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March 31, 2008

*Via email and Xpresspost*

Mr. Richard Dwyer
Licensing Administrator
Nunavut Water Board
PO Box 119
Gjoa Haven, NU X0B 1J0
Phone: (867) 360-6338

Dear Mr. Dwyer,

**Re: Meadowbank Water License 2BE-MEA0813 Addendum – Spill Contingency Plan**

As per Water License 2BE-MEA0813, Part H, Item 2, please consider this letter and enclosed plan as an Addendum to the Spill Contingency Plan. The following revisions have been made to address points 2a through 2f:

2a. GN-DOE and INAC comments were taken into consideration
2b. Figure 6.1, page 20 revised
2c. Figure 6.1, page 20 revised
2d. Figure 6.2, page 21 revised
2e. Nunavut Spill Report Form included in Appendix J
2f. Table 8.2, page 27 revised

Please note that in light of the recent amendment application under 2BE-MEA0813, the attached document *'Spill Contingency Plan – Proposed New Exploration Camp at KM 100'* has been revised instead of '*Spill Contingency Plan, Agnico-Eagle Meadowbank Project, Exploration Camp, October 24, 2007*', which was submitted with the original renewal and referred to in Part H, Item 1. Agnico-Eagle Mines Ltd. (AEM) has submitted this plan to avoid any potential confusion regarding content and scope of the most current plan.

Please contact me should you have any questions or concerns regarding this submission.

Regards,

Rachel Lee Gould, Msc.
Project Manager:  Environmental Permitting and Compliance Monitoring

# SPILL CONTINGENCY PLAN

## PROPOSED NEW EXPLORATION CAMP AT KM 100

***AGNICO-EAGLE MINES LTD - MEADOWBANK DIVISION***


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Revision 2
March 25, 2008

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# 1. INTRODUCTION

## 1.1 PURPOSE & SCOPE OF THE SPILL CONTINGENCY PLAN

The overall purpose of establishing a spill contingency plan is to minimize the impacts of spills by the establishment of predetermined lines of response and plans of action. More specifically the objectives of this Spill Contingency Plan are to:

- identify roles, responsibilities, and reporting procedures;
- provide readily accessible emergency information to the cleanup crews, management, and government agencies;
- comply with federal and territorial regulations and guidelines pertaining to the preparation of contingency plans and notification requirements;
- promote the safe and effective recovery of spilled materials;
- minimize the environmental impacts of spills to water or land;
- provide site information on the facilities and contingencies in place, in the event of an emergency or spill.

This plan is in support of the amendment to the NWB 2BE-MEA0813 Type B Water License, incorporating the activities taking place at the Meadowbank Exploration Camp located at Km 100 (Exploration Camp Km 100). It has been prepared in accordance with the following reference documents:

• Indian and Northern Affairs Canada (INAC) 2007. *Guidelines for Spill Contingency Planning*.

• Government of Nunavut (GN) 2002, *Guideline General Management of Hazardous Wastes in Nunavut.*

• Northwest Territories Resources Wildlife and Economic Development Environmental Protection Service. 1988. *Spill Contingency Planning and Reporting Regulations.*

## 1.2 CORPORATE STRUCTURE

In early July 2007, Cumberland Resources became a 100% wholly-owned subsidiary of Agnico-Eagle Mines Limited (AEM). Through a series of steps, AEM amalgamated with Cumberland and Meadowbank Mining Corporation (a wholly-owned subsidiary of Cumberland) on August 1, 2007. As a result of this amalgamation, all of the rights, title, interests, liabilities and obligations of Cumberland and AEM are automatically, by law, transferred to and assumed by AEM. Therefore in all the Water License documents, the terms 'Cumberland', 'Meadowbank', 'AEM' and 'AEM' are to mean the same entity: 'Agnico-Eagle Mines Limited.

