn should be based on the following factors:
  - Emulsion should be at least approximately 75% oil;
  - Slick thickness should be greater than 2-3 mm;
  - Waves should be less than 2 m high and not breaking;
  - Wind speed should be less than 35 km/h (20 knots); and
  - Crude oil should be burned within 2-5 days of the spill.
- An ignition system is needed; fire-resistant boom and spotter aircraft should be used, if available;
- A safety plan for response workers is required that addresses the location of ignition, burning and areas that would be affected by the smoke plume;
- Crude oil high sulphur content would likely present health and safety concerns either in an unburned state or upon ignition;
- A 10 km (6 mile) downwind exclusion zone provides adequate protection for response workers, the public and wildlife;
- Ensure that the risk of secondary fires is minimized or have the means to extinguish the burn; and
- No burning should take place until the KIA and/or regulatory authorities have given approval.

Protection

Protecting resources in the spill path usually involves the deployment of mechanical equipment but may be accomplished by chemical dispersion or burning. The objective of protection is to prevent or minimize contact between the spilled oil and the resource at risk.

- Initially, estimate the direction and speed of movement of the oil. Then identify the

resources at risk from the spill and evaluate whether protection operations actions are likely to be successful, and then take the following actions for mechanical containment and removal strategies:

  - Deploy diversion boom with both top and bottom tension members and high reserve buoyancy to exclude or divert oil; and
  - Secure and then regularly monitor anchor systems.

- Using stationary skimmer such as smaller oleophilic skimmers, e.g., disc, drum and rope mops units, to remove light and medium viscosity oils for storage in either water – or land-based storage systems.
- In storm surges, protection strategies might not work if oil mixes in the surf zone and if booms fail.
- In-situ burning is a possible protection option in nearshore waters, using an ignition device (s) in concentrated oil; fire-resistant booms and spotter aircraft should be used, if available.
- A safety plan for the burn operation must be prepared that considers the potential impacts of the burn, amenities at risk and the possible health effects of the smoke plume, e.g., 10 km (6 miles) downwind exclusion zone, sulphur content of crude and the means to extinguish the fire.
- Chemical dispersion is a possible protection technique in coastal waters characterized by:
  - Good flushing; and
  - Water depth greater than 10 – 20 m.
- For effective dispersion, oil must meet the following criteria:
  - Viscosity is less than 10 000 cSt, i.e., less viscous than molasses;
  - The temperature of the water is above the pour point of the oil, i.e., the oil is freely flowing; and
  - Slick thickness is more than 0.1 mm thick.
- Vessel application is likely to be as, or more effective than, aerial methods if:
  - Dispersant is applied within 2 – 5 days of spill;
  - The spill covers a relatively small coastal area that can be readily treated with dispersants from vessel;
  - Dispersant supplies and fuel are positioned on vessels and at selected sites onshore so that downtime is minimized; and
  - Good access to, and visibility of, slicks exists.
- Information on dosage rates, areas treated and apparent effectiveness should be recorded so that the data can be transferred to subsequent responders.

Shoreline Treatment

- First response activities usually take places on a shoreline only if available resources are not required for source control, recovery of free oil or protection.

This might be the case for a land-based spill, e.g., a tank farm, or if all or most of the oil has washed ashore.

- Low pressure, cold-water wash is generally practical and effective before the oil has weathered, i.e., in the early stages of a spill, on:
    - Impermeable (bedrock, man-made) shore types;
    - Fine sediment beaches or flats (sand, mud); and
    - Vegetated shores (marshes, peat, low-lying tundra).
- On sheltered, low wave-energy shores with fine sediment, trenching can be rapid and effective method for containing stranded oil and preventing further redistribution. Oil in the trench can be removed by vacuum trucks. If such system is not available in remote areas, sufficient bags of corn-cobs should be used to absorb the remaining oil in the trench.
- Use manual and/or mechanical removal to recover oil on open beaches with wave action. Often it is important to remove oil that is on surface before the oil, sediments are reworked by wave action, and the oil is possibly buried.
- If oily waste generation and its disposal are issues (which is common in Arctic and many remote areas), mixing and sediment relocation on beaches are likely to be practical and highly effective since the oil would be relatively unweathered. Mixing (also known as tilling) and sediment reworking (surf washing) involve the use of earthmoving equipment to move oiled sediments so that they are exposed to weathering processes, such as evaporation or wave action, to accelerate natural cleaning of an oiled beached. The techniques do not involve mechanical removal of oiled sediments from beach for disposal.
- Land-based operations should avoid disturbances to the permafrost and the active layer above it, e.g., digging, the use of tracked vehicles and uncontrolled burns.

Table 6.5 lists recommended initial treatment methods according to various shore types in the event of an uncontrolled environmental incident.

Table 6.5: Recommended initial treatment methods of an uncontrolled environmental incident

Environmental Habitats - Shore Type	Recommended Initial Treatment Methods
Bedrock	• Low-pressure, cold water wash • Manual removal • Vacuum system
Man-made solid structures	• Low-pressure, cold water wash • Manual removal
Ice or ice covered shores	• Low-pressure, cold water wash • Low-pressure, warm or hot water wash • Manual removal • Vacuum systems • Burning • Flooding
Sandy beaches	• Low-pressure, cold-water wash • Manual removal • Mechanical removal • Mixing • Sediment relocation • Flooding
Mixed-sediment beaches	• Low-pressure, cold-water wash • Manual removal • Mechanical removal • Mixing • Sediment relocation
Pebble/cobble beaches	• Low-pressure, cold-water wash • Manual removal • Mechanical removal • Mixing • Sediment relocation
Boulder beaches and rip-rap	• Low-pressure, cold-water wash • Manual removal • Passive sorbents
Sand flats	• Low-pressure, cold-water wash • Manual removal • Vacuum systems • Mechanical removal
Mud flats	• Low-pressure, cold-water wash • Manual removal • Vacuum systems • Mechanical removal
Salt marshes	• Flooding • Low-pressure, cold-water wash • Manual removal • Vacuum systems • Passive sorbents

Environmental Habitats - Shore Type	Recommended Initial Treatment Methods
Peat shores	• Flooding • Low-pressure, cold-water wash • Manual removal • Vacuum systems • Mechanical removal
Inundated low-lying tundra shores	• Flooding • Low-pressure, cold-water wash • Manual removal • Vacuum systems
Tundra cliff shores	• Low-pressure, cold-water wash • Manual removal • Vacuum systems • Mixing • Sediment relocation
Shorelines with snow	• Vacuum systems • Manual removal • Mechanical removal • Burning

7.0 DAM SAFETY

Prior to the start of operations (4th quarter of 2008), MHBL will arrange for SRK to prepare an Operation, Maintenance and Surveillance Manual (OMS manual) as defined by the Mining Association of Canada and an Emergency Preparedness Plan as defined by the Canadian Dam Association for the Tail Lake tailings containment system. In this way the OMS manual can include the as-built drawings and construction information (including location, operation and maintenance procedures for instrumentation).

The objective of the Emergency Preparedness Plan is to protect the public and the environment from the consequences of release of any or all of the stored volume, or unplanned changes in reservoir levels.

One of the major structures on the site will be the tailings containment at Tail Lake. It is an ongoing commitment of MHBL to insure the integrity of this structure by continual regular inspection and minimize any damage should an incident occur. The Emergency Preparedness Plan will elaborate on the following response measures.

7.1 Definitions

7.1.1 Emergency

Any condition that develops naturally or unexpectedly, endangers the integrity of the dam, upstream or downstream property, or life, and requires immediate action.

7.1.2 Emergency Preparedness Plan

A document that contains procedures for preparing for and responding to emergencies at the dam or its appurtenances, including notification process and inundation maps.

7.1.3 Dam failure:

Failure of the dams to act as they were designed. In terms of structural integrity, the uncontrolled release of the contents of a reservoir through collapse of the dam or part of it.

7.1.4 Risk

A measure of the probability and severity of an adverse effect to heath, property, or the environment. Risk is estimated by the mathematical expectation of the consequences of an adverse event (i.e., the product of the probability of occurrence and the consequences).

7.1.5 Levels of risk

For this dam three levels of warning signs or emergency conditions have been assumed:

- High level – observations and conditions representing an obvious emergency and failure and/or catastrophic collapse is imminent or has occurred (such as a piping

failure or major deformation crack in the dam):

- Moderate level – observations and conditions that represent a potential emergency if allowed to continue and exacerbate, but catastrophic collapse is not imminent (such as a smaller crack or slump or new evidence of increased seepage); and
- Low level – observations and conditions are noted as being unusual and likely requiring intensified monitoring, supplemented with prompt investigation, assessment, and resolution (such as evidence of ground movement, small cracks or seepage where none was previously noted).

7.1.6 Tailings Dam

Dam, including foundations, water control structures, and base of the basin, which is constructed to retain tailings or other waste material from mining operations.

7.2 Sub-plans

Emergency Preparedness Plans consist of four components called sub-plans. The four sub-plans are:

1. Emergency Identification;
2. Emergency Operations and Repair;
3. Notification; and
4. Evacuation.

7.3 Emergency Preparedness Plan for Dams at Doris North Project

There are usually three cases identified for which an Emergency Preparedness Plan should be developed:

1. Discharges in sufficiently large volume to cause flooding in downstream areas;
2. Flooding upstream due to high lake level; and
3. Dam failure.

For the facilities at the Tail Lake MHBL will develop an Emergency Preparedness Plan only for potential dam failure. Tail Lake will not retain large volumes of water and the spillway will be designed to accommodate the river flows minimizing the potential for flooding both upstream and downstream. Therefore, the Emergency Preparedness Plan will be developed for potential failure of south and north dams and discussed below. A failure of the tailings delivery line is to be handled using the spill response procedures previously presented in Section 4.

7.3.1 Emergency Identification

Potential causes of dam failure have been identified as:

- Embankment Instability;
- Deformation due to Earthquake;
- Excess seepage;
- Piping;
- High pool conditions;
- High pore pressure;
- Thawing of central core;
- Increasing of ground temperature;
- Cracking;
- Failure of discharge facilities;
- Upstream dam failure;
- Downstream dam failure; and
- Extreme climatic events.

A continuous monitoring system will be instituted by the Mill Superintendent and regular daily inspections by Shift Supervisor will be established as soon as the impoundment is in place.

7.3.2 Operations Emergency

As the design of the dyke structure for Tail Lake is finalized an operational plan will be developed and the final emergency plan will follow a set of emergency criteria that will be designated by the design engineer. These criteria will set out tolerance parameters for dam movement, deformation, seepage discharge and internal core temperatures. Each of the parameters if exceeded will have a response. In most cases of potential emergencies, the main and immediate action will be reduction of water level in Tail Lake. In addition, mobilization of earth moving equipment, resources and required materials may be needed.

If or when there is a need to reduce the level of water in the dam, the following approach will be taken:

- Notify regulatory authorities;
- Develop a water sampling plan for before, during, and after excess water release; and
- Submit a written report to the regulatory authorities within 30 days of the completed task.

7.3.3 Emergency Identification Criteria

Inspection Procedures

A monitoring program is included in the final design to monitor the performance of the tailings impoundment, including the dams. Inspection procedures will be developed and will be described in detail in the OMS Manual. The monitoring program includes the thermal regime, deformation, seepage and climate. The level of monitoring will be intensive during the early stages of operations since it is during this period that the design assumptions would be confirmed. In the event that the dam is not performing adequately, the collected data will be used to determine appropriate mitigation measures. Additionally, the monitoring information may identify aspects of the original design that may be too conservative, thus providing opportunities to readjust some of the predictions. The monitoring program described below will be developed in detail during the final design.

Given the importance of the frozen core for the performance of the dam, the ground temperature inside the dam will be monitored. The ground temperature measurements will determine the extent of the frozen region in the dam and should provide information on the rate of thawing or freezing fronts. Temperature probes will be put in sensitive areas, such as the upstream zone of the dam, the outer shell that will be subject to the fluctuations of the active zone, as well as the area at the abutments. It is expected that temperature probes will be installed both horizontally and vertically. Monthly readings should be sufficient to depict the thermal regime in the dams but data loggers will be installed to collect continuous data at key locations. This frequency will be maintained until the dam reaches pseudo-steady state conditions. The frequency may then be reduced thereafter but the frequency would have to coincide with the peaks of the annual climatic cycles (i.e., low and high temperatures).

Climate data will be collected during the operation of the mine. The climatic data will include ambient temperature, precipitation (rain and snow), wind speed and wind direction as a minimum. Other parameters such as relative humidity and sun radiation are not essential but would provide useful information, in particular for evapo-transpiration estimations. The climatic data will be recorded with an automatic data logger.

Settlement will be monitored by installing monuments along the crest of the dam. The monuments would be installed during the construction of the dam and would be surveyed on a regular basis to monitor the movement of the dam, both horizontally and vertically. The deformation will be monitored using settlement plates (or similar devices) and, possibly, inclinometers. The frequency of measurements will be higher during the initial stage of the operations and will be based on the rate at which the talik (thaw area under the tailings impoundment) is developing along the upstream side of the dams. The frequency of the measurements may be decreased as the rate of deformation decreases.

The dams will be inspected on a regular basis to detect damage, deformation or any other anomalies. It is important that the inspections be frequent during the period the lake level is rising and the tailing developing. The water level of Tail Lake will also be monitored as part of those regular inspections. Observations of potential seepage will be incorporated in the dam inspection requirements.

The dams and related facilities at the tailings impoundment, including the shoreline of Tail Lake, will be inspected by individuals responsible for routine monitoring activities at the Doris North site. In addition, a geotechnical or civil engineer registered in the Nunavut Territory will make an annual inspection of the tailings impoundment facilities each summer. The subsequent inspection report will summarize the observations and the review of the available monitoring data (described below). The report will be filed in a timely manner so that, if required, construction activity or modifications to these structures can be implemented prior to the next freshet.

Documenting Observations

In such instances in which a potential emergency is recognized, the first action is to initiate the chain of communication as instructed in the notification sub plan. When documenting a potential emergency, the observer should accurately and properly record the appropriate factual information including:

- When the observation was made;
- What was observed; and
- Location of the observations.

Photographs of the observation should be taken to aid in documentation of the potential emergency. The photographs should include something for scale and the time and date that the photo is taken.

7.3.4 Site Access

Access to the North and South Dams, including the dam crest, will be maintained properly at all times.

Winter roads over frozen terrain may be used during winter periods. During the winter, snow removal along access roads to the dam is required and will be conducted within 24 hours of a snowfall. Snowmobiles may be required when snow accumulations are sufficient and a visual inspection is required before snow removal operations can be conducted.

7.3.5 Stockpiled Materials and Equipment

Some materials and equipment will be stockpiled on site to ensure a quick response is possible to any potential emergency. Rock fill and/ or general fill may be required for construction of emergency remedial structures or emergency access roads in the summer. Care will be taken to prevent permafrost aggradations in stockpiled materials.

Light plants may be required for construction occurring during dark winter conditions and/or during 24 hour operations.

7.3.6 Equipment that may be needed for Emergency Operation and Repair

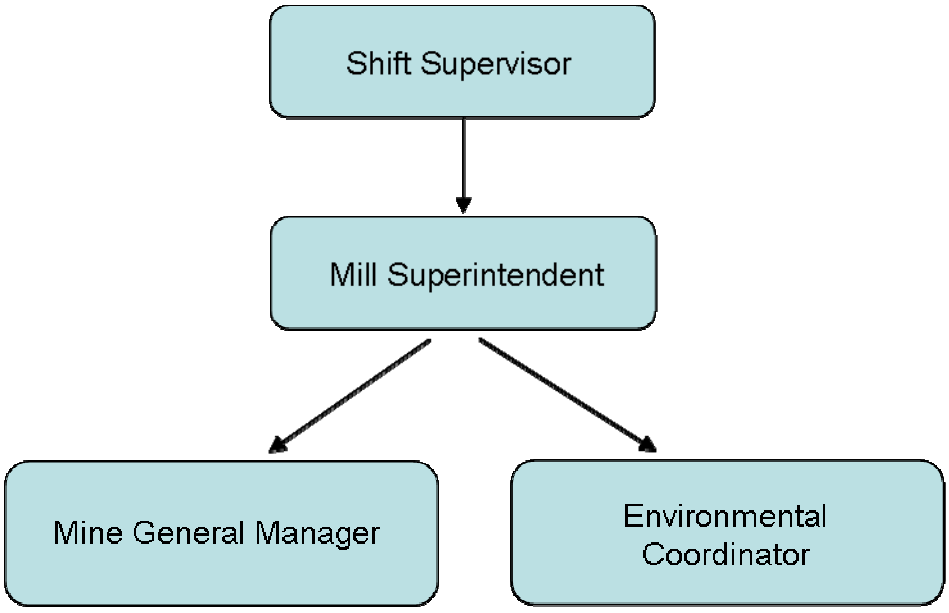
In order to carry out remedial construction or repairs the following equipment will be located on site:

- Dozer or plow for snow clearing and/ or road access;
- Hydraulic excavator for excavation and placement of materials;
- Loader;
- Haul truck to transport materials as required; and
- Compactor.

7.3.7 Notification

If during inspection or at any time one of the established emergency criteria is met, the Mill Superintendent, Environmental Coordinator, and Mine General Manager will be notified as shown in the internal notification process below. Each emergency condition will be immediately assessed and the appropriate response will be initiated. The Mine General Manager will contact the Geotechnical Engineer or Environmental Consultant, if warranted. The internal notification process is as follows:

Figure 7.1: Internal Notification Process



7.3.8 Evacuation

Because of the remoteness of the site and relatively small amount of water contained by the dams, it is concluded that a breach of one of the dams would not necessitate any evacuation.

This report, “Emergency Response and Contingency Plan, Doris North Project, Nunavut, April 2007”, has been prepared by Miramar Hope Bay Ltd.

Prepared By

_____

Lawrence J. Connell, P.Eng.
General Manager, Environment

8.0 REFERENCES

Re-Evaluation of Tailing Disposal Alternative; for Miramar Hope Bay Limited, SRK Consulting Limited, December 2004.

Contingency Planning and Spill Reporting in Nunavut A Guide to the new Regulations, Department of Environment, Iqualuit, Nunavut.

Consolidation of Regulation R-068-93 *Spill Contingency Planning and Reporting Regulations* (Dated 22 July, 1993); Department of Environment, Iqualuit, Nunavut.

Mine Health and Safety Regulations, Government of Nunavut.

APPENDIX A

Emergency Procedure Requirements for Underground Mine
NWT/NU Mine Health & Safety Regulations

Division 3 EMERGENCY PROCEDURES

Section 8.31 Definitions

8.31. In this Division,

"key process person" means a person who is in control of a continuous operating process such as a mill or concentrator;

"procedure" means the procedure the manager prepares pursuant to subsection 8.32(1).

Section 8.32

- 8.32. (1) The manager shall prepare a procedure for dealing with any emergency that is likely to occur at the mine.

- (2) The procedure shall specify the organization and procedures for handling sudden unexpected situations that require immediate attention.
- (3) The manager shall involve the Committee in the preparation of the procedure.
- (4) The manager shall send a copy of the procedure to the chief inspector.

Section 8.33

8.33. The procedure shall include

- (a) a vulnerability assessment listing the potential hazards, both natural and technological;
- (b) the consequences of each major hazard that has been identified;
- (c) the procedures to be adopted to safeguard persons;
- (d) an inventory and location of resources required to support the planned action;
- (e) the proposed organization and allocation of responsibility to deal with an emergency;
- (f) the details of external sources of assistance; and
- (g) means of notification, in conjunction with the R.C.M.P., of immediate next-of-kin, where a person is seriously injured or killed.

Section 8.34

8.34. The manager shall ensure that persons are instructed in the details for the safe evacuation of the mine or a part of the mine and these details shall include

- (a) the identification of escape routes;
- (b) the location of refuge stations;
- (c) the proper use of emergency equipment; and
- (d) the nature of the warning system.

Section 8.35

8.35. The manager shall develop and maintain a system acceptable to the chief inspector for warning all employees, whether underground or in buildings on the surface, of an emergency requiring prompt evacuation of their worksites.

Section 8.36

8.36. A test of the warning system referred to in section 8.35 that does not require the evacuation of key process persons shall be conducted at least every 12 months on a production shift, and the manager shall ensure that the key process persons not involved in the evacuation are knowledgeable of the warning system and the evacuation procedure.

Section 8.37

8.37. A report of the results of all emergency warning system tests shall be sent to the chief inspector and a copy shall be given to each member of the Committee

APPENDIX B

MSDSs & Spill Procedures for Selected Products on Site

AMMONIUM NITRATE Fuel Mixture (ANFO)

CONSIDER ACTION ONLY IF SAFETY PERMITS! ELIMINATE IGNITION SOURCES. If safe, stop the source of spill

On Land	• Block entry into waterways; • Do not flush into sewer/drainage system; • Contained fuel will float to surface, use absorbent; • Contain spill by dyking with earth or other barrier; • If liquid, remove minor spills with sorbent, large spills with pumps or vacuum equipment; and • Prills /granules can be shoveled or removed mechanically.
On Snow and Ice	• Block entry into waterways and contain with snow or other barrier; • Remove ammonium nitrate; and • Contaminated snow with shovels or other mechanical means.
On Tundra	• Do not deploy personnel and equipment on marsh or vegetation; • Remove ammonium nitrate and contaminated snow with shovels or other mechanical means if feasible; • Burning is not feasible; • Flushing with low pressure water can be tried if feasible; and • Minor spill amounts can be left in place to serve as fertilizer; and • Minimize damage caused by equipment and excavation.
On Water	• Ammonium nitrate sinks and mixes with water; • Contain spill by isolating contaminated water through damming or diversion; and • Flushing with water can be tried, if spill area cannot be isolated.
Streams	• Ammonium nitrate is completely soluble in water and is difficult to recover; and • Water flushing can be tried do disperse spill.
Storage and Transfer	• Store closed, labeled containers in cool, ventilated areas away from incompatible materials.
Disposal	• Segregate waste types; • Place contaminated materials into marked containers; and • Consult with environmental authorities during final disposal.

DIESEL / P40 / P50, HYDRAULIC, LUBE and WASTE OIL

CONSIDER ACTION ONLY IF SAFETY PERMITS! ELIMINATE IGNITION SOURCES. If safe, stop the source of spill

On Land	• Block entry into waterways; • Do not flush into sewer/drainage system; • Contain spill by dyking with earth or other barrier; • If liquid, remove minor spills with sorbent, large spills with pumps or vacuum equipment; and • Prills /granules can be shoveled or removed mechanically.
On Snow and Ice	• Block entry into waterways and contain with snow or other barrier; • Remove minor spills with sorbent pads and/or snow; • Use ice augers and pump to recover diesel under ice; • Slots in ice can be cut over slow moving water to contain oil; and • Burn accumulated diesel from the surface using Tiger Torches if feasible and safe to do so.
On Tundra	• Do not flush into ditches or drainage systems; • Block entry into waterways and contain with earth, snow or other barrier; • Remove small spills with sorbent pads; • On tundra use peat moss and leave in place to degrade, if practical; • Do not deploy personnel and equipment on marsh or vegetation; • Remove pooled diesel with pumps and skimmers; • Flush with low pressure water to herd diesel to collection point; • Burn only in localized areas, e.g., trenches, piles or windrows; • Do not burn if root systems can be damaged (low water table); and • Minimize damage caused by equipment and excavation.
On Water	• Contain spill as close to release point as possible; • Use spill containment boom to concentrate slicks for recovery; • On small spills, use sorbent pads to pick up contained oil; • On larger spills, use skimmer on contained slicks; and • Do not deploy personnel and equipment onto mudflats or into wetlands.
Streams	• Prevent entry into water, if possible, by building berm or trench; • Intercept moving slicks in quiet areas using (sorbent) booms; and • Do not use sorbent booms/pads in fast currents and turbulent water.
Storage and Transfer	• Store closed labelled containers outside away from flammable sources; and • Electrically ground containers and vehicles during transfer.
Disposal	• Segregate waste types; • Place contaminated materials into marked containers; and • Consult Site Services Manager on disposal procedures.

JET A, Gasoline

CONSIDER ACTION ONLY IF SAFETY PERMITS! ELIMINATE IGNITION SOURCES If safe stop the source of spill

On Land	• Block entry into waterways; • Do not flush into ditches sewer/drainage system; • Contain spill by dyking with earth or other barrier; • If liquid, remove minor spills with sorbent, large spills with pumps or vacuum equipment; and • Prills /granules can be shoveled or removed mechanically.
On Snow and Ice	• Block entry into waterways by dyking with snow or other barrier; • Do not contain spill if there is any chance of igniting vapours; and • In work/depot yards, apply particulate sorbents.
On Tundra	• Block entry into waterways by dyking with earth, snow or other barrier(s); • Do not contain spill if there is any chance of igniting vapours; • On shop floors and in work/depot yards, apply particulate sorbents; • On tundra use peat moss and leave to degrade if feasible to do so; • Remove pooled liquid with pumps, if safe to do so; • Do not deploy personnel and equipment on marsh or vegetation; • Low pressure flushing can be tried to disperse small spills; • Burn CAREFULLY only in localized areas, e.g., trenches, piles or windrows; • Do not burn if root systems can be damaged (low water table); and • Minimize damage caused by equipment and digging.
On Water	• Contain or remove spills ONLY AFTER VAPOURS DISSIPATE; • Use booms to protect water intakes; and • Skimming can be tried once light ends evaporate.
On Streams	• Prevent entry into water, if possible, by building berm or trench; • Intercept moving slicks in quiet areas using (sorbent) booms; and • Do not use sorbent booms/pads in fast currents and turbulent water.
Storage and Transfer	• Store closed, labelled containers in cool, ventilated areas away from incompatible materials; and • Electrically ground containers and vehicles during transfer.
Disposal	• Segregate waste types; • Place contaminated materials into marked containers; and • Consult Site Services Manager on disposal procedures.

ANTIFREEZE (ETHYLENE GLYCOL)

CONSIDER ACTION ONLY IF SAFETY PERMITS! If safe, stop the source of spill

On Land	• Block entry into waterways; • Do not flush into ditch/drainage system; • Contain spill by dyking with earth, snow or other barrier;; • Remove minor spills with peat moss and/or sorbent pads; and • Remove large spills with pumps or vacuum equipment.
On Snow and Ice	• Block entry into waterways by dyking with snow or other barrier; • Do not contain spill if there is any chance of igniting vapours; • In work/depot yards, apply particulate sorbents; and • Remove contaminated snow with shovels or mechanical equipment.
On Tundra	• Do not deploy personnel and equipment on marsh or vegetation; • Block entry into waterways by dyking with earth, snow or other barrier(s); • On shop floors and in work/depot yards, apply particulate sorbents; • Low pressure flushing can be tried to disperse small spills; • Burning is not feasible; and • Minimize damage caused by equipment and digging.
On Water	• Ethylene glycol sinks and mixes with water; • Contain spill by isolating contaminated water through damming or diversion; and • Use spill containment boom to protect water intakes and sensitive areas.
On Streams	• Prevent entry into water, if possible, by building berm or trench; • Intercept moving slicks in quiet areas using (sorbent) booms; and • Do not use sorbent booms/pads in fast currents and turbulent water.
Storage and Transfer	• Store closed labelled containers in cool, ventilated areas away from incompatible materials, e.g., oxidizable materials, finely divided metals and organics.
Disposal	• Segregate waste types; • Place contaminated materials into marked containers; and • Consult with environmental authorities during final disposal

NITRIC ACID

CONSIDER ACTION ONLY IF SAFETY PERMITS! If safe, stop the source of spill

On Land	• Block entry into waterways; • Do not flush into ditch/drainage system; • Contain spill by dyking with earth, snow or other barrier; • Remove minor spills with dry earth, sand or other barrier; • Neutralization with lime, sodium bicarbonate or crushed limestone; and • Remove large spills with pumps or vacuum equipment after neutralization.
On Snow and Ice	• Block entry into waterways by dyking with snow or other barrier; • Do flush into ditches or drainage system; • Remove minor spills with dry snow or other barrier; • Neutralization with lime, sodium bicarbonate or crushed limestone; • Remove large spills with pumps or vacuum equipment after neutralization; and • Remove contaminated snow with shovels or mechanical equipment.
On Tundra	• Do not deploy personnel and equipment on marsh or vegetation; • Block entry into waterways by dyking with earth, snow or other barrier(s); • Neutralization with lime, sodium bicarbonate or crushed limestone; • Removed polled nitric acid with pump or vacuum equipment after neutralization; • Burning is not recommended; and • Minimize damage caused by equipment and digging.
On Water	• Nitric acid will dissolve in water; • Contain spill by isolating contaminated water through damming or diversion; • Flushing with water can be tried, if spill area cannot be isolated; and • Neutralization with lime or sodium bicarbonate can be tried.
On Streams	• Nitric acid will dissolve in water; • Contain spill by isolating contaminated water through damming or diversion; • Flushing with water can be tried, if spill area cannot be isolated; and • Neutralization with lime or sodium bicarbonate can be tried.
Storage and Transfer	• Corrodes metal such as aluminum, copper, zinc and their alloys; • Use plastic containers; • Store closed labeled containers in cool, ventilated areas away from incompatible materials, e.g., oxidizable materials, oil and wood.
Disposal	• Segregate waste types; • Place contaminated materials into marked containers; and • Consult with environmental authorities during final disposal.

CARBON

CONSIDER ACTION ONLY IF SAFETY PERMITS! If safe, stop the source of spill

On Land	• • Block entry into waterways. • Do not flush into ditch/drainage system. • Vacuuming is the best clean up procedure. • Remove contaminated snow with shovels or mechanical equipment.
On Snow and Ice	• Block entry into waterways by dyking with snow or other barrier. Do flush into ditches or drainage system. Vacuuming is the best clean up procedure. Remove contaminated snow with shovels or mechanical equipment.
On Tundra	• Do not deploy personnel and equipment on marsh or vegetation. Block entry into waterways by dyking with earth, snow or other barrier(s). Vacuuming is the best clean up procedure. Remove contaminated snow with shovels or mechanical equipment Burning is not recommended.
On Water	• Contain the spill area using floating booms; • Vacuuming is the best clean up procedure; and • Remove contaminated snow with skimmers or mechanical equipment.
On Streams	• Contain the spill area using floating booms; • Vacuuming is the best clean up procedure; and • Remove contaminated snow with skimmers or mechanical equipment.
Storage and Transfer	• Check oxygen content of atmosphere of any vessel containing activated carbon before allowing entry of personnel; and • Packaged activated carbon is not resistant to weather or outside storage and requires indoor Type I and Type II storage facilities
Disposal	• Segregate waste types; • Place contaminated materials into marked containers; • Wet or dry activated carbon is best disposed by landfill; and • Consult with environmental authorities during final disposal.

HYDROGEN PEROXIDE

CONSIDER ACTION ONLY IF SAFETY PERMITS! ELIMINATE IGNITION SOURCES. If safe, stop the source of spill

On Land	• Avoid runoff into waterways; • Clean up spills immediately; • Use protective equipment; • Use water spray to disperse the gas/vapour ; • Absorb spill using an absorbent, non-combustible material; • Flush spill are with water Provide ventilation; • Do not get water inside containers; and • Keep combustibles away from spill.
On Snow and Ice	• Block entry into waterways by dyking with snow or other barrier; • Do flush into ditches or drainage system; • Use protective equipment; • Use water spray to disperse the gas/vapour; • Absorb spill using an absorbent, non-combustible material; • Keep combustibles away from spill; and • Remove contaminated snow with shovels or mechanical equipment.
On Tundra	• Do not deploy personnel and equipment on marsh or vegetation; • Block entry into waterways by dyking with earth or other barrier; • Do flush into ditches or drainage system; • Use protective equipment; • Use water spray to disperse the gas/vapour; • Absorb spill using an absorbent, non-combustible material; • Keep combustibles away from spill; and • Remove contaminated snow with shovels or mechanical equipment.
On Water	
Storage and Transfer	• Segregate waste types; • Place contaminated materials into marked containers; • Contents may develop pressure upon storage; • Keep container tightly closed; • Store protected from light, below 35 ºC; • Avoid contact with combustible materials and keep away from heat, sparks and flame; and • Store in a cool, dry, well-ventilated area away from incompatible substances (alkalies, oxidizable materials, finely divided metals, alcohols and permanganate)
Disposal	• Rinse empty containers and drums thoroughly with water before discarding; and • Consult with environmental authorities during final disposal

POTASSIUM AMYL XANTHATE

CONSIDER ACTION ONLY IF SAFETY PERMITS! ELIMINATE IGNITION SOURCES. If safe, stop the source of spill

General	• Evacuate area of all unnecessary personnel; • Wear protective equipment and/or garments described in personal protection, if exposure conditions warrant; • When entry into or exit from concentrations of unknown exposure, use NIOSN/MSHA approved self-contained breathing apparatus (SCBA); and • Contain spill. Protect from ignition.
On Land	• Block entry into waterways by dyking with soil, sand or other barrier; • Do flush into ditches or drainage system; • Use protective equipment; and • Sweep or vacuum up spill
On Snow and Ice	• Block entry into waterways by dyking with snow or other barrier; • Do flush into ditches or drainage system; • Use protective equipment; • Sweep or vacuum up spill; and • Remove contaminated snow with shovels or mechanical equipment.
On Tundra	• Do not deploy personnel and equipment on marsh or vegetation; • Block entry into waterways by dyking with earth or other barrier; • Do flush into ditches or drainage system; • Use protective equipment; and • Sweep or vacuum up spill
On Water	• Do not release water collect and dispose properly
Storage and Transfer	• Transfer to disposal drums using non-sparking equipment; • Segregate waste types; and • Place contaminated materials into marked containers
Disposal	• Waste disposal (insure conformity with all applicable disposal regulations; • Incinerate or place in permitted waste management facility; and • Consult with environmental authorities during final disposal

AEROPHINE 3418A Promoter

CONSIDER ACTION ONLY IF SAFETY PERMITS! If safe, stop the source of spill

On Land	• Block entry into waterways by dyking with soil, sand or other barrier; • Do flush into ditches or drainage system; • Use protective equipment; and • Sweep or vacuum up spill
On Snow and Ice	• Block entry into waterways by dyking with snow or other barrier; • Do flush into ditches or drainage system; • Use protective equipment; • Sweep or vacuum up spill; and • Remove contaminated snow with shovels or mechanical equipment.
On Tundra	• Do not deploy personnel and equipment on marsh or vegetation; • Block entry into waterways by dyking with earth or other barrier; • Do flush into ditches or drainage system; • Use protective equipment; and • Sweep or vacuum up spill
On Water	• Dissolves in water; • Hold water until neutralized; and • Dilution could be considered
Storage and Transfer	• Store as per manufactures directions in a dry facility; • Segregate waste types; and • Place contaminated materials into marked containers
Disposal	• Cytec recommends that organic materials classified as hazardous waste according to the relevant local or national regulations be disposed of by thermal treatment or incineration at approved facilities; and • Consult with environmental authorities during final disposal

CAUSTIC SODA (SODIUM HYDROXIDE)

CONSIDER ACTION ONLY IF SAFETY PERMITS! If safe, stop the source of spill

On Land	• Block entry into waterways; • Do not flush into ditch/drain systems; • Contain spill by dyking with earth, sand or other barrier; • Remove minor spills with earth, sand or vermiculite sorbent Large spills in solution with pumps or vacuum equipment; and • Neutralization with dilute hydrochloric acid.
On Snow and Ice	• Block entry into waterways; • Contain spill by dyking with snow or other barrier; • Do not flush into ditch/drain systems Remove minor spills with dry earth, sand or vermiculite sorbent; and • Remove contaminated snow with shovels or other mechanical equipment.
On Tundra	• Do not deploy personnel and equipment on marsh or vegetation. Block entry into waterways Remove minor spills with sand or vermiculite sorbent Low pressure water flushing can be tried if feasible.
On Water	• Caustic soda sinks and mixes with water generating heat; • Isolate/confine spill by damming or diversion if feasible; • Remove pooled caustic soda after neutralization with pumps; • Water flushing can be tried to disperse the caustic sodas; and • Neutralization with dilute hydrochloric acid can also be tried
On Streams	• Caustic soda sinks and mixes with water generating heat; and • Water flushing can be tried to disperse the caustic sodas Neutralization with dilute hydrochloric acid can also be tried
Storage and Transfer	• Store closed, labelled containers in cool, ventilated areas away from incompatible materials; • Protect from contact with water; • May react with aluminium, zinc and tin metals to generate flammable and potentially explosive hydrogen gas; and • Avoid contact with strong oxidizers, such as nitric acid, sulphuric acid, chlorine, ozone, peroxides.
Disposal	• Place contaminated materials in segregated, marked containers; and • Consult with environmental authorities during final disposal

SODIUM NITRATE

CONSIDER ACTION ONLY IF SAFETY PERMITS! If safe, stop the source of spill

On Land	• Block entry into waterways; and • Do not flush into ditch/drain systems; and • Contain spill by dyking with earth, sand or other barrier.
On Snow and Ice	• Block entry into waterways; • Do not flush into ditch/drain systems; • Contain spill by dyking with snow or other barrier; and • Remove spills by sweeping up material for disposal.
On Tundra	• Do not deploy personnel and equipment on marsh or vegetation; • Block entry into waterways; • Do not flush into ditch/drain systems; • Contain spill by dyking with earth, snow or other barrier; and • Remove spills by sweeping up material for disposal
On Water	• Dissolves in water; • Isolate/confine spill by damming or diversion if feasible; and • Water flushing can be tried to disperse the sodium nitrate
On Streams	• Dissolves in water; and • Water flushing can be tried to disperse the sodium nitrate.
Storage and Transfer	• Store closed, labelled containers in cool, ventilated areas away from incompatible materials; and • Keep away from reducing agents and liquids of low flash point.
Disposal	• Dispose of in accordance with local, provincial and federal environmental regulations; • Wood and empty paper bags should be removed; and • Consult with environmental authorities during final disposal.