Agnico-Eagle Mines (AEM) Limited has its head office in Toronto at the following address:

Agnico-Eagle Mines Limited
145 King Street East, Suite 400
Toronto, Ontario,
M5C 2Y7

Tel: 416-947-1212
Website: www.agnico-eagle.com

The Meadowbank project is managed out of the Vancouver office at the following address:

Agnico-Eagle Mines Limited
Suite 375, 555 Burrard Street, Box 209
Two Bentall Centre
Vancouver, BC, V7X 1M8
Tel: 604-608-2557

The exploration activities are managed out of the Val d'Or exploration office at the following address:

Agnico-Eagle Exploration Division
761 chemin de la mine Goldex
Val d'Or, QC, J9P 4N9
Tel: 819-874-5980

## 1.3 ENVIRONMENTAL POLICY

The present SCP has been prepared in accordance with the commitments made in Agnico-Eagle's environmental policy, which are to:

- Assess the potential environmental impacts of any new undertaking with an objective to minimise them.

- Design and operate our facilities to ensure that effective controls are in place to minimise risks to health, safety and the environment.

- Implement an emergency response plan to minimise the impacts of unforeseen events.

- Provide a professional environmental staff to plan and direct environmental compliance programs and to assist in training and education activities.

- Provide training and resources to develop environmentally responsible employees.

- Ensure that environmental factors are included in the purchase of equipment and materials.

- Ensure that contractors operate according to our environmental policy and procedures.

- Comply with all applicable environmental laws and regulations.

- Communicate with employees, the public, government agencies and other stakeholders on activities involving health, safety and the environment.

- Regularly verify environmental performance and implement any required corrective action.

- Minimise the generation of hazardous and non-hazardous waste and ensure proper disposal of all wastes.

- Implement measures to conserve natural resources such as energy and water.

- Rehabilitate sites in accordance with regulatory criteria and within the established time-frame.

## 2. EXPLORATION CAMP KM 100 DESCRIPTION

The exploration camp is located about 65 km north of the Hamlet of Baker Lake in Nunavut (see Figure 2-1). The project is located on Inuit Owned surface lands (IOL BL-14) and has the following coordinates:

- Latitude: 65°01'52"N
- Longitude: 96° 04'22"W

on NTS map sheet 66H/1.

The general layout of the camp is shown in Figure 2-2; the camp will affect an areas of 0.9 ha.