SODIUM CYANIDE

CONSIDER ACTION ONLY IF SAFETY PERMITS! If safe, stop the source of spill

On Land	• Block entry into waterways; • Do not flush into ditch/drain systems; • DO NOT allow entrance in soil stretches of water drainage systems; • Avoid formation of dust; • Ensure sufficient ventilation; • Use protective equipment; • Avoid skin contact because of the danger of skin absorption; • Cyanide-containing sewage water and solutions must be decontaminated before entering public canal network or stretch of water; and • Remove spills by sweeping up material for disposal.
On Snow and Ice	• Block entry into waterways; • Do not flush into ditch/drain systems; • Contain spill by dyking with snow or other barrier; and • Remove spills by sweeping up material for disposal.
On Tundra	• Do not deploy personnel and equipment on marsh or vegetation; • Block entry into waterways; • Do not flush into ditch/drain systems; and • Remove spills by sweeping up material for disposal.
On Water	• Dissolves in water Isolate/confine spill by damming or diversion if feasible; and • Neutralisation/decontamination must be provided.
On Streams	• Dissolves in water Neutralisation/decontamination must be provided, if feasible.
Storage and Transfer	• Store hermetically closed, labeled containers in cool, ventilated areas; and • DO NOT store together with acids.
Disposal	• Dispose of in accordance with local, provincial and federal environmental regulations; and • Consult with environmental authorities during final disposal.

RAW SEWAGE

CONSIDER ACTION ONLY IF SAFETY PERMITS! Avoid direct contact with raw sewage If safe, stop the source of spill

On Land	• Block entry into waterways; • Do not flush into ditch/drain systems; • Contain spill by dyking with earth or other barrier; • Remove spill with pumps or vacuum equipment; and • On tundra use peat moss and leave in place to degrade, if feasible.
On Snow and Ice	• Block entry into waterways; • Contain spill by dyking with snow or other barrier; • Do not flush into ditch/drain systems; and • Remove contaminated snow with shovels or other mechanical means.
On Tundra	• Do not deploy personnel and equipment on marsh or vegetation; • Remove pooled sewage with pump or vacuum equipment; and • Minimize damage caused by equipment and excavation.
On Water	• Isolate/confine spill by damming or diversion if feasible; and • If not possible to confine and pump, disperse using water flushing
Storage and Transfer	• Store closed, labelled containers in cool, ventilated areas; and • Avoid contact with collected material.
Disposal	• Place contaminated materials into marked containers; • Transport to sewage treatment plant; • Dispose of in accordance with local, provincial and federal environmental regulations; and • Consult with environmental authorities during final disposal.

ACETYLENE and PROPANE

CONSIDER ACTION ONLY IF SAFETY PERMITS! ELIMINATE IGNITION SOURCES, Keep vehicles away from accident area. If safe, stop the source of spill.

- Vaporous cannot be contained when released
- Water spray can be used to knock down vaporous if there is NO chance of ignition
- Personnel should withdraw immediately from area unless it is a small leak that has been stopped immediately after detection
- If tanks are damaged, gas should be allowed top disperse and no attempted recovery made
- Personnel should avoid touching release point on container since frost quickly forms
- Keep away from tank ends.

CYTEC

Technology ahead of its time™

MSDS: 0001787
Date: 05/04/2004
Supercedes: 10/10/2001

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: **AEROPHINE® 3418A Promoter**
Product Description: Flotation reagent in water
Use: Mining chemical

Supplied By: CYTEC CANADA INC., GARNER ROAD, P.O. BOX 240,
NIAGARA FALLS, ONTARIO, CANADA L2E 6T4 1-905/356-9000
EMERGENCY PHONE: In CANADA: 905/356-8310 In USA: 1-800/424-9300 or 1-703/527-3887.

Manufactured By: CYTEC CANADA INC., GARNER ROAD, P.O. BOX 240 NIAGARA FALLS, ONTARIO, CANADA L2E 6T4 PHONE: 905/356-9000

2. COMPOSITION/INFORMATION ON INGREDIENTS

WHMIS REGULATED COMPONENTS

Component / CAS No.	% (w/w)	OSHA (PEL):	ACGIH (TLV)	Carcinogen
Sodium diisobutyl-dithiophosphinate 13360-78-6	50 - 52	Not Established	Not Established	-

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

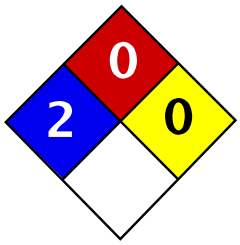
APPEARANCE AND ODOR:

Color:	yellowish
Appearance:	liquid
Odor:	odorless

STATEMENTS OF HAZARD:
DANGER! CAUSES EYE BURNS AND SKIN IRRITATION

POTENTIAL HEALTH EFFECTS

EFFECTS OF EXPOSURE:
The acute oral (rat) and acute dermal (rabbit) LD50 values for this material are 3.35 g/kg and greater than 5.0 g/kg, respectively. Moderate skin and severe eye irritation were produced during primary irritation studies in rabbits. Skin irritation was increased after repeated exposures in rabbit studies.
This material was not mutagenic in the Ames Salmonella Assay. Refer to Section 11 for toxicology information on the regulated components of this product.



Health	2
Fire	0
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Sodium metabisulfite MSDS

Section 1: Chemical Product and Company Identification

Product Name: Sodium metabisulfite

Catalog Codes: SLS3025

CAS#: 7681-57-4

RTECS: VZ2000000

TSCA: TSCA 8(b) inventory: Sodium metabisulfite

CI#: Not available.

Synonym: Disodium disulfite; Disodium pyrosulfite; Sodium Pyrosulfite; Sodium Metabisulphite

Chemical Name: Pyrosulfurous acid, disodium salt

Chemical Formula: Na2S2O5

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 metabisulfite	7681-57-4	100

Toxicological Data on Ingredients: Sodium metabisulfite: ORAL (LD50): Acute: 1131 mg/kg [Rat]. DERMAL (LD50): Acute: >2000 mg/kg [Rat]. >1000 mg/kg [Guinea pig].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator), of eye contact (irritant).

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (sensitizer), of ingestion, of inhalation (lung irritant).
CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC.
MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance may be toxic to upper respiratory tract, skin, eyes.
Repeated or prolonged exposure to the substance can produce target organs 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. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used.Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

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

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

Serious Inhalation: Not available.

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: Not applicable.

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.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards:
When heated to decomposition it emits toxic fumes of SOx, Na2O.
Decomposes on heating to form sodium sulfate

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. 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 locked up.. Do not ingest. Do not breathe dust. Avoid contact with skin. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Moisture sensitive. Air Sensitive

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: Safety glasses. Lab coat. 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. 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:
TWA: 5 (mg/m3) [United Kingdom (UK)]
TWA: 5 (mg/m3) from ACGIH (TLV) [United States]
TWA: 5 (mg/m3) from NIOSH [United States]Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Crystals solid or Powdered solid.)

Odor: odor of sulfur dioxide

Taste: Not available.

Molecular Weight: 190.13 g/mole

Color: White to yellowish.

pH (1% soln/water): 4.3 [Acidic.]

Boiling Point: Not available.

Melting Point: Decomposition temperature: 150°C (302°F)

Critical Temperature: Not available.

Specific Gravity: 1.4 (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, hot water.
Freely soluble in glycerol.
Slightly soluble in alcohol.
Moderately soluble in ethanol.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, heat, moisture, air, dust generation.

Incompatibility with various substances: Reactive with oxidizing agents, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Moisture sensitive Air sensitive.
It slowly oxidizes to sodium sulfate upon exposure to air and moisture.
Incompatible with sodium nitrite

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
Acute oral toxicity (LD50): 1131 mg/kg [Rat].
Acute dermal toxicity (LD50): >1000 mg/kg [Guinea pig].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC.
MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast.
May cause damage to the following organs: upper respiratory tract, skin, eyes.

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant), of ingestion, of inhalation.
Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

May affect genetic material (mutagenic) based on animal test data.
May cause adverse reproductive effects based on animal test data.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects:
Skin: May cause skin irritation.
Eyes: May cause eye irritaiton.
Inhalation: May cause respiratory tract irritation with coughing and wheezing.
Ingestion: May be harmful if swallowed. May cause gastrointestinal tract irritation irritation with abdominal pain, nausea, vomiting, diarrhea, violent colic, and possible gastri hemorrhaging. May affect behavior/central nervous system and cause central nervous system depression/seizures. It may also affect the cardiovasular system (hypotension, tachycardia, cardiovascular collapse), Ingestion of sulfite compounds may cause a severe allergic reaction (anaphylactoid symptoms) in sensitive individuals and some asthmatics.
Chronic Potential Health Effects:
Skin: Prolonged or repeated skin contact may cause allergic dermatitis.
Ingestion: Prolonged or repeated ingestion may affect the liver, urinary system, and metabolism (weight loss). Future exposures may also cause asthma like allergy with coughing, shortness of breath, wheezing and/or chest tightness.
Inhalation: Prolonged or repeated inhalation may irritate the lungs, may cause bronchitis to develop with cough, phlegm and/or shortness of breath.

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 products of degradation are less toxic than the product itself.

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: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Sodium metabisulfite
Illinois toxic substances disclosure to employee act: Sodium metabisulfite
Rhode Island RTK hazardous substances: Sodium metabisulfite
Pennsylvania RTK: Sodium metabisulfite
Minnesota: Sodium metabisulfite

Massachusetts RTK: Sodium metabisulfite
New Jersey: Sodium metabisulfite
California Director's List of Hazardous Substances: Sodium metabisulfite
TSCA 8(b) inventory: Sodium metabisulfite
TSCA 4(a) ITC priority list: Sodium metabisulfite
TSCA 8(a) PAIR: Sodium metabisulfite
TSCA 8(d) H and S data reporting: Sodium metabisulfite: effective: 1/26/94; sunset: 6/30/98

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 D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

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

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/11/2005 12:35 PM

Last Updated: 10/11/2005 12:35 PM

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Material Safety Data Sheet

SULPHURIC ACID

Infosafe no. AJ1YR **Issue Date** September 2001 **Status** ISSUED by APSSC
Classified as hazardous according to criteria of NOHSC

COMPANY DETAILS

Company Name	Asia Pacific Specialty Chemicals Limited (ABN 32000316138)
Address	15 Park Road SEVEN HILLS NSW 2147
Emergency Tel.	1800 022 037 (24H)
Tel/Fax	Tel: (02) 9839 4000 Fax: (02) 9674 6225
Other Information	AUSTRALIA: Division of: Asia Pacific Specialty Chemicals Limited A.C.N. 000 316 138 15 Park Road, Seven Hills, NSW, 2147 Tel: (02) 9839 4000, Fax: (02) 9674 6225 NEW ZEALAND: Asia Pacific Specialty Chemicals (NZ) Limited 119 Carbine Road, Mt. Wellington, Auckland 6 Tel: (09) 276 4019, Fax: (09) 276 7231.

IDENTIFICATION

Product Code AR 00000534

Product Name SULPHURIC ACID

Proper Shipping Name SULFURIC ACID

Other Names	**Name**	**Manf. Code**
	SULPHURIC ACID SG 1.500 - 60%	BATT 00002227
	SULPHURIC ACID SG 1.62 - 70%	BATT 00002238
	SULPHURIC ACID MILK TEST	LC 00001599
	SULPHURIC ACID 98%	TECH 00000535
	SULPHURIC ACID SG 1.235	BATT 00004725
	SULPHURIC ACID	UL 00001262
	Sulfuric acid	
	Oil of vitriol	
	Fertiliser acid	
	Electrolyte acid	
	SULPHURIC ACID SG 1.820 - 92%	BATT 00001596
	SULPHURIC ACID 70%	TECH 00001593
	SULPHURIC ACID 80%	TECH 00004364
	SULPHURIC ACID 89% MILK TEST	LC 00001598
	SULPHURIC ACID 92%	CP 00001637

UN Number 1830

DG Class 8

Packing Group II

Hazchem Code 2P

Poisons Schedule S6

Product Use Fertilizers, explosives, electroplating, dyes, drugs, detergents, adhesives, plastics, paints, tanning, food processing.

Physical Data

Appearance	Colourless (pure) to brownish liquid, denser than water, choking fumes if heated, hygroscopic.
Melting Point	10 degrees C
Boiling Point	270 degrees C
Vapour Pressure	< 0.001 mm Hg at 20 degrees C
Specific Gravity	approx 1 - 1.8 mg/ml
Flash Point	No Data
Flamm. Limit LEL	No Data

Other Properties

pH Value	0.3, 1N solution
Formula	H2SO4
Molecular Weight	98.08
Other Information	Soluble in water in all proportions, soluble in most organic solvents (may react).

Ingredients

Ingredients	**Name**	**CAS**	**Proportion**
	Sulphuric acid	7664-93-9	0-98 %
	Water to make total of 100%		

HEALTH HAZARD INFORMATION

Health Effects

Acute - Swallowed	Can kill if swallowed. Will cause severe damage to the mucous membranes. May cause severe burns to the mouth,throat and stomach. Ingestion can cause nausea and vomiting. Ingestion can result in abdominal pain.
Acute - Eye	Corrosive to eyes; contact can cause corneal burns. Permanent eye damage,including loss of sight,may occur.
Acute - Skin	Highly corrosive to skin. Causes severe burns.
Acute - Inhaled	Harmful by inhalation. Possible harmful corrosive effects. High concentrations of vapour can cause severe irritation of the respiratory tract.

First Aid

Swallowed	Rinse mouth thoroughly with water immediately. Give water to drink. DO NOT induce vomiting. Seek immediate medical assistance. Poison Information Centres in each State capital city can provide additional assistance for scheduled poisons.
Eye	Immediately irrigate with copious quantity of water for at least 15 minutes. Eyelids to be held open. Seek immediate medical assistance.
Skin	Wash affected areas with copious quantities of water immediately. Remove contaminated clothing and wash before re-use. Treat skin and clothing with 1% sodium bicarbonate solution to neutralize acid residues. If irritation occurs seek medical advice.
Inhaled	Remove victim from exposure - avoid becoming a casualty. Allow patient to assume most comfortable position and keep warm.Keep at rest until fully recovered. If breathing laboured and patient cyanotic (blue), ensure airways are clear and have qualified person give oxygen through a face mask. If breathing has stopped apply artificial respiration at once. In the event of cardiac arrest, apply external cardiac massage. Seek medical attention.

Advice to Doctor

Advice to Doctor	Consult Poisons Information Centre. Treat symptomatically as for strong acids.

Other Health Hazard Information

PRECAUTIONS FOR USE

Exposure Limits	Name	STEL (mgm3)	STEL (ppm)	TWA (mgm3)	TWA (ppm)	FootNote
	Sulphuric acid	3		1		

Other Exposure Info. TLV/TWA: 1 mg/m3, STEL: 3 mg/m3 Worksafe Aust.
Odour Threshold: > 1 mg/m3 IDLH Value: 80 mg/m3

Eng. Controls Maintain concentration below recommended exposure limit.
Use with local exhaust ventilation or:
Combination particulate/gas respirator, Class B, (Inorganic vapour).
Self contained breathing apparatus may be needed for prolonged periods of exposure.

Personal Protection

Protective Equip. The following personal protective equipment must be worn.
Overalls or similar protective apparel.
Safety glasses,goggles or faceshield as appropriate.
Rubber boots.
Elbow-length PVC gloves.
Splash apron.
Wash contaminated clothing and protective equipment before storing/re-using.
Avoid all contact.

Flammability

Fire Hazards The product is considered non-combustible. Its other hazardous properties should however be considered if it is involved in a fire.
Contact with moisture or water may generate heat.
Contact with strong alkalis may generate heat.

Other Precautions Prolonged exposure to mists and vapours can cause erosion of teeth, chronic irritation of eyes, nose and throat and chronic inflammation of airways. 77 - 98% acid causes 2nd and 3rd degree burns of skin on short contact and is very injurious to the eyes.
In October 1992 the International Agency for Research on Cancer (IARC) classified occupational exposure to strong inorganic acid mists containing sulphuric acid as carcinogenic to humans, ie a Group 1 carcinogen.
Further information can be obtained from N.S.W WorkCover Authority publication dated September 1993.

SAFE HANDLING INFORMATION

Storage and Transport

Storage Precautions	Store in well ventilated area. Store in a cool,dry place. Keep dry - reacts with water; may lead to drum rupture. Keep containers securely sealed and protected against physical damage. Store away from strong bases. Not to be loaded with Class 1, 4.3, 5.1, 5.2, 6*,7, Foodstuff and foodstuff empties. (* where the Class 6 substance is a cyanide and the Class 8 substance is an acid).
Other Storage Info.	Corrosive to most metals in the presence of moisture, liberating hydrogen gas, (potential explosion). Reacts violently or explosively with a wide range of organic and inorganic chemicals, including water, alcohol, carbides, chlorates, picrates, nitrates, metals and other combustibles.
Proper Shipping Name	SULFURIC ACID
EPG Number	8A2
IERG Number	40
Packaging Method	5.9.8RT8

Spills and Disposal

Spills & Disposal	Shut off all possible sources of ignition. Clear area of all unprotected personnel. Contain using sand and earth - prevent run-off into drains and waterways. For large spills notify Emergency Services. In the event of a small spill: Neutralise remaining product with lime or soda ash, adjusting pH to 6-10. Flush to sewer as a greatly diluted solution. Wear full protective clothing (see Personal Protection/Ventilation Section) .Self contained breathing apparatus may be needed for prolonged periods of exposure. Refer to appropriate State Waste Disposal Authority Observe local regulations.

Fire/Explosion Hazard

Fire/Explos. Hazard	Decomposes on heating emitting toxic fumes. Oxides of sulphur Fire fighters to wear self-contained breathing apparatus if risk of exposure to products of decomposition. Reacts violently with water.
Hazchem Code	2P

OTHER INFORMATION

Toxicology	Oral LD50(rat): 2140 mg/kg
Environ. Protection	Highly toxic to aquatic life. Avoid contaminating waterways. The product is strongly acidic and hence may react with metals to produce hydrogen, a flammable gas.
Risk Statement	R35 Causes severe burns.
Safety Statement	S2 Keep out of reach of children. S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S30 Never add water to this product. S24/25 Avoid contact with skin and eyes.
Pkg. & Labelling	As required by the ADG Code and the Standard for the Uniform Scheduling of Drugs and Poisons. RISK AND SAFETY PHRASES R35- Causes severe burns. S2- Keep out of reach of children S26- In case of contact with eyes ,rinse immediately with plenty of water and contact a doctor or Poisons Information Centre. S30- Never add water to this product.
Hazard Category	Very Corrosive
Manufacturers Advice	Dilution of acid should always be carried out by slowly adding acid to water with constant stirring. Concentrated acid reacts violently with water, generating heat and causing splattering. In the case of fire, use extinguisher appropriate for burning material. Water used on adjacent fires must be carefully handled if acid has spilt.
References	CCINFO, CHRIS
Empirical Formula & Structural Formula	H2SO4
Other Information	Sulphuric acid: with not more than 51% acid, Group text EPG 8A1 with more than 51% acid, Group text EPG 8A2

CONTACT POINT

Contact

Australia: Business Hours: Mr Bob Wells, Tel: (02) 9839 4000
After Hours: Tel: 1800 022 037
NEW ZEALAND: Mr. Lloyd Williams, (09) 276 4019
IMPORTANT ADVICE:
This MSDS summarises our best knowledge of the health and safety hazard information of the product and how to safely handle and use the product in the workplace. Each user should read this MSDS and consider the information in the context of how the product will be handled and used in the workplace including its use in conjunction with other products. If clarification or further information is needed to ensure that an appropriate risk assessment can be made, the user should contact APS Chemicals. Our responsibility for products sold is subject to our standard terms and conditions, a copy of which is sent to our customers and is also available on request.

End of MSDS

SODIUM CYANIDE

MSDS Number: S3458 --- *Effective Date: 12/08/96*

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1. Product Identification

Synonyms: Hydrocyanic acid, sodium salt; Cyanogran
CAS No.: 143-33-9
Molecular Weight: 49.01
Chemical Formula: NaCN
Product Codes: J.T. Baker: 3662, 3663 Mallinckrodt: 7616

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2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Sodium Cyanide	143-33-9	90 - 100%	Yes

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3. Hazards Identification

Emergency Overview

DANGER! MAY BE FATAL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CONTACT WITH ACIDS LIBERATES POISONOUS GAS. CAUSES BURNS TO SKIN, EYES, AND RESPIRATORY TRACT. AFFECTS BLOOD, CARDIOVASCULAR SYSTEM, CENTRAL NERVOUS SYSTEM AND THYROID.

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

Health Rating: 3 - Severe (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 2 - Moderate
Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

In most cases, cyanide poisoning causes a deceptively healthy pink to red skin color. However, if a physical injury or lack of oxygen is involved, the skin color may be bluish. Reddening of the eyes and pupil dilation are symptoms of cyanide poisoning. Cyanosis (blue discoloration of the skin) tends to be associated with severe cyanide poisonings.

Inhalation:
Corrosive to the respiratory tract. The substance inhibits cellular respiration and may cause blood, central nervous system, and thyroid changes. May cause headache, weakness, dizziness, labored breathing nausea and vomiting, which can be followed by weak and irregular heart beat, unconsciousness, convulsions, coma and death.

Ingestion:
Highly Toxic! Corrosive to the gastro-intestinal tract with burning in the mouth and esophagus, and abdominal pain. Larger doses may produce sudden loss of consciousness and prompt death from respiratory arrest. Smaller but still lethal doses may prolong the illness for one or more hours. Bitter almonds odor may be noted on the breath or vomitus. Other symptoms may be similar to those noted for inhalation exposure.

Skin Contact:

Corrosive. May cause severe pain and skin burns. Solutions are corrosive to the skin and eyes, and may cause deep ulcers which heal slowly. May be absorbed through the skin, with symptoms similar to those noted for inhalation.

Eye Contact:
Corrosive. Symptoms may include redness, pain, blurred vision, and eye damage.

Chronic Exposure:
Prolonged or repeated skin exposure may cause a "cyanide" rash and nasal sores.

Aggravation of Pre-existing Conditions:
Workers using cyanides should have a preplacement and periodic medical exam. Those with history of central nervous system, thyroid, skin, heart or lung diseases may be more susceptible to the effects of this substance.

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4. First Aid Measures

IN CASE OF CYANIDE POISONING, start first aid treatment immediately, then get medical attention. A cyanide antidote kit (amyl nitrite, sodium nitrite and sodium thiosulfate) should be available in any cyanide work area. Actions to be taken in case of

cyanide poisoning should be planned and practiced before beginning work with cyanides. Oxygen and amyl nitrite can be given by a first responder before medical help arrives. Allow victim to inhale amyl nitrite for 15-30 seconds per minute until sodium nitrite and sodium thiosulfate can be administered intravenously (see Note to Physician). A new amyl nitrite ampule should be used every 3 minutes. If conscious but symptoms (nausea, difficult breathing, dizziness, etc.) are evident, give oxygen. If consciousness is impaired (non-responsiveness, slurred speech, confusion, drowsiness) or the patient is unconscious but breathing, give oxygen and amyl nitrite by means of a respirator. If not breathing, give oxygen and amyl nitrite immediately by means of a positive pressure respirator (artificial respiration).

Inhalation:
If inhaled, remove to fresh air. Administer antidote kit and oxygen per pre-planned instructions if symptoms occur. Keep patient warm and at rest. Do not give mouth to mouth resuscitation.

Ingestion:
If ingested, antidote kit and oxygen should be administered per above. If the patient is conscious, immediately give the patient activated charcoal slurry. Never give anything by mouth to an unconscious person. Do not induce vomiting as it could interfere with resuscitator use.

Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse. Administer antidote kit and oxygen per preplanned instructions if symptoms occur.

Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:
If patient does not respond to amyl nitrite, inject intravenously with 10mL of a 3% solution of sodium nitrite at a rate of not more than 2.5 to 5 mL per minute.Once nitrite administration is complete, follow directly with 50 mL of a 25% solution of sodium thiosulfate at the same rate by the same route. Give victim oxygen and keep under observation. If exposure was severe, watch victim for 24-48 hours. If signs of cyanide poisoning persist or reappear, repeat nitrite and thiosulfate injections 1 hour later in 1/2 the original doses. Cyanocabalamin (B12), 1 mg intramuscularly, may speed recovery. Moderate cyanide exposures need be treated only by supportive measures such as bed rest and oxygen.

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5. Fire Fighting Measures

Fire:
Not combustible, but upon decomposition or contact with acids, this material releases highly flammable and toxic hydrogen cyanide gas.

Explosion:
Not considered an explosion hazard, but upon heating with chlorates or nitrites to 450C (842F) may cause an explosion. Violent explosion occurs if melted with nitrite salt. Sealed containers may rupture when heated.

Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire. Do Not use carbon dioxide. Carbon dioxide can react with this material in the presence of moisture to produce hydrogen cyanide. Water spray may be used to keep fire exposed containers cool. Reacts slowly with water to form hydrogen cyanide.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

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6. Accidental Release Measures

Spills: Ventilate area of leak or spill. Allow only qualified personnel to handle spill. Clean-up personnel require protective clothing and respiratory protection from vapors. Collect material and place in a closed container for recovery or disposal. Do not flush to sewer! Decontaminate liquid or solid residues in spill area with sodium or calcium hypochlorite solution. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

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7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Separate from incompatibles. Workers must carefully follow good hygienic practices, including no eating, drinking, or smoking in workplace. Proper use and maintenance of protective equipment is essential. Workers using cyanide need preplacement and annual medical exams. Special training should be given to workers using cyanide. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product. Do not store near combustibles or flammables because subsequent fire fighting with water could lead to cyanide solution runoff. Do not store under sprinkler systems. All persons with the potential for cyanide poisoning should be trained to provide

immediate First Aid using oxygen and amyl nitrite. A cyanide anitdote kit (amyl nitrite, sodium nitrite, and sodium thiosulfate) should be readily available in cyanide workplaces. The antidotes should be checked annually to ensure they are still within their shelf-lives. Identification of community hospital resources and emergency medical squads in order to equip and train them on handling cyanide emergencies is essential.

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8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL): 5 mg/m3 skin (TWA) (as CN) -ACGIH Threshold Limit Value (TLV): 5 mg/m3 (STEL) Ceiling, skin, as CN

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. This substance has poor warning properties.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

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9. Physical and Chemical Properties

Appearance:
White deliquescent granular solid.

Odor:
Almond odor. Bitter almonds.

Solubility:
48 g/100 cc @ 10C (50F)

Specific Gravity:
1.60 @ 25C/4C

pH:
Aqueous solutions are strongly alkaline.

% Volatiles by volume @ 21C (70F):
0

Boiling Point:
1496C (2725F)

Melting Point:
564C (1047F)

Vapor Density (Air=1):
No information found.

Vapor Pressure (mm Hg):
1 @ 817C (1503F)

Evaporation Rate (BuAc=1):
No information found.

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10. Stability and Reactivity

Stability:
Very stable when dry. Moisture will cause slow decomposition, releasing poisonous hydrogen cyanide gas.

Hazardous Decomposition Products:
Emits toxic fumes of cyanide and oxides of nitrogen when heated to decomposition.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Acid. nitrates, nitrites, chlorates, fluorine, magnesium, and strong oxidizers. Reacts with acids to liberate toxic and flammable hydrogen cyanide gas. Water or weak alkaline solutions can produce dangerous amounts of hydrogen cyanide in confined areas. Reacts with carbon dioxide in air to form hydrogen cyanide gas.

Conditions to Avoid:
Heat, moisture, incompatibles.

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11. Toxicological Information

Oral rat LD50: 6440 ug/kg. Investigated as a tumorigen, mutagen, reproductive effector.

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

Ingredient	Known	NTP Carcinogen - Anticipated	IARC Category
Sodium Cyanide (143-33-9)	No	No	None

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12. Ecological Information

Environmental Fate:
No information found.

Environmental Toxicity:
This material is expected to be very toxic to aquatic life. This material is expected to be very toxic to terrestrial life.

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13. Disposal Considerations

Cyanides must be oxidized to harmless waste before disposal. An alkaline solution (pH about l0) is treated with chlorine or commercial bleach in excess to decompose cyanide. When cyanide-free, it can be neutralized. Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

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14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: RQ, SODIUM CYANIDE
Hazard Class: 6.1

UN/NA: UN1689
Packing Group: I
Information reported for product/size: 100LB

International (Water, I.M.O.)

Proper Shipping Name: SODIUM CYANIDE, SOLID
Hazard Class: 6.1
UN/NA: UN1689
Packing Group: I
Information reported for product/size: 100LB

International (Air, I.C.A.O.)

Proper Shipping Name: SODIUM CYANIDE, SOLID
Hazard Class: 6.1
UN/NA: UN1689
Packing Group: I
Information reported for product/size: 100LB

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15. Regulatory Information

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

Ingredient	TSCA	EC	Japan	Australia
Sodium Cyanide (143-33-9)	Yes	Yes	Yes	Yes

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

	--Canada--				
Ingredient	Korea	DSL	NDSL	Phil.	
Sodium Cyanide (143-33-9)	Yes	Yes	No	Yes	

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

	-SARA 302-	------SARA 313------			
Ingredient	RQ	TPQ	List	Chemical Catg.	
Sodium Cyanide (143-33-9)	10	100	No	Cyanide comp	

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

		-RCRA-	-TSCA-
Ingredient	CERCLA	261.33	8(d)
Sodium Cyanide (143-33-9)	10	P106	No

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

Australian Hazchem Code: 4X
Poison Schedule: S7

WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: 3 **Flammability:** 0 **Reactivity:** 1

Label Hazard Warning:
DANGER! MAY BE FATAL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CONTACT WITH ACIDS LIBERATES POISONOUS GAS. CAUSES BURNS TO SKIN, EYES, AND RESPIRATORY TRACT. AFFECTS BLOOD, CARDIOVASCULAR SYSTEM, CENTRAL NERVOUS SYSTEM AND THYROID.

Label Precautions:
Do not breathe dust. Do not get in eyes, on skin, or on clothing. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling.

Label First Aid:
IN ALL CASES, GET MEDICAL ATTENTION IMMEDIATELY. KEEP A CYANIDE ANTIDOTE KIT (amyl nitrite, sodium nitrite and sodium thiosulfate) in area of product use or storage. First-aiders must take precautions to avoid contact with cyanide substance. If ingested, administer antidote kit and oxygen per pre-planned instructions. If the patient is conscious, immediately give the patient activated charcoal slurry. Never give anything by mouth to an unconscious person. Do not induce vomiting as it could interfere with resuscitator use. If inhaled, remove to fresh air. Administer antidote kit and oxygen per pre-planned instructions if symptoms occur. Keep patient warm and at rest. Do not give mouth to mouth resuscitation. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Administer antidote kit and oxygen per preplanned instructions if symptoms occur.

Product Use:
Laboratory Reagent.

Revision Information:
Pure. New 16 section MSDS format, all sections have been revised.

Disclaimer:
****
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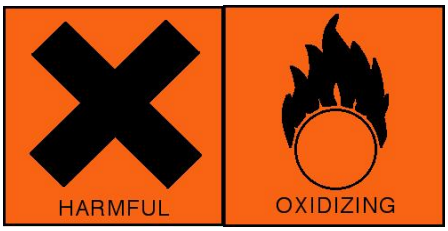
****
********** **Prepared by:** Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

Safety (MSDS) data for sodium nitrate



Click here for data on sodium nitrate in student-friendly format, from the HSci project

---

General

Synonyms: nitratine, soda niter, soda nitre, Chile saltpetre, cubic nitre, sodium saltpeter, nitric acid sodium salt
Molecular formula: $NaNO_3$
CAS No: 7631-99-4
EC No: 231-554-3

Physical data

Appearance: colourless crystals or white powder
Melting point: 306 C
Boiling point:
Vapour density: 2.9 (air = 1)
Vapour pressure:
Density (g cm^{-3}): 2.26
Flash point:
Explosion limits:
Autoignition temperature:
Water solubility: soluble

Stability

Stable. Strong oxidizer - may ignite flammable material. Incompatible with cyanides, combustible material, strong reducing agents, aluminium.

Toxicology

Harmful if swallowed or inhaled. Skin, eye and respiratory irritant.

Toxicity data

(The meaning of any abbreviations which appear in this section is given here.)
ORL-CHD LDLO 22.5 mg kg^{-1}
ORL-RAT LD50 1267 mg kg^{-1}
IVN-MUS LD50 175 mg kg^{-1}
ORL-RBT LD50 2680 mg kg^{-1}

Risk phrases

(The meaning of any risk phrases which appear in this section is given here.)
R8 R20 R22 R36 R37 R38.

Transport information

(The meaning of any UN hazard codes which appear in this section is given here.)
UN No 1498. Hazard class 5.1. Packing group III. UK transport category 3.

Personal protection

Safety glasses.

Safety phrases

(The meaning of any safety phrases which appear in this section is given here.)
S17 S26 S27 S36 S37 S39.

Safety (MSDS) data for borax decahydrate

General

Synonyms: antipyonin, borax, boricin, disodium tetraborate decahydrate, three elephant, tronabor, sodium pyroborate decahydrate, sodium tetraborate decahydrate, sodium borate 10-hydrate, sodium borate decahydrate, sodium biborate decahydrate
Molecular formula: $B_4Na_2O_7\ 10H_2O$
CAS No: 1303-96-4
EINECS No:

Physical data

Appearance: white crystals
Melting point: 75 C
Boiling point: 320 C
Vapour density:
Vapour pressure:
Density (g cm^{-3}): 1.73
Flash point:
Explosion limits:
Autoignition temperature:
Water solubility: moderate

Stability

Stable. Reacts violently with potassium, acid anhydrides. Incompatible with strong acids, metallic salts.

Toxicology

Possible risk that this may cause reproductive disorders, based on tests with laboratory animals. Eye and skin irritant. Harmful by ingestion. May be harmful by inhalation. Typical TLV/TWA 5 mg/m3.

Toxicity data

(The meaning of any toxicological abbreviations which appear in this section is given here.)
ORL-INF LDLO 1000 mg kg^{-1}
ORL-MAN LDLO 709 mg kg^{-1}
ORL-RAT LD50 2660 mg kg^{-1}
IPR-MUS LD50 2711 mg kg^{-1}
IVN-MUS LD50 1320 mg kg^{-1}

Risk phrases

(The meaning of any risk phrases which appear in this section is given here.)
R22 R36 R37 R38.

Transport information

Non-hazardous for air, sea and road freight.

Personal protection

Safety glasses, adequate ventilation.