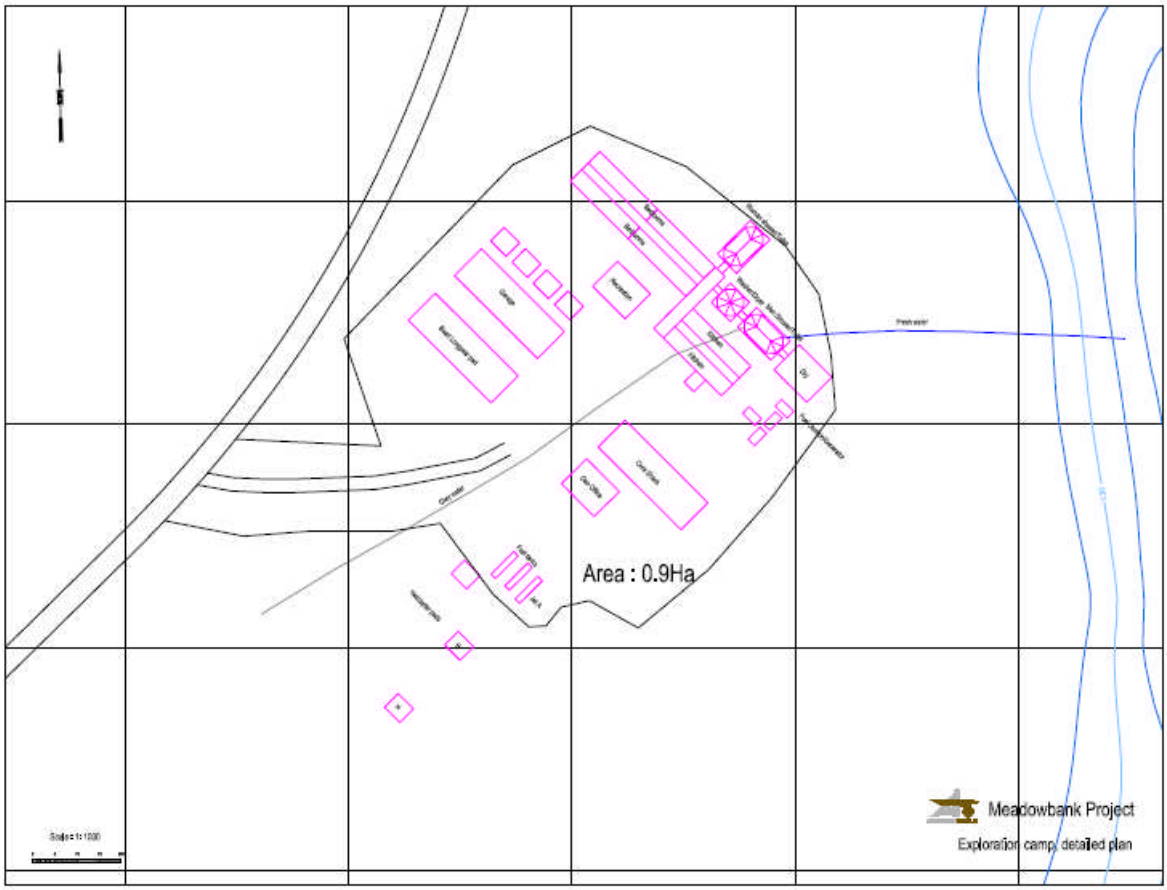
### Buildings and Tents

The Exploration Camp Km 100 (not currently under use) consists of the following structures:

- 4: 12’ x 60’ trailers to form the camp kitchen,
- 9 :12’x60’ trailers for bedroom/sleeping units,
- 1: 12’x60’ Weatherhavean shower/toilet tent,
- 1: 24’x 84’ Weatherhaven to be used as a core shack ,
- 1: 24’ x 32’ Weatherhaven to be used as an office tent,
- 1: plywood generator shed and driller’s shop, and
- 1: a 42’ x 70’ temporary Cover-all fabric building to be used as a garage and storage unit.

FIGURE 2.1: Location of the Meadowbank Project

**Figure 2.2: General layout of camp**



**Fuel Storage**

The following fuel storage equipment is used on site:

- 3 fuel tanks: 50 000 litres each, double-walled skid-mounted
  - Length 7.34 m (secondary tank)
  - Length 6.48 m (primary tank)
  - Diameter 3.2 m (outside secondary)
  - Maximum fill capacity 47 500 litres
  - Skid assembly – 8.48 m x 2.44 m

- 1 fuel tanks: 75 000 litres double-walled skid-mounted
  - Length 11.71 m (secondary tank)
  - Length 10.59 m (primary tank)
  - Diameter 2.90 m (outside secondary)
  - Maximum fill capacity 71 250 litres
  - Skid assembly: 13.04 m x 2.90 m

Both sizes of tanks are mounted on steel skids, which are supported by timbers resting on a bed of gravel and sand. All tanks are double-walled, with a secondary internal containment area and interstitial monitoring capability. Filling and pumping sites have additional spill containment capabilities and secondary containment is used under hose connections coming from the fuel tanks. The fuel storage monitoring program is included in Appendix A.

Other fuel supplies such as gasoline will be stored in 205 litres metal drums, as the amount presently required at site does not justify the use of fuel tanks.

**Other Equipment**

The following equipment will be also on site:

- 5 drills belonging to the drilling company (Boart-Longyear), and
- Snowmobiles and four wheelers.