Safety phrases

(The meaning of any safety phrases which appear in this section is given here.)
S22 S26 S36 S37 S39 S45.

Material Safety Data Sheet

Orfom(R) PAX

February 15, 2002
MSDS #: 76060
Revision #: 0

CHEVRON PHILLIPS CHEMICAL COMPANY LP
10001 Six Pines Drive
The Woodlands, TX 77380

PHONE NUMBERS
HEALTH:
Chevron Phillips Emergency Information Center 866.442.9628 (North America) and 1.832.813.4984(International)
TRANSPORTATION:
North America: CHEMTREC 800.424.9300 or 703.527.3887
ASIA: 1.703.527.3887
EUROPE: BIG .32.14.584545 (phone) or .32.14.583516 (telefax)
SOUTH AMERICA SOS-Cotec
Inside Brazil: 0800.111.767
Outside Brazil: 55.19.3467.1600
Technical Services: (832) 813-4862
For Additional MSDSs: (800) 852-5530

A. Product Identification

Synonyms: Not Established
Chemical Name: Potassium Amyl Xanthate
Chemical Family: Dithiocarbonate
Chemical Formula: C5H11OCS2K
CAS Reg. No.: 2720-73-2
Product No.: Not Established

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

Canadian Inventory Listing Status: DSL
All ingredients are listed in the Domestic Substances List (DSL). Impurities are exempt in accordance with Section 3 of the Canadian Environmental Protection Act (CEPA).

B. Components

Ingredients	CAS Number	% By Wt.	OSHA PEL	ACGIH TLV
Potassium Amyl Xanthate	2720-73-2	93 min.	NE	NE
Potassium Hydroxide	1310-58-3	0.15	2 ppm(c)	2 ppm (c)

(c)Ceiling Limit
See Section F, for additional Recommended Exposure Limits

C. Personal Protection Information

Ventilation: Use adequate ventilation to control exposure below recommended level.

Respiratory Protection: Not generally required unless needed to prevent respiratory irritation.

Eye Protection: Use safety glasses with side shields.

Skin Protection: No special garments required. Avoid unnecessary skin contamination. Use impervious rubber gloves.

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

D. Handling and Storage Precautions

Do not get in eyes, on skin or on clothing. Do not breathe vapors, mist, fume or dust. Wear protective equipment and/or garments described above if exposure conditions warrant. Wash thoroughly after handling. Launder contaminated clothing before reuse. Use only with adequate ventilation. When entry into or exit from concentrations of unknown exposure, use NIOSH/MSHA approved self-contained breathing apparatus (SCBA). Wash thoroughly after handling.

Store in a closed containers. Store in cool, well-ventilated area away from ignition sources. Protect from moisture and oxidants.

E. Reactivity Data

Stability: Stable
Conditions to Avoid: Not Applicable
Incompatibility (Materials to Avoid): Oxygen and strong oxidizing Agents and Moisture

Hazardous Polymerizatio: Will Not Occur
Conditions to Avoid: Not Applicable
Hazardous Decomposition Products: Carbon oxides and various hydrocarbons formed when burned.

F. Health Hazard Data

Recommended Exposure Limits:

Treat as a nuisance particulate	OSHA PEL	ACGIH TVL
Total Dust	15 mg/m3	10 mg/m3
Respirable Fraction	5 mg/m3	NE

Acute Effects of Overexposure:

Eye: Slight eye irritation

Skin: Slight eye irritation

Inhalation: Aerosol may cause irritation to nose, throat or lungs..

Ingestion: No data available.

Subchronic and Chronic Effects of Overexposure:

Aerosol has produce liver, kidney and nervous system changes in laboratory animals. Carbon disulfide may be released upon heating or if conditions become acidic. Then headache, dizziness, nervousness, loss of appetite, psychosis, nerve, heart, kidney or liver changes may develop..

Other Health Effects:

No known applicable information.

Health Hazard Categories:

	Animal	Human		Animal	Human
Known Carcinogen	___	___	Toxic	___	___
Suspect Carcinogen	___	___	Corrosive	___	___
Mutagen	___	___	Irritant	___	___
Teratogen	___	___	Target Organ Toxin	_X_	___
Allergic Sensitizer	___	___	Specify - Liver, Kidney,& Nerve Toxin-Animal		
Highly Toxic	___	___			

Canadian WHIMS:

First Aid and Emergency Procedures:

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

Skin: Wash skin with soap and water. If irritation develops, seek Medical attention

Inhalation: Remove from exposure.

Ingestion: Promptly induce vomiting and seek medical attention

G. Physical Data

Appearance:	Yellowish-grey Powder or Pellets
Odor:	Mild
Boiling Point:	Not Applicable
Vapor Pressure:	Not Applicable
Vapor Density (Air = 1):	Not Applicable
Solubility in Water:	Appreciable
Specific Gravity (H2O = 1):	Not Established
Percent Volatile by Volume:	<1
Viscosity:	Not Applicable

H. Fire and Explosion Data

Flash Point (Method Used):	Not Applicable
Flammable Limits (% by Volume in Air):	LEL - Not Applicable UEL - Not Applicable
Fire Extinguishing Media:	Dry chemical, foam or carbon dioxide (CO2)
Special Fire Fighting Procedures:	Evacuate area of all unnecessary personnel. Shut off source, if possible. Use NIOSH/MSHA approved self-contained breathing apparatus and other protective equipment and/or garments described in Section C if conditions warrant. Water fog or spray may be used to cool exposed containers and equipment.
Fire and Explosion Hazards:	Sulfur oxides and carbon disulfide Formed when burned.

I. Spill, Leak and Disposal Procedures

Precautions Required if Material is Released or Spilled:
Evacuate area of all unnecessary personnel. Wear protective equipment and/or garments described in Section C if exposure conditions warrant. When entry into or exit from concentrations of unknown exposure, use NIOSN/MSHA approved self-contained breathing apparatus (SCBA). Contain spill. Protect from ignition. Keep out of water sources and sewers. Sweep or vacuum up spill. Transfer to disposal drums using non-sparking equipment..

Waste Disposal (Insure Conformity with all Applicable Disposal Regulations):
Incinerate or place in permitted waste management facility.

J. DOT Transportation

Shipping Name: Not Applicable
Hazard Class: Not Applicable
ID Number: Not Applicable
Packing Group: Not Applicable
Marking: Not Applicable
Label: Not Applicable
Placard: Not Applicable
Hazardous Substance/RQ: Not Applicable
Shipping Description: Not Applicable
Packaging References: Not Applicable

K. RCRA Classification - Unadulterated Product as a Waste

Not Applicable

L. Protection Required for Work on Contaminated Equipment

Contact immediate supervisor for specific instructions before work is initiated. Wear protective equipment and/or garments described in Section C if exposure conditions warrant. When entry into or exit from concentrations of unknown exposure, use NIOSH/MSHA approved self-contained breathing apparatus (SCBA).

.

M. Hazard Classification

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

___ Combustible Liquid
___ Compressed Gas
___ Flammable Gas
___ Flammable Liquid
___ Flammable Solid
___ Flammable Aerosol
___ Explosive
_X_ Health Hazard (Section F)
___ Organic Peroxide
___ Oxidizer
___ Pyrophoric
___ Unstable
___ Water Reactive

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

N. Additional Comments

REVISION STATEMENT
This revision reviews entire MSDS.

SARA 313

As of the preparation date, this product did not contain a chemical or chemicals subject to the reporting requirements of Section 313 of Title III of Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372

For more information and technical assistance contact:

Chevron Phillips Chemical Company LP
P.O. Box 4910
The Woodlands, TX 77387-4910
800.858.4327

ORFOM® PAX

potassium amyl xanthate

ORFOM® PAX is available in both powder and pellet forms. Potassium amyl xanthate is a well known, versatile collector for sulfide minerals including sulfides of copper, lead, nickel and zinc. It is generally considered the most powerful, least selective xanthate and is often used where high selectivity is not required. Selectivity is often ore dependant and testing is required to determine the optimum collector as well as the optimum dosage of each collector. ORFOM® PAX is manufactured to close specifications to ensure product consistency. ORFOM® PAX is available in both drums and wooden boxes.

Application

ORFOM® PAX potassium amyl xanthate is a high quality xanthate for sulfide mineral flotation.

Availability

ORFOM® PAX is available in drums and wooden boxes.

Material Handling

Do not get in eyes, on skin, or on clothing. Do not breathe vapors, mist, fume or dust. Wear personal protective equipment described in the Material Safety Data Sheet (MSDS) if exposure conditions warrant. Wash thoroughly after handling. Launder contaminated clothing before reuse. Use only with adequate ventilation. Store in a cool well-ventilated area away from ignition sources. Store in closed container. Protect from moisture and oxidants. If spilled, shut off source if possible and contain spill. Protect from ignition. Keep out of water sources and sewers. Follow normal clean-up procedures for solid spills. Control dust. Insure conformity with all applicable disposal regulations.

Refer to the Material Safety Data Sheet for complete safety and health information.

Typical Properties

Property	Value
Composition, % Typical	
Purity, Minimum	90%
Free Alkali, Maximum	0.5%
Color	Yellow

BEST SAND
CORPORATION

Material Safety Data Sheet

Date: June 29, 2005 **Supersedes:** March 21, 2005

SECTION 1 : PRODUCT IDENTIFICATION

Trade Name as Labeled: Silica, Lake or Bank Sand; All Grades
Chemical Name and Formula: Silica, mainly in the form of quartz (crystalline silica); SiO_2

Manufacturer:
Best Sand Corporation
P.O. Box 87
Chardon, OH 44024
Phone: (440) 285-3132

Emergency Telephone Number: (800) 281-9876

"This Best Sand Corporation product is not intended for and is strictly prohibited for sandblasting."

SECTION 2: COMPOSITION/INFORMATION ON INGREDIENTS

Chemical	CAS Number	% by Weight
Crystalline Silica (Quartz)	14808-60-7	87-99.9

Crystalline silica exists in several forms, the most common of which is quartz. If crystalline silica (quartz) is heated to more than 870°C, it can change to a form of crystalline silica known as trydimite, and if crystalline silica (quartz) is heated to more than 1470°C, it can change to a form of crystalline silica known as cristobalite. The OSHA PEL for crystalline silica as trydimite and cristobalite is one-half of the OSHA PEL for crystalline silica (quartz).

SECTION 3: HAZARD IDENTIFICATION

Emergency Overview: The material is white or tan colored free-flowing sand. High airborne levels of dust may cause irritation to eyes and upper respiratory tract. Crystalline silica is an IARC Group 1 carcinogen. Contact with powerful oxidizing agents such as fluorine, chlorine trifluoride, manganese trioxide, oxygen difluoride, may cause fire. It dissolves in hydrofluoric acid and may produce a corrosive gas (silicon tetrafluoride).

Acute Health Effects:

Inhalation: Excessive exposure to high concentrations of dust may cause irritation to the eyes, skin, and mucous membranes of the upper respiratory tract.

Eye: Dusts may cause irritation to the eye. Scratching of cornea can occur if eye is rubbed.

Ingestion: Ingestion of harmful amounts of this product as distributed is unlikely due to its solid insoluble form. Ingestion of excessive amounts of dust may cause nausea or vomiting.

Chronic Health Effects:

Chronic inhalation of respirable crystalline silica may cause silicosis; a fibrosis (scarring) of the lungs. Silicosis may be progressive; it may lead to disability and death. Crystalline silica inhaled from occupational sources is classified as carcinogenic to humans. There is some evidence that inhalation of respirable crystalline silica or silicosis is associated with an increased incidence of scleroderma (an immune system disorder manifested by

fibrosis of the lungs, skin, and other internal organs), and kidney disease. Silicosis is also reported to increase the risk of tuberculosis. Generally, there are no signs or symptoms of exposure to crystalline silica. The condition of individuals with lung disease (e.g., bronchitis, emphysema, chronic obstructive pulmonary disease) can be aggravated by exposure. *See Section 11, Toxicological Information, for additional detail on potential adverse health effects.*

SECTION 4: FIRST AID MEASURES

Inhalation: If there is a gross inhalation of crystalline silica, remove the person immediately to fresh air. Consult a physician as necessary.

Ingestion: Ingestion may cause gastrointestinal discomfort. Dilute by drinking large quantities of water. If discomfort persists, consult a physician.

Eye Contact: Immediately wash eyes with large amounts of water. If irritation or redness persists consult a physician.

Skin Contact: Wash with soap and water. If irritation persists consult a physician.

SECTION 5: FIRE FIGHTING MEASURES

Crystalline silica (quartz) is not flammable, combustible, or explosive.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Accidental Release: Use personal protective equipment recommended in Section 8. Clean up using dustless methods (water or vacuum) to minimize generation and distribution of respirable silica particles. Avoid using compressed air. Collect material in appropriate containers for recovery and recycling or disposal.

Waste Disposal: See Section 12.

SECTION 7: HANDLING AND STORAGE

Handling: Handle the product in accordance with good industrial hygiene and safety practices. Refer to Section 8 for additional information on personal protective equipment. See American Society of Testing and Materials (ASTM) Standard Practice E 1132-99a, "*Standard Practice for Health Requirements Relating to Occupational Exposure to Respirable Crystalline Silica.*" Do not breathe dust. Use proper work practices and adequate ventilation with dust collection to maintain airborne levels of crystalline silica to below the PEL. *Use of this product may generate elevated levels of crystalline silica dust that may not be visible to the unaided eye.* If the airborne exposure levels to crystalline silica cannot be maintained below the PEL, wear a respirator (see Section 8) when handling, storing, or disposing of this product.

Storage: Avoid breakage of bagged material or spills of bulk material. *Note*: Quartz is incompatible with oxidizers such as hydrofluoric acid, fluorine, chlorine trifluoride, or oxygen difluoride (see Section 10).

The OSHA Hazard Communication Standard 29 CFR 1910.1200 and state and local worker or community "Right to Know" laws and regulations should be strictly followed. *Warn your employees (and your customer users in case of resale) by posting and other means of the hazards and the required OSHA precautions to be used. Provide training about the OSHA precautions.*

SECTION 8: EXPOSURE CONTROL/PERSONAL PROTECTION

Local Exhaust: Use sufficient local exhaust to reduce the level of respirable crystalline silica to below the PEL. See ACGIH "Industrial Ventilation, A Manual of Recommended Practice" (latest edition). Minimize the collection (build-up) of dust on walls, floors, equipment, and other horizontal surfaces.

Eye Protection: Use safety glasses, goggles, or face shield (as appropriate) under circumstances where particles could cause injury to the eye.

Skin Protection: Good personal hygiene practices should be followed including cleansing of exposed skin with soap and water, and laundering soiled work clothing.

Respiratory Protection: Use a NIOSH-approved air purifying or supplied-air respirator where airborne concentrations of crystalline silica (quartz) are expected to exceed exposure limits (see table below). Appropriate respiratory protection for respirable crystalline silica is based on the airborne exposure concentration and duration of exposure for the particular use of the respirator. A respiratory protection program in accordance with OSHA Standard 29 CFR 1910.134 must be implemented whenever workplace conditions warrant use of a respirator. ANSI Standard Z88.2 (recent revision) "American National Standard for Respiratory Protection." should also be considered. All tight-fitting respirators must be fit-tested either qualitatively or quantitatively for each respirator user. NIOSH recommends the use of respiratory protection when effective engineering controls are not feasible, or while they are being installed to control workplace exposures to crystalline silica.

AIRBORNE CRYSTALLINE SILICA CONCENTRATION	MINIMUM RESPIRATORY PROTECTION
Up to 0.5 mg/m^3	Any air-purifying respirator with a high efficiency particulate air (HEPA) filter.
Up to 1.25 mg/m^3	Any powered, air-purifying, full-facepiece respirator with a HEPA filter. Any supplied-air respirator operated in a continuous-flow mode.
Up to 2.5 mg/m^3	Any powered, air-purifying, full-facepiece respirator with a HEPA filter. Any powered, air-purifying respirator with a tight-fitting facepiece and a HEPA filter.
Up to 25 mg/m^3	Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode.
Emergency or Planned Entry into Unknown Concentrations or Immediately Dangerous to Life or Health (IDLH) Conditions	Up to 500 mg/m^3: Any self-contained breathing apparatus with a full-facepiece and is operated in pressure-demand mode or other positive pressure mode. Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus.
Escape	Any air-purifying, full-facepiece respirator with a HEPA filter. Any appropriate escape-type, self-contained breathing apparatus.
Use only NIOSH-approved respiratory protection. See 29 CFR §1910.134 and 42 CFR §84. See also ANSI standard Z88.2 (latest revision) "American National Standard for Respiratory Protection."	

Exposure Guidelines:

Chemical	Percentage (by wt.)	Exposure Guidelines						Unit
		OSHA		NIOSH		ACGIH		
		TWA	STEL	TWA	STEL	TWA	STEL	
Crystalline Silica (Quartz)	87-99.9	$\frac{10\ mg/m^3\ [a]}{\%\ SiO_2 + 2}$	N.E.	0.05[a]	N.E.	0.05 0.025[b]	N.E.	mg/m^3
N.E. = Not Established. a = respirable dust. b = Notice of Intended Change.								
OSHA Permissible Exposure Limits (PEL) and ACGIH Threshold Limit Values (TLV) are an 8-hour time-weighted average (TWA) concentration during a 40-hour workweek. NIOSH Recommended Exposure Limits (REL) is for up to a 10-hour workday during a 40-hour workweek.								

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Vapor Density (Air = 1): Not applicable.
Specific Gravity (Water = 1): 2.65
Solubility in Water: Insoluble in water.
Vapor Pressure: 10mm @ 1730°C
Melting Point: 1710° C
Boiling Point: 2230° C
Evaporation Rate (Butyl Acetate = 1): None.
Appearance and Color: White to tan; odorless.

SECTION 10: STABILITY AND REACTIVITY

Stability: Stable under normal handling and storage conditions.

Hazardous Polymerization: Cannot occur.

Chemical Incompatibility (Materials to Avoid): Contact with powerful oxidizing agents such as fluorine, chlorine trifluoride, manganese trioxide, oxygen difluoride, may cause fires.

Hazardous Decomposition Products: Crystalline silica will dissolve in hydrofluoric acid and produce a corrosive gas (silicon tetrafluoride).

SECTION 11: TOXICOLOGICAL INFORMATION

Silicosis: The major concern is silicosis, caused by the inhalation and retention of respirable crystalline silica dust. Silicosis can exist in several forms, chronic (or ordinary), accelerated, or acute.

Chronic or Ordinary Silicosis (often referred to as Simple Silicosis) is the most common form of silicosis, and can occur after many years of exposure to relatively low concentrations of airborne respirable crystalline silica dust. It is further defined as either simple or complicated silicosis. Lung lesions (shown as radiographic opacities) less than 1 centimeter in diameter characterize simple silicosis, primarily in the upper lung zones. Often, simple silicosis is not associated with symptoms, detectable changes in lung function or disability. Simple silicosis may be progressive and may develop into complicated silicosis or progressive massive fibrosis (PMF). Complicated silicosis or PMF is characterized by lung lesions (shown as radiographic opacities) greater than 1 centimeter in diameter. Although there may be no symptoms associated with complicated silicosis or PMF, the symptoms, if present, are shortness of breath, wheezing, cough and sputum production. Complicated silicosis or PMF may be associated with decreased lung function and may be disabling. Advanced complicated silicosis or PMF may lead to death. Advanced complicated silicosis or PMF can result in heart disease secondary to the lung disease (cor pumonale).

Accelerated Silicosis can occur with exposure to high concentrations of respirable crystalline silica over a relatively short period; the lung lesions can appear within five years of the initial exposure. The progression can be rapid. Accelerated silicosis is similar to chronic or ordinary silicosis, except that the lung lesions appear earlier and the progression is more rapid.

Acute Silicosis can occur with exposures to very high concentrations of respirable crystalline silica over a very short time period, sometimes as short as a few months. The symptoms of acute silicosis include progressive shortness of breath, fever, cough and weight loss. Acute silicosis can be fatal.

Cancer:

IARC: The International Agency for Research on Cancer ("IARC") concluded that there was *"sufficient evidence* in humans for the carcinogenicity of crystalline silica in the forms of quartz or cristobalite from occupational sources", and that there is *"sufficient evidence* in experimental animals for the carcinogenicity of quartz and cristobalite." The overall IARC evaluation was that "crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is *carcinogenic to humans (Group* 1)." The IARC evaluation noted that "carcinogenicity was not detected in all industrial circumstances studies. Carcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs." For further information on the IARC evaluation, see IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Volume 68, "Silica, Some Silicates..." (1997).

NTP: The National Toxicology Program (NTP), in its Ninth Annual Report on Carcinogens, classified "silica, crystalline (respirable)" as a known human carcinogen.

OSHA: Crystalline silica (quartz) is not regulated as a human carcinogen by the Occupational Safety and Health Administration (OSHA) as a carcinogen.

There have been many articles published on the carcinogenicity of crystalline silica, which the reader should consult for additional information. The following are examples of recently published articles:

"*Crystalline Silica and Lung Cancer: The Problem of Conflicting Evidence*", Indoor Built Environ, Volume 8, pp. 121-126 (1998);

"*Crystalline Silica and the Risk of Lung Cancer on the Potteries*", Occup. Environ. Med., Volume 55, pp. 779-785 (1998);

"*Is Silicosis Required for Silica-Associated Lung Cancer?*" American Journal of Industrial Medicine, Volume 37, pp. 252- 259 (2000);

"*Silica, Silicosis, and Lung Cancer: A Risk Assessment*", American Journal of Industrial Medicine, Volume 38, pp. 8-18 (2000);

"*Silica, Silicosis, and Lung Cancer: A Response to a Recent Working Group Report*", Journal of Occupational and Environmental Medicine, Volume 42, pp. 704-720 (2000).

"*NIOSH Hazard Review: Health Effects of Occupational Exposure to Respirable Crystalline Silica*. DDHS (NIOSH) Publication No. 2002-129 (2002).

Autoimmune Diseases: There is evidence that exposure to respirable crystalline silica (without silicosis) or that the disease silicosis is associated with the increased incidence of several autoimmune disorders, -- scleroderma, systemic lupus erythematosus, rheumatoid arthritis and diseases affecting the kidneys. For a review of the subject, the following may be consulted:

"*Occupational Exposure to Crystalline Silica and Autoimmune Disease*", Environmental Health Perspectives, Volume 107, Supplement 5, pp. 793-802 (1999);

"*Occupational Scleroderma*", Current Opinion in Rheumatology, Volume 11, pp. 490-494 (1999).

Tuberculosis: Individuals with silicosis are at increased risk to develop pulmonary tuberculosis, if exposed to persons with tuberculosis. The following may be consulted for further information:

Occupational Lung Disorders, Third Edition, Chapter 12, entitled "Silicosis and Related Diseases", Parkes, W. Raymond (1994);

"*Risk of pulmonary tuberculosis relative to silicosis and exposure to silica dust in South African gold miners*," Occup. Environ. Med., Volume 55, pp.496-502 (1998).

Kidney Disease: There is evidence that exposure to respirable crystalline silica (without silicosis) or that the disease silicosis is associated with the increased incidence of kidney diseases, including end stage renal disease. For additional information on the subject, the following may be consulted:

"*Kidney Disease and Silicosis*", Nephron, Volume 85, pp. 14-19 (2000).

SECTION 12: DISPOSAL CONSIDERATIONS

General: Disposal of the material should be in accordance with applicable regional, national and local laws and regulations. Local regulations may be more stringent than regional or national requirements. The material should be covered to minimize generation of airborne dust.

RCRA: Crystalline silica (quartz) is not classified as a hazardous waste under the Resource Conservation and Recovery Act, or its regulations, 40 CFR §261 et seq.

The above applies to materials as sold by Best Sand Corporation. The material may be contaminated during use, and it is the responsibility of the user to assess the appropriate disposal of the used material.

SECTION 13: TRANSPORT INFORMATION

Crystalline silica (quartz) is not a hazardous material for purposes of transportation under the U. S. Department of Transportation Table of Hazardous Materials, 49 CFR §172.101.

SECTION 14: REGULATORY INFORMATION

United States (Federal and State):

TSCA: Crystalline silica (quartz) is on the EPA Toxic Substance Control Act (TSCA) Section 8(b) inventory under CAS No. 14808-60-7.

RCRA: Crystalline silica (quartz) is not classified as a hazardous waste under the Resource Conservation and Recovery Act (RCRA), or its regulations, 40 CFR §261 et seq.

CERCLA: Crystalline silica (quartz) is not classified as a hazardous substance under regulations of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), 40 CFR §302.

Emergency Planning and Community Right to Know Act (EPCRA): Crystalline silica (quartz) is not an extremely hazardous substance under Section 302 and is not a toxic chemical subject to the requirements of Section 313.

Clean Air Act: Crystalline silica (quartz) was not processed with or does not contain any Class I or Class II ozone depleting substances.

Clean Water Act: Crystalline silica (quartz) is not listed as a hazardous substance in Section 311.

NTP: Respirable crystalline silica (quartz) is classified as a carcinogen.

OSHA: Crystalline silica (quartz) is listed under 29 CFR 1910.1000 as a toxic and hazardous substance.

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): Crystalline silica (quartz) is classified as a substance known to the State of California to be a carcinogen.

Canada:

Domestic Substances List (DSL): Best Sand Corporation's products, as naturally occurring substances, are on the Canadian DSL.

WHMIS (Workplace Hazardous Materials Information System) Classification: Class D, Division 2A.

Other:

IARC: Crystalline silica (quartz) is classified in IARC Group 1 Carcinogen.

National, state, provincial or local emergency planning, community right-to-know or other laws, regulations or ordinances may be applicable--consult applicable national, state, provincial or local laws.

SECTION 15: OTHER INFORMATION

Web Sites with Information about Effects of Crystalline Exposure:

http://www.osha.gov
http://www.cdc.gov/niosh/silicpag.html

User's Responsibility: The OSHA Hazard Communication Standard 29 CFR 1910.1200 require that this Material Safety Data Sheet be made available to your employees who handle or may be exposed to this product. Educate and train your employees regarding applicable precautions. Instruct your employees to handle this product properly.

Disclaimer: The information contained in this document applies to this specific material as supplied. It may not be valid for this material if it is used in combination with other materials. It is the user's responsibility to satisfy oneself as to the suitability and completeness of this information for one's own particular use. Since the actual use of the product described herein is beyond our control, Best Sand Corporation assumes no liability arising out of the use of the product by others. Appropriate warnings and safe handling procedures should be provided to handlers and users.

Silica, Lake or Bank Sand

WARNING

Inhalation May Cause Lung Damage

Read Material Safety Data Sheet Before Using Product

Product is not intended for and is strictly prohibited for sandblasting.

This product contains respirable crystalline silica "quartz" (CAS #1408-60-7). Long term or repeated inhalation of respirable crystalline silica can cause fibrosis or scar tissue in the lungs (Silicosis). The International Agency for Research on Cancer (IARC) concluded that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (Group 1).

For additional information on this product
Refer to the Material Safety Data Sheet or contact:

Best Sand Inc.
2069 N. 3462nd Road
P.O. Box 177
Wedron, IL 60557
(800) 281-9876

6/29/05

Safety (MSDS) data for 4-methyl-2-pentanol

General

Synonyms: isobutyl methyl carbinol, methyl amyl alcohol, MIBC, methyl isobutyl carbinol
Use:
Molecular formula: $(CH_3)_2CHCH_2CH(OH)CH_3$
CAS No: 108-11-2
EINECS No: 203-551-7

Physical data

Appearance: colourless liquid
Melting point: -90 C
Boiling point: 132 C
Vapour density:
Vapour pressure:
Density (g cm^{-3}): 0.802
Flash point:
Explosion limits:
Autoignition temperature:
Water solubility: slight

Stability

Stable. Flammable. Incompatible with oxidizing agents, acids, acid chlorides.

Toxicology

Respiratory, skin and eye irritant.

Toxicity data

(The meaning of any toxicological abbreviations which appear in this section is given here.)

ORL-RAT LD50 2590 mg kg^{-1}
SKN-RBT LD50 3560 mg kg^{-1}

Risk phrases

(The meaning of any risk phrases which appear in this section is given here.)
R10 R36 R37 R38.

Transport information

(The meaning of any UN hazard codes which appear in this section is given here.)
UN No 2282. Packing group III. Hazard code 3.3.

Personal protection

Safety glasses, good ventilation. Keep away from sources of ignition.

Safety phrases

(The meaning of any safety phrases which appear in this section is given here.)
S24 S25.

Material Safety Data Sheet for #2 Diesel

Definition of terms

1. Chemical Product

MSDS Number: U7770

MSDS Date: 01-31-99

Product Name: #2 Diesel Fuel

24 Hour Emergency Phone: (210) 979-8346
Transportation Emergencies: Call Chemtrec at 1-800-424-9300
MSDS Assistance: (210) 592-4593

Distributors Name and Address:

T.W. Brown Oil Co., Inc.
1857 Knoll Drive
Ventura, California 93003

Chemical Name: #2 Diesel Fuel **Cas Number:** 68476-34-6

Synonyms/Common Names: This Material Safety Data Sheet applies to the following product descriptions for Hazard Communication purposes only. Technical specifications vary greatly depending on the product, and are not reflected in this document. Consult specification sheets for technical information.

California Air Resources Board (Carb) Diesel Fuel- On-road, Off-Road, Tax Exempt blends
Premium Diesel Fuel- Low-Sulfur, High-sulfur, On-Road, Off-Road, Tax Exempt blends
#2 Distillate- Low-Sulfur, High-sulfur, On-Road, Off-Road, Tax Exempt blends
#2 Diesel Fuel- Low-Sulfur, High-sulfur, On-Road, Off-Road, Tax Exempt blends
#2 Fuel Oil- Low-Sulfur, High-sulfur, On-Road, Off-Road, Tax Exempt blends

2. Composition, Information On Ingredients

Product Use: This product is intended for use as a fuel in engines and heaters designed for diesel fuels, and for use in engineered processes. Use in other applicatiions may result in higher exposures and require additional controls, such as local exhaust ventilation and personal protective equipment.

Description: #2 Diesel is a complex mixture of hydrocarbons from a variety of chemical processes blended to meet standardized product specifications. Composition varies greatly and includes C9 to C20 hydrocarbons with a boiling range of about 325-675 degrees F. The following is a non-exhaustive list of common components, typical percentage ranges in product, and occupational exposure limits for each.

Material Safety Data Sheet for #2 Diesel

Component or Material Name	%	CAS Number	ACGIH Limits TLV -- STEL -- Units	OSHA Exposure Limits PEL -- STEL -- C/P -- Units
Cat cracked distillate, light	0-100	64741-59-9	100 -- NA -- mg/m3	N/A -- N/A -- N/A -- N/A
Hydrotreated distillate, middle	0-100	64742-46-7	100 -- NA -- mg/m3	N/A -- N/A -- N/A -- N/A
Hydrotreated distillate, light	0-100	64742-47-8	100 -- NA -- mg/m3	N/A -- N/A -- N/A -- N/A
Gas oil, light	0-100	64741-44-2	100 -- NA -- mg/m3	N/A -- N/A -- N/A -- N/A

3. Hazards Identification

Health Hazard Data:

1. The major effect of exposure to this product is giddiness, headache, central nervous system depression; possible irritation of eyes, nose, and lungs; and dermal irritation. Signs of kidney and liver damage may be delayed. Pulmonary irritation secondary to exhalation fo solvent.

2. NIOSH recommends that whole diesel engine exhaust be regarded as a potential occupational carcinogen. Follow OSHA and NSHA rules where diesel engine exhaust fumes may be generated.

3. A life time skin painting study by the American Petroleum Institute has shown that similar naphtha products with a boiling range of 350-700 degrees F usually produce skin tumors and/ or skin cancers in laboratory mice. Only a weak to moderate response occurred. The effect to humans has not been determined.

4. Positive results at 2.0 ml/kg and 6.0 ml/kg noted in mutagenesis studies via in-vivo bone marrow cytogenetics assay in rats.

5. Kerosene is classified as a severe skin irritant. Mutation data has been reported for kerosene products. Hydrotreated kerosene is listed as being probably carcinogenic to humans with limited evidence in humans and sufficient evidence in experimental animals.

Hazards of Combustion Products: Carbon monoxide and carbon dioxide can be found in the combustion products of this product and other forms of hydrocarbon combustion. Carbon monoxide in moderate concentrations can cause symptoms of headache, nausea, vomiting, increased cardiac output, and confusion. Exposure to higher concentrations of carbon monoxide can cause loss of consciousness, heart damage, brain damage, and/or death. Exposure to high concentrations of carbon dioxide can cause simple asphyxiation by displacing available oxygen. Combustion of this and other similar materials should only be carried out in well ventilated areas.

MATERIAL SAFETY DATA SHEET

Hydrogen Peroxide Solutions Greater Than 60%

MSDS Ref. No.: 7722-84-1-5
Date Approved: 11/04/2004
Revision No.: 8

This document has been prepared to meet the requirements of the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200; the Canada's Workplace Hazardous Materials Information System (WHMIS) and, the EC Directive, 2001/58/EC.

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Hydrogen Peroxide Solutions Greater Than 60%

ALTERNATE PRODUCT NAME(S): Durox® Reg. & LR 70%, Semiconductor Reg. 70%, Standard 60 & 70%, Super D® 65%, Technical 70%

GENERAL USE: Durox® 70% Reg. and LR - meets food chemical codex specifications, when diluted to 50% and lower concentrations with proper quality water, for aseptic packaging and other food related applications.

Standard 60 & 70% - the grade most suitable for industrial bleaching, processing, pollution abatement and general oxidation reactions.

Super D® 65% - meets US Pharmacopoeia specifications for 3% topical solutions when diluted with proper quality water. While manufactured to the USP standards for purity and to FMC's demanding ISO 9002 quality standards, FMC does not claim that its Hydrogen Peroxide is manufactured in accordance with all pharmaceutical cGMP conditions.

Technical 70% - suitable for chemical synthesis (essentially free of inorganic metals).

Semiconductor Reg. 70% - conforms to ACS and semi specs; for wafer etching and cleaning, and applications requiring low residues.

Chlorate Grade 70% - specifically formulated for use in chlorate manufacture or processing.

MANUFACTURER

FMC CORPORATION
Hydrogen Peroxide Division
1735 Market Street
Philadelphia, PA 19103
(215) 299-6000 (General Information)

FMC of Canada Ltd.
Hydrogen Peroxide Division
PG Pulp Mill Road
Prince George, BC V2N2S6
(250) 561-4200 (General Information)

EMERGENCY TELEPHONE NUMBERS

(800) 424-9300 (CHEMTREC - U.S.)
(613) 996-6666 (CANUTEC)
(303) 595-9048 (Medical - U.S. - Call Collect)

(281) 474-8750 (Plant: Pasadena, TX, US - Call Collect)
(250) 561-4221 (Plant: Prince George, BC, Canada - Call Collect)

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

- Clear, colorless, odorless liquid
- Oxidizer.
- Contact with combustibles may cause fire.
- Decomposes yielding oxygen that supports combustion of organic matters and can cause overpressure if confined.
- Corrosive to eyes, nose, throat, lungs and gastrointestinal tract.

POTENTIAL HEALTH EFFECTS: Corrosive to eyes, skin, nose, throat and lungs. May cause irreversible tissue damage to the eyes including blindness.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name	CAS#	Wt.%	EC No.	EC Class
Hydrogen Peroxide	7722-84-1	>60	231-765-0	Xi, R36/38; C, R34; O, R8
Water	7732-18-5	<40	231-791-2	Not classified

4. FIRST AID MEASURES

EYES: Immediately flush with water for at least 15 minutes, lifting the upper and lower eyelids intermittently. See a medical doctor or ophthalmologist immediately.

SKIN: Immediately flush with plenty of water while removing contaminated clothing and/or shoes, and thoroughly wash with soap and water. See a medical doctor immediately.

INGESTION: Rinse mouth with water. Dilute by giving 1 or 2 glasses of water. Do not induce vomiting. Never give anything by mouth to an unconscious person. See a medical doctor immediately.

INHALATION: Remove to fresh air. If breathing difficulty or discomfort occurs and persists, contact a medical doctor.

NOTES TO MEDICAL DOCTOR: Hydrogen peroxide at these concentrations is a strong oxidant. Direct contact with the eye is likely to cause corneal damage especially if not washed immediately. Careful ophthalmologic evaluation is recommended and the possibility of local corticosteroid therapy should be considered. Because of the likelihood of corrosive effects on the gastrointestinal tract after ingestion, and the unlikelihood of systemic effects, attempts at evacuating the stomach via emesis induction or gastric lavage should be avoided. There is a remote possibility, however, that a nasogastric or orogastric tube may be required for the reduction of severe distension due to gas formation.

5. FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA: Flood with water.

FIRE / EXPLOSION HAZARDS: Product is non-combustible. On decomposition releases oxygen which may intensify fire. An explosion hazard when mixed with organics at high concentrations.

FIRE FIGHTING PROCEDURES: Any tank or container surrounded by fire should be flooded with water for cooling. Wear full protective clothing and self-contained breathing apparatus.

FLAMMABLE LIMITS: Non-combustible

SENSITIVITY TO IMPACT: No data available

SENSITIVITY TO STATIC DISCHARGE: No data available

6. ACCIDENTAL RELEASE MEASURES

RELEASE NOTES: Dilute with a large volume of water and hold in a pond or diked area until hydrogen peroxide decomposes. Hydrogen peroxide may be decomposed by adding sodium metabisulfite or sodium sulfite after diluting to about 5%. Dispose according to methods outlined for waste disposal.

Combustible materials exposed to hydrogen peroxide should be immediately submerged in or rinsed with large amounts of water to ensure that all hydrogen peroxide is removed. Residual hydrogen peroxide that is allowed to dry (upon evaporation hydrogen peroxide can concentrate) on organic materials such as paper, fabrics, cotton, leather, wood or other combustibles can cause the material to ignite and result in a fire.

7. HANDLING AND STORAGE

HANDLING: Wear chemical splash-type monogoggles and full-face shield, impervious clothing, such as rubber, PVC, etc., and rubber or neoprene gloves and shoes. Avoid cotton, wool and leather. Avoid excessive heat and contamination. Contamination may cause decomposition and generation of oxygen gas which could result in high pressures and possible container rupture. Hydrogen peroxide should be stored only in vented containers and transferred only in a prescribed manner (see FMC Technical Bulletins). Never return unused hydrogen peroxide to original container, empty drums should be triple rinsed with water before discarding. Utensils used for handling hydrogen peroxide should only be made of glass, stainless steel, aluminum or plastic.

STORAGE: Store drums in cool areas out of direct sunlight and away from combustibles. For bulk storage refer to FMC Technical Bulletins.

COMMENTS: VENTILATION: Provide mechanical general and/or local exhaust ventilation to prevent release of vapor or mist into the work environment.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMITS

Chemical Name	ACGIH	OSHA	Supplier
Hydrogen Peroxide	1 ppm (TWA)	1 ppm (PEL)	

ENGINEERING CONTROLS: Ventilation should be provided to minimize the release of hydrogen peroxide vapors and mists into the work environment. Spills should be minimized or confined immediately to prevent release into the work area. Remove contaminated clothing immediately and wash before reuse.

PERSONAL PROTECTIVE EQUIPMENT

EYES AND FACE: Use chemical splash-type monogoggles and a full-face shield made of polycarbonate, acetate, polycarbonate/acetate, PETG or thermoplastic.

RESPIRATORY: If concentrations in excess of 10 ppm are expected, use NIOSH/DHHS approved self-contained breathing apparatus (SCBA), or other approved atmospheric-supplied respirator (ASR) equipment (e.g., a full-face airline respirator (ALR)). DO NOT use any form of air-purifying respirator (APR) or filtering facepiece (AKA dust mask), especially those containing oxidizable sorbants such as activated carbon.

PROTECTIVE CLOTHING: For body protection wear impervious clothing such as an approved splash protective suit made of SBR Rubber, PVC (PVC Outershell w/Polyester Substrate), Gore-Tex (Polyester trilaminate w/Gore-Tex), or a specialized HAZMAT Splash or Protective Suite (Level A, B, or C). For foot protection, wear approved boots made of NBR, PVC, Polyurethane, or neoprene. Overboots made of Latex or PVC, as well as firefighter boots or specialized HAZMAT boots are also permitted. DO NOT wear any form of boot or overboots made of nylon or nylon blends. DO NOT use cotton, wool or leather, as these materials react RAPIDLY with higher concentrations of hydrogen peroxide. Completely submerge hydrogen peroxide contaminated clothing or other materials in water prior to drying. Residual hydrogen peroxide, if allowed to dry on materials such as paper, fabrics, cotton, leather, wood or other combustibles can cause the material to ignite and result in a fire.

GLOVES: For hand protection, wear approved gloves made of nitrile, PVC, or neoprene. DO NOT use cotton, wool or leather for these materials react RAPIDLY with higher concentrations of hydrogen peroxide. Thoroughly rinse the outside of gloves with water prior to removal. Inspect regularly for leaks.

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9. PHYSICAL AND CHEMICAL PROPERTIES

ODOR:	Odorless
APPEARANCE:	Clear, colorless liquid
AUTOIGNITION TEMPERATURE:	Non-combustible
BOILING POINT:	119°C (246°F) (60%); 126°C (258°F) (70%)
COEFFICIENT OF OIL / WATER:	Not available
DENSITY / WEIGHT PER VOLUME:	(g/mL) Not available
EVAPORATION RATE:	(butyl acetate = 1) Less than water
FLASH POINT:	Non-combustible
FREEZING POINT:	-56°C (-68°F) (60%); -40°C (-40°F) (70%)
ODOR THRESHOLD:	Not available
OXIDIZING PROPERTIES:	Strong oxidizer
PERCENT VOLATILE:	100%
pH:	(as is) < / = 1.0
SOLUBILITY IN WATER:	(in H_2O % by wt) 100%

SPECIFIC GRAVITY:	(H_2O = 1): 1.24 @ 20°C/4°C (60%); 1.29 @ 20°C/4°C (70%)
VAPOR DENSITY:	(Air = 1): Not available
VAPOR PRESSURE:	14.5 mmHg @ 30°C (60%); 10.1 mmHg @ 30°C (70%)

COMMENTS:
pH (1% solution): 5.0 - 6.0

10. STABILITY AND REACTIVITY

CONDITIONS TO AVOID:	Excessive heat or contamination could cause product to become unstable.
STABILITY:	Stable (heat and contamination could cause decomposition)
POLYMERIZATION:	Will not occur
INCOMPATIBLE MATERIALS:	Reducing agents, wood, paper and other combustibles, iron and other heavy metals, copper alloys and caustic.
HAZARDOUS DECOMPOSITION PRODUCTS:	Oxygen which supports combustion.

COMMENTS: Materials to Avoid : Dirt, organics, cyanides and combustibles such as wood, paper, oils, etc.

11. TOXICOLOGICAL INFORMATION

EYE EFFECTS: 70% hydrogen peroxide: Corrosive (rabbit) [FMC Study Number: ICG/T-79.027]

SKIN EFFECTS: 70% hydrogen peroxide: Corrosive. (rabbit) [FMC Study Number: I87-0972]

DERMAL LD_{50}: 70% hydrogen peroxide: > 6.5 g/kg (rabbit) [FMC Study Number: ICG/T-79.027]

ORAL LD_{50}: 70% hydrogen peroxide: 805 mg/kg (rat) [FMC Study Number: I96-2068]

INHALATION LC_{50}: 50% hydrogen peroxide: > 0.17 mg/l (rat) [FMC Study Number: I89-1080]

TARGET ORGANS: Eye, skin, nose, throat, lungs

ACUTE EFFECTS FROM OVEREXPOSURE: Corrosive to eyes, skin, nose, throat, lungs and gastrointestinal tract. May cause irreversible tissue damage to the eyes including blindness.

CHRONIC EFFECTS FROM OVEREXPOSURE: The International Agency for Research on Cancer (IARC) has concluded that there is inadequate evidence for carcinogenicity of hydrogen peroxide in humans, but limited evidence in experimental animals (Group 3 - not classifiable as to its carcinogenicity to humans). The American Conference of Governmental Industrial Hygienists (ACGIH) has concluded that hydrogen peroxide is a 'Confirmed Animal Carcinogen with Unknown Relevance to Humans' (A3).

CARCINOGENICITY:

Chemical Name	IARC	NTP	OSHA	Other
Hydrogen Peroxide	Listed	Not listed	Not listed	(ACGIH) Listed (A3, Animal Carcinogen)

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION: Channel catfish 96-hour LC_{50} = 37.4 mg/L
Fathead minnow 96-hour LC_{50} = 16.4 mg/L
Daphnia magna 24-hour EC_{50} = 7.7 mg/L
Daphnia pulex 48-hour LC_{50} = 2.4 mg/L
Freshwater snail 96-hour LC_{50} = 17.7 mg/L
For more information refer to ECETOC "Joint Assessment of Commodity Chemicals No. 22, Hydrogen Peroxide." ISSN-0773-6339, January 1993

CHEMICAL FATE INFORMATION: Hydrogen peroxide in the aquatic environment is subject to various reduction or oxidation processes and decomposes into water and oxygen. Hydrogen peroxide half-life in freshwater ranged from 8 hours to 20 days, in air from 10-20 hrs. and in soils from minutes to hours depending upon microbiological activity and metal contaminants.

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHOD: An acceptable method of disposal is to dilute with a large amount of water and allow the hydrogen peroxide to decompose followed by discharge into a suitable treatment system in accordance with all regulatory agencies. The appropriate regulatory agencies should be contacted prior to disposal.

14. TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION (DOT)

PROPER SHIPPING NAME: Hydrogen Peroxide, aqueous solutions, stabilized with more than 60% hydrogen peroxide.

PRIMARY HAZARD CLASS / DIVISION:	5.1 (Oxidizer)
UN/NA NUMBER:	UN 2015
PACKING GROUP:	I
LABEL(S):	Oxidizer, Corrosive
PLACARD(S):	5.1 (Oxidizer)
ADDITIONAL INFORMATION:	DOT Marking: Hydrogen Peroxide, aqueous solutions, stabilized with more than 60 percent Hydrogen Peroxide, UN 2015 Hazardous Substance/RQ: Not applicable 49 STCC Number: 4918335 DOT Spec: stainless steel/high purity aluminum cargo tanks and rail cars. UN Spec: high purity aluminum drums. Contact FMC for specific details.

INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG)

PROPER SHIPPING NAME:	Hydrogen peroxide, aqueous solutions stabilized with more than 60% hydrogen peroxide.

INTERNATIONAL CIVIL AVIATION ORGANIZATION (ICAO) / INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA)

PROPER SHIPPING NAME:	Hydrogen peroxide greater than 60% is forbidden on Passenger and Cargo Aircraft, as well as Cargo Only Aircraft.

OTHER INFORMATION:

Protect from physical damage. Keep drums in upright position. Drums should not be stacked in transit. Do not store drum on wooden pallets.

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15. REGULATORY INFORMATION

UNITED STATES

SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT)

SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355, APPENDIX A):

Hydrogen Peroxide > 52%, RQ: 1000 lbs. Planning Threshold: 10,000 lbs.

SECTION 311 HAZARD CATEGORIES (40 CFR 370):

Fire Hazard, Immediate (Acute) Health Hazard

SECTION 312 THRESHOLD PLANNING QUANTITY (40 CFR 370):

The Threshold Planning Quantity (TPQ) for this product, if treated as a mixture, is 10,000 lbs; however, this product contains the following ingredients with a TPQ of less than 10,000 lbs.: (hydrogen peroxide, 1000 lbs. when conc is >52%)

SECTION 313 REPORTABLE INGREDIENTS (40 CFR 372):

Not listed

CERCLA (COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT)

CERCLA DESIGNATION & REPORTABLE QUANTITIES (RQ) (40 CFR 302.4):

Not listed
Unlisted (Hydrogen Peroxide); RQ = 100 lbs.; Ignitability, Corrosivity

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)

RCRA IDENTIFICATION OF HAZARDOUS WASTE (40 CFR 261):

Waste Number: D001, D002

CANADA

WHMIS (WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM):

Product Identification Number:	2015
Hazard Classification / Division:	Class C (Oxidizer), Class D, Div. 2, Subdiv. B (Toxic), Class E (Corrosive)
Ingredient Disclosure List:	Listed

EU EINECS NUMBERS:

008-003-00-9 (hydrogen peroxide)

INTERNATIONAL LISTINGS

Hydrogen peroxide:
China: Listed
Japan (ENCS): (1)-419
Korea: KE-20204
Philippines (PICCS): Listed

HAZARD, RISK AND SAFETY PHRASE DESCRIPTIONS:

<u>Hydrogen Peroxide:</u>

EC Symbols:	C	(Corrosive)
	O	(Oxidizer)

EC Risk Phrases:	R34	(Causes burns)
	R8	(Contact with combustible material may cause fire)
EC Safety Phrases:	S1/2	(Keep locked up and out of reach of children.)
	S3	(Keep in a cool place.)
	S28	(After contact with skin, wash immediately with plenty of water and soap.)
	S36/39	(Wear suitable protective clothing. Wear eye / face protection.)
	S45	(In case of accident or if you feel unwell, seek medical advice immediately - show the label where possible.)

16. OTHER INFORMATION

HMIS

Health	3
Flammability	0
Physical Hazard	3
Personal Protection (PPE)	H

Protection = H (Safety goggles, gloves, apron, the use of a supplied air or SCBA respirator is required in lieu of a vapor cartridge respirator)

HMIS = Hazardous Materials Identification System

Degree of Hazard Code:
4 = Severe
3 = Serious
2 = Moderate
1 = Slight
0 = Minimal

NFPA

Health	3
Flammability	0
Reactivity	3
Special	OX

SPECIAL = OX (Oxidizer)

NFPA = National Fire Protection Association

Degree of Hazard Code:
4 = Extreme
3 = High
2 = Moderate
1 = Slight
0 = Insignificant

REVISION SUMMARY:
This MSDS replaces Revision #7, dated February 02, 2004.
Changes in information are as follows:
Section 9 (Physical and Chemical Properties)

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MSDS Number: **A6048** * * * * * *Effective Date:* ***07/21/04*** * * * * * *Supercedes:* ***11/02/01***

MSDS Material Safety Data Sheet

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

Mallinckrodt CHEMICALS | J.T.Baker

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

National Response in Canada
CANUTEC: 613-996-6666

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

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

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

AMMONIUM NITRATE

1. Product Identification

Synonyms: Nitric acid, ammonium salt
CAS No.: 6484-52-2
Molecular Weight: 80.04
Chemical Formula: NH4NO3
Product Codes:
J.T. Baker: 0729, 0731
Mallinckrodt: 3436

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Ammonium Nitrate	6484-52-2	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE OR EXPLOSION. MAY BE HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

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

Health Rating: 2 - Moderate
Flammability Rating: 1 - Slight
Reactivity Rating: 3 - Severe (Oxidizer)
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: Yellow (Reactive)

Potential Health Effects

Inhalation:
May cause irritation to the respiratory tract; symptoms may include coughing, sore throat, and shortness of breath. At high temperatures, exposure to toxic nitrogen oxides decomposition products can quickly cause acute respiratory problems. Inhalation of large amounts causes systemic acidosis and abnormal hemoglobin.

Ingestion:
Large oral doses of nitrates may cause dizziness, abdominal pain, vomiting, bloody diarrhea, weakness, convulsions, and collapse. Harmful if swallowed. May cause methemoglobinemia resulting in cyanosis.

Skin Contact:
Causes irritation to skin. Symptoms include redness, itching, and pain.

Eye Contact:
Causes irritation, redness, and pain.

Chronic Exposure:
Small repeated oral doses of nitrates may cause weakness, depression, headache, and mental impairment.

Aggravation of Pre-existing Conditions:
No information found.

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4. First Aid Measures

Inhalation:
Remove to fresh air. Get medical attention for any breathing difficulty.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Remove any contaminated clothing. Wash skin with soap and water for at least 15 minutes. Get medical attention if irritation develops or persists.
Eye Contact:
Wash thoroughly with running water. Get medical advice if irritation develops.

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5. Fire Fighting Measures

Fire:
Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. May support combustion in an existing fire.
Explosion:
Contact with oxidizable substances may cause extremely violent combustion. Sealed containers may rupture when heated. Sensitive to mechanical impact.
Fire Extinguishing Media:
Use flooding amounts of water in early stages of fire involving ammonium nitrate. Use any means suitable for extinguishing surrounding fire.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

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6. Accidental Release Measures

Remove sources of heat and ignition.
Collected waste may be transferred to a closed, preferably metal, container and sent to a RCRA approved waste disposal facility.
Alternatively, sweep spill into noncombustible container and dissolve in large amount of water. Add soda ash. Mix and neutralize with 6M-HCl. Neutralized sludge may be sent to an approved waste disposal facility.

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7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Protect against physical damage. Store in a dry location separate from combustible, organic or other readily oxidizable materials. Avoid storage on wood floors. Remove and dispose of any spilled dichromates; do not return to original containers. Do not store above 54C (130F) preferably below 30C (86F). Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

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8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
None established.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
For conditions of use where exposure to dust or mist is apparent and engineering controls are not feasible, a particulate respirator (NIOSH type N95 or better filters) may be worn. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-face positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear protective gloves and clean body-covering clothing.
Eye Protection:
Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

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9. Physical and Chemical Properties

Appearance:
Colorless crystals.
Odor:
Odorless.
Solubility:
118g/100g water @ 0C (32F).
Specific Gravity:
1.73 @ 23C (77F)
pH:
5.4

% Volatiles by volume @ 21C (70F):
0
Boiling Point:
210C (410F) Decomposes.
Melting Point:
170C (338F)
Vapor Density (Air=1):
No information found.
Vapor Pressure (mm Hg):
No information found.
Evaporation Rate (BuAc=1):
No information found.

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10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Hygroscopic.
Hazardous Decomposition Products:
Emits nitrous oxides when heated to decomposition. Liberates ammonia in reaction with strong alkalis.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Aluminum, antimony, chromium, copper, iron, lead, magnesium, manganese, nickel, zinc, brass, oil, charcoal, organic material, acetic acid, ammonium chloride, bismuth, cadmium, chlorides, cobalt, phosphorus, potassium and ammonium sulfate, sodium, sodium hypochlorite, sodium perchlorate, sodium-potassium alloy, and sulfure.
Conditions to Avoid:
Heat, flame, ignition sources, dusting and incompatibles. Moisture and combustible materials. Shock sensitive.

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11. Toxicological Information

Oral rat LD50: 2217 mg/kg.

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

Ingredient	NTP Carcinogen - Known	NTP Carcinogen - Anticipated	IARC Category
Ammonium Nitrate (6484-52-2)	No	No	None

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12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is not expected to evaporate significantly. When released into water, this material is expected to readily biodegrade.
Environmental Toxicity:
No information found.

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13. Disposal Considerations

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

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14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: AMMONIUM NITRATE
Hazard Class: 5.1
UN/NA: UN1942
Packing Group: III
Information reported for product/size: 300LB

International (Water, I.M.O.)

Proper Shipping Name: AMMONIUM NITRATE
Hazard Class: 5.1
UN/NA: UN1942
Packing Group: III
Information reported for product/size: 300LB

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15. Regulatory Information

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  --------\Chemical Inventory Status - Part 1\------------------------
--------
  Ingredient                                        TSCA  EC   Japan
Australia
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```
  ---------------------------------------------  ----  ---  -----  --
-------
  Ammonium Nitrate (6484-52-2)                    Yes  Yes   Yes
Yes

  --------\Chemical Inventory Status - Part 2\-------------------------
--------
                                                          --Canada--
  Ingredient                                       Korea  DSL   NDSL
Phil.
  ---------------------------------------------  -----  ---   ----  -
----
  Ammonium Nitrate (6484-52-2)                     Yes   Yes   No
Yes

  --------\Federal, State & International Regulations - Part 1\--------
--------
                                           -SARA 302-    ------SARA
313------
  Ingredient                               RQ    TPQ     List
Chemical Catg.
  ---------------------------------------  ---   -----   ----  ------
--------
  Ammonium Nitrate (6484-52-2)             No    No      No
Nitrate cmpd

  --------\Federal, State & International Regulations - Part 2\--------
--------
                                                        -RCRA-    -
TSCA-
  Ingredient                               CERCLA     261.33     8(d)
  ---------------------------------------  ------     ------    -----
-
  Ammonium Nitrate (6484-52-2)             No         No         No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: No   Fire: No  Pressure: No
Reactivity: Yes         (Pure / Solid)
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Australian Hazchem Code: 1[S]
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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16. Other Information

NFPA Ratings: Health: **0** Flammability: **0** Reactivity: **3** Other: **Oxidizer**
Label Hazard Warning:
DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY

CAUSE FIRE OR EXPLOSION. MAY BE HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

Label Precautions:

Keep from contact with clothing and other combustible materials.
Do not store near combustible materials.
Store in a tightly closed container.
Avoid breathing dust.
Avoid contact with eyes, skin and clothing.
Remove and wash contaminated clothing promptly.
Use only with adequate ventilation.
Wash thoroughly after handling.
Store preferably below 30C

Label First Aid:

If inhaled, remove to fresh air. Get medical attention for any breathing difficulty. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 3, 16.

Disclaimer:

4. FIRST AID MEASURES

Ingestion:
If swallowed, call a physician immediately. Only induce vomiting at the instruction of a physician. Never give anything by mouth to an unconscious person.

Skin Contact:
Remove contaminated clothing and shoes without delay. Wash immediately with plenty of water. Do not reuse contaminated clothing without laundering. Get medical attention if pain or irritation persists after washing or if signs and symptoms of overexposure appear.

Eye Contact:
Rinse immediately with plenty of water for at least 15 minutes. Obtain medical attention immediately.

Inhalation:
Material is not expected to be harmful if inhaled. Remove to fresh air.

5. FIRE-FIGHTING MEASURES

Extinguishing Media:	Use water spray, carbon dioxide or dry chemical.
Protective Equipment:	Firefighters, and others exposed, wear self-contained breathing apparatus. Wear full firefighting protective clothing. See MSDS Section 8 (Exposure Controls/Personal Protection).
Special Hazards:	Keep containers cool by spraying with water if exposed to fire.
Mechanical/Static Sensitivity Statements:	None

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions:
Where exposure level is known, wear approved respirator suitable for level of exposure. Where exposure level is not known, wear approved, positive pressure, self-contained respirator. In addition to the protective clothing/equipment in Section 8 (Exposure Controls/Personal Protection), wear impermeable boots.

Methods For Cleaning Up:
Cover spills with some inert absorbent material; sweep up and place in a waste disposal container. Flush spill area with water.

7. HANDLING AND STORAGE

HANDLING

Precautionary Measures: Do not get in eyes, on skin or on clothing. Wash thoroughly after handling.

Handling Statements: None

STORAGE
None

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Measures:
Utilize a closed system process where feasible. Where this material is not used in a closed system, good enclosure and local exhaust ventilation should be provided to control exposure.

Respiratory Protection:
For operations where inhalation exposure can occur, use an approved respirator recommended by an industrial hygienist after an evaluation of the operation. Where inhalation exposure can not occur, no respiratory protection is required. A full facepiece respirator also provides eye and face protection.

Eye Protection:
Prevent eye and skin contact. Provide eye wash fountain and safety shower in close proximity to points of potential exposure. Wear eye/face protection such as chemical splash proof goggles or face shield.

Skin Protection:
Prevent contamination of skin or clothing when removing protective equipment. Wear impermeable gloves and suitable protective clothing.

Additional Advice:
Food, beverages, and tobacco products should not be carried, stored, or consumed where this material is in use. Before eating, drinking, or smoking, wash face and hands thoroughly with soap and water.

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9. PHYSICAL AND CHEMICAL PROPERTIES

Color:	yellowish
Appearance:	liquid
Odor:	odorless
Boiling Point:	106 °C 223 °F
Melting Point:	-5 - 0 °C 23 - 32 °F (crystallization point)
Vapor Pressure:	17.5mm Hg @ 20 °C (value for water)
Specific Gravity:	1.14 @ 24 °C
Vapor Density:	Not applicable
Percent Volatile (By Wt.):	~50(water)
pH:	Slightly alkaline
Saturation In Air (% By Vol.):	Not applicable
Evaporation Rate:	Not applicable
Solubility In Water:	Complete
Volatile Organic Content:	Not Applicable
Flash Point:	>93 °C 200 °F Pensky-Martens Closed Cup
Flammable Limits (% By Vol):	Not applicable
Autoignition Temperature:	437 °C 819 °F
Decomposition Temperature:	>350 °C 662 °F
Partition coefficient (n-octanol/water):	Not applicable
Odor Threshold:	See Section 2 for exposure limits.

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10. STABILITY AND REACTIVITY

Stability:	Stable
Conditions To Avoid:	None known
Polymerization:	Will not occur
Conditions To Avoid:	None known
Materials To Avoid:	Strong mineral acids and strong oxidizing agents.

Hazardous Decomposition Products:	oxides of carbon oxides of phosphorus oxides of sulfur (includes sulfur di and tri oxides)

11. TOXICOLOGICAL INFORMATION

Toxicological information for the product is found under Section 3. HAZARDS IDENTIFICATION.
Toxicological information on the regulated components of this product is as follows:

Sodium diisobutyldithiophosphinate may cause severe eye and moderate skin irritation.

12. ECOLOGICAL INFORMATION

This material is readily biodegradable.
This material is not classified as dangerous for the environment.

ALGAE TEST RESULTS

Test: Growth Inhibition (OECD 201)
Duration: 96 hr
Species: Green Algae (Selenastrum capricornutum)

35.1 mg/l	EbC50
115 mg/l	ErC50

FISH TEST RESULTS

Test: Acute toxicity, freshwater (OECD 203)
Duration: 96 hr.
Species: Bluegill Sunfish (Lepomis macrochirus)

375 mg/l	LC50

INVERTEBRATE TEST RESULTS

Test: Acute Immobilization (OECD 202)
Duration: 48 hr
Species: Water Flea (Daphnia magna)

149 mg/l	EC50

DEGRADATION

Test: Closed Bottle (OECD 301D)
Duration: 28 day **Procedure:** Ready biodegradability
78.8 %

13. DISPOSAL CONSIDERATIONS

Cytec encourages the recycle, recovery and reuse of materials, where permitted, as an alternative to disposal as a waste. Cytec recommends that organic materials classified as hazardous waste according to the relevant local or national regulations be disposed of by thermal treatment or incineration at approved facilities. All local and national regulations should be followed.

14. TRANSPORT INFORMATION

This section provides basic shipping classification information. Refer to appropriate transportation regulations for specific requirements.

US DOT

Proper Shipping Name: Not applicable/Not regulated
Hazardous Substances:
Not applicable

TRANSPORT CANADA

Proper Shipping Name: Not applicable/Not regulated

ICAO / IATA

Proper Shipping Name: Not applicable/Not regulated
Packing Instructions/Maximum Net Quantity Per Package:
Passenger Aircraft: -
Cargo Aircraft: -

IMO

Proper Shipping Name: Not applicable/Not regulated

15. REGULATORY INFORMATION

This product has been classified in accordance with the hazard criteria of the Controlled products Regulations and this Material Safety Data Sheet contains all the information required by the Controlled Products Regulations.

WHMIS CLASSIFICATION:
Class D2B Toxic

INVENTORY INFORMATION

United States (USA): All components of this product are included on the TSCA Inventory in compliance with the Toxic Substances Control Act, 15 U. S. C. 2601 et. seq.

Canada: Components of this product have been reported to Environment Canada in accordance with Sections 66 and/or 81 of the Canadian Environmental Protection Act (1999), and are included on the Domestic Substances List.

European Union (EU): All components of this product are included in the European Inventory of Existing Chemical Substances (EINECS) in compliance with Council Directive 67/548/EEC and its amendments.

Australia: All components of this product are included in the Australian Inventory of Chemical Substances (AICS).

China: All components of this product are included on the Chinese inventory or are not required to be listed on the Chinese inventory.

Korea: All components of this product are NOT included on the Korean (ECL) inventory.

16. OTHER INFORMATION

NFPA Hazard Rating (National Fire Protection Association)

Health: 3 - Materials that, under emergency conditions, can cause serious or permanent injury.

Fire: 1 - Materials that must be preheated before ignition can occur.

Reactivity: 0 - Materials that in themselves are normally stable, even under fire exposure conditions.

Reasons For Issue: Revised Section 15

Prepared By: Randy Deskin, Ph.D., DABT +1-973-357-3100

Envirotrol Inc.®Emergency Phone Number:

P.O. Box 61724.827.8181
432 Green St.
Sewickley, PA 15143
Phone: 412.741.2030 Fax: 412.741.2670

MSDS Date: 5/14/2003

Material Safety Data Sheet

Section 1 – Product Identification

Chemical Name: Carbon Trade Name: Activated/Reactivated Carbon (Granular, Pelletized or Powdered)

Formula: _____ Common Name: C a r b o n

CAS Number: 7440-44-0 Chemical Family: Element, Group IV-A

Section 2 – Ingredients (Typical Values)

Carbon	90-100%
Inert Ingredients	0-10%

Section 3 - Physical And Chemical Data

Boiling Point:	8721° F, 4827° C (Approx.)	Vapor Pressure:	N/A
Vapor Density:	N/A	Solubility in Water:	Insoluble
Specific Gravity:	0.2 – 0.75	Percent, Volatile by Volume:	N/A
Appearance:	Black, Odorless, Pelletized, Powder	Evaporation Rate:	N/A

Section 4 - Fire And Explosion Hazard Data

- Flash Point: N / A
- Ignition Point: 500-800° F
- Extinguishing Media: Dry Chemical, Water Fog, Foam
- Special Fire Fighting Procedures: Wear positive pressure self-contained breathing apparatus if fire occurs in enclosed space. Oxygen starved fires may result in the release of carbon monoxide.
- Unusual Fires And Explosion Hazards: Avoid producing suspensions of dust during handling, and avoid exposure of suspensions to sources of ignition. Suspensions of -40 mesh powdered activated carbon may explode if exposed to strong sources of ignition

Section 5 - Health Hazard Data

- Eye: Carbon particles may cause physical irritation if not removed.
- Skin Contact: Constant prolonged exposure may cause dryness or chapping of exposed area
- Skin Adsorption: Not adsorbed by skin.
- Ingestion: No adverse affect unless quantity ingested causes physical discomfort.
- Inhalation: No toxic affect caused by dust. As with any dust, excessive exposure should be avoided. OSHA "Nuisance Dust" limitations should be observed
- Systemic And Other Effects: None

432 Green St.
Sewickley, PA 15143
Phone: 412.741.2030 Fax: 412.741.2670

MSDS Date: 5/14/2003

Section 5 - Health Hazard Data *(continued)*

- Eyes: Irrigate with water immediately. Repeat as needed to flush particle from eye. If irritation persists, consult medical personnel.
- Skin: Wash with soap and water to avoid skin drying or chapping.
- Ingestion: N/A
- Inhalation: N/A

Section 6 - Reactivity Data Compatibility Data

- Stability: Avoid contact with strong oxidizing chemicals, such as ozone, perchloric acid, permanganate, sodium chlorite, etc. Exposure to hydrocarbons and vegetable oils may cause slow oxidation until ignition point is reached--contact should be avoided.
- Incompatibility: Strong oxidizing materials.
- Hazardous Decomposition Products: Oxygen starved combustion may yield carbon monoxide.
- Hazardous Polymerization: Will not occur.

Section 7 - Storage Handling And Use

- Action To Take For Spills: Shovel and sweep material into appropriate container. If necessary wash area with water.
- Disposal Method: Reactivation, landfill or incineration, in accordance with applicable regulations.

Section 8 - Personnel Protection

- Ventilation: Local exhaust recommended minimizing dust exposure.
- Respiratory Protection: Approved "nuisance dust" dust masks should be worn in dust exposure areas.
- Protective Clothing: Protective gloves can be worn.
- Eye Protection: Safety glasses with side shields should be worn and eye wash capabilities should be available.

Section 9 - Special Precautions And Additional Information

Precautions to be taken in handling and storage: keep dry; wet carbon will adsorb oxygen and may reduce oxygen levels in confined spaces to dangerous levels. Adequate ventilation and precautions should be employed whenever closed tanks, receptacles or other enclosed spaces containing carbon are accessed. Suspensions of dust should be avoided and exposure of suspensions of dust to sources of ignition should be avoided.

APPENDIX C

Nunavut Spill Report Form & Quantity of Spill Requiring Notification to Spill Report Line

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE
TEL: (867) 920-8130
FAX: (867) 873-6924
EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR	REPORT TIME	☐ ORIGINAL SPILL REPORT, OR ☐ UPDATE # _____ TO THE ORIGINAL SPILL REPORT	REPORT NUMBER _____-_____
B	OCCURRENCE DATE: MONTH – DAY – YEAR	OCCURRENCE TIME		

C	LAND USE PERMIT NUMBER (IF APPLICABLE)	WATER LICENCE NUMBER (IF APPLICABLE)
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION	REGION ☐ NWT ☐ NUNAVUT ☐ ADJACENT JURISDICTION OR OCEAN
E	LATITUDE DEGREES MINUTES SECONDS	LONGITUDE DEGREES MINUTES SECONDS

F	RESPONSIBLE PARTY OR VESSEL NAME	RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION	
G	ANY CONTRACTOR INVOLVED	CONTRACTOR ADDRESS OR OFFICE LOCATION	
H	PRODUCT SPILLED	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER
	SECOND PRODUCT SPILLED (IF APPLICABLE)	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER
I	SPILL SOURCE	SPILL CAUSE	AREA OF CONTAMINATION IN SQUARE METRES
J	FACTORS AFFECTING SPILL OR RECOVERY	DESCRIBE ANY ASSISTANCE REQUIRED	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT
K	ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS		

L	REPORTED TO SPILL LINE BY	POSITION	EMPLOYER	LOCATION CALLING FROM	TELEPHONE
M	ANY ALTERNATE CONTACT	POSITION	EMPLOYER	ALTERNATE CONTACT LOCATION	ALTERNATE TELEPHONE

REPORT LINE USE ONLY

N	RECEIVED AT SPILL LINE BY	POSITION STATION OPERATOR	EMPLOYER	LOCATION CALLED YELLOWKNIFE, NT	REPORT LINE NUMBER (867) 920-8130

LEAD AGENCY ☐ EC ☐ CCG ☐ GNWT ☐ GN ☐ ILA ☐ INAC ☐ NEB ☐ TC

SIGNIFICANCE ☐ MINOR ☐ MAJOR ☐ UNKNOWN

FILE STATUS ☐ OPEN ☐ CLOSED

AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

Schedule B[1]

Reportable Spill Quantities

Item No.	TDGA Class	Description of Contaminant	Amount Spilled
1.	1	Explosives	Any amount
2.	2.1	Compressed gas (flammable)	Any amount of gas from containers with a capacity greater than 100[1].
3.	2.2	Compressed gas (no corrosive, non flammable)	Any amount of gas from containers with a capacity greater than 100[1].
4.	2.3	Compressed gas (toxic)	Any amount
5.	2.4	Compressed gas (corrosive)	Any amount
6.	3.1, 3.2, 3.3	Flammable liquid	100 l
7.	4.1	Flammable solid	25 kg
8.	4.2	Spontaneously combustible solids	25kg
9.	4.3	Water reactant solids	25 kg
10.	5.1	Oxidizing substances	50 l or 50 kg
11.	5.2	Organic Peroxides	1 l or 1 kg
12.	6.1	Poisonous substances	5 l or 5 kg
13.	6.2	Infectious substances	Any amount
14.	7	Radioactive	Any amount
15.	8	Corrosive substances	5 l or 5 kg
16.	9.1 (in part)	Miscellaneous products or substances, excluding PCB mixtures	50 l or 5 kg
17.	9.2	Environmentally hazardous	1 l or 1 kg
18.	9.3	Dangerous wastes	5 l or 5 kg
19.	9.1 (in part)	PCB mixtures of 5 or more parts per million	0.5 l or 0.5 kg
20.	None	Other contaminants	100 l or 100 kg

1 1 From: Consolidation of Regulation R-068-93 Spill Contingency Planning And Reporting Regulations (July 22 1993) Consolidation Issued July 15 1998