## 3. HAZARDOUS MATERIALS STORED ON SITE

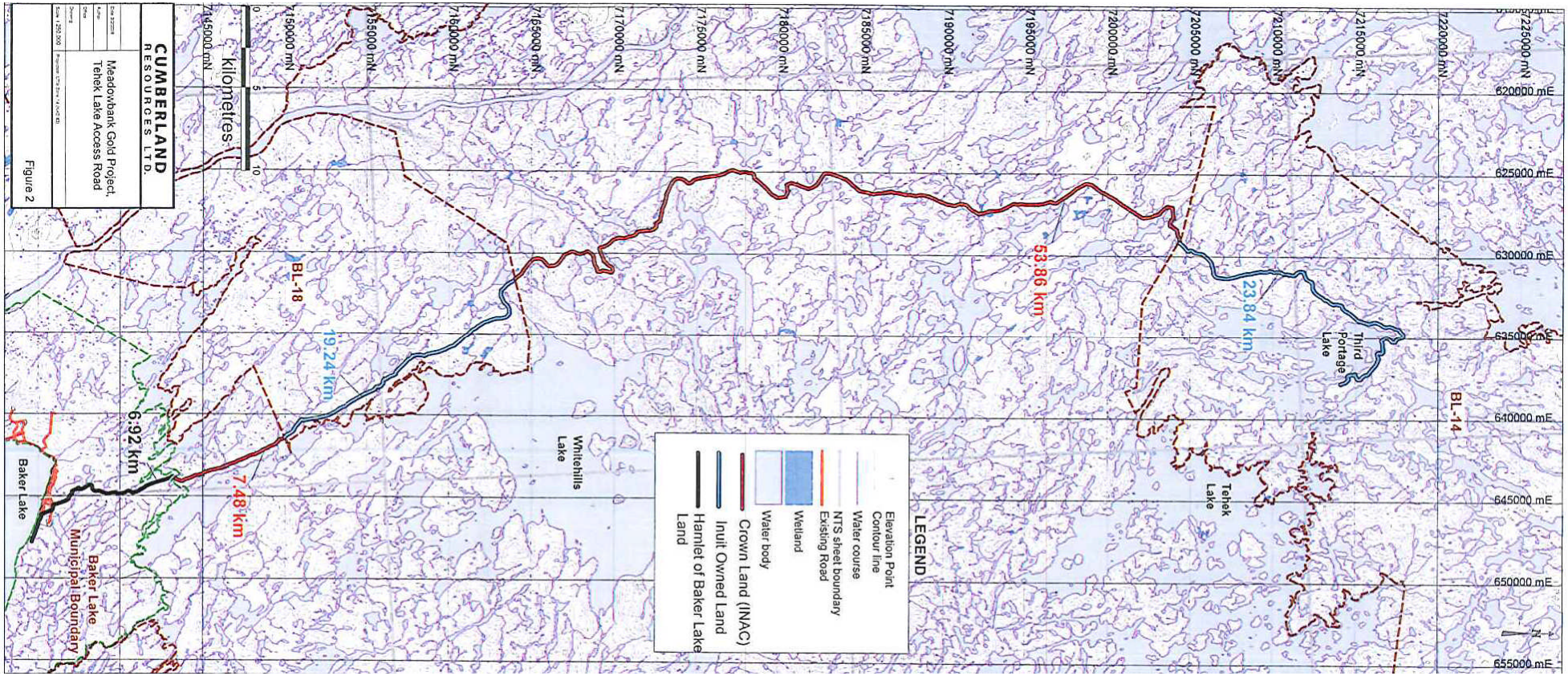
The hazardous materials stored on site consist of the following substances:

- P-50 Diesel
- Jet A turbo fuel
- Hydraulic Oil
- Lube Oil
- Waste Oil
- Propane
- Other materials hazardous to the safety of personnel and the environment

The Material Safety Data Sheets (MSDS) for the hazardous materials stored at the exploration camp can be found in Appendix I.

Until now, the transportation of fuel from Baker Lake to the site was accomplished over a winter road. The All Weather Private Access Road (AWPAR) from Baker Lake to the Meadowbank camp is expected to reach the Meadowbank site in late December 2007. This road will be 108 km long and will be used to supply the camp site with fuel and other material as required (see Figure 3-1).

## Figure 3.1 All Weather Private Access Road



# 4. DEFINITIONS

## 4.1. WHAT IS A SPILL?

For the purposes of this plan, a spill is defined as an accidental release of product into the environment that has the potential for adverse impact. The emergency response team must be notified immediately of any spill or emergency.

## 4.2. MATERIALS & REPORTABLE SPILLS ON SITE

The GN Department of Environment is responsible for ensuring that spill contingency planning and reporting regulations are enforced as outlined in the *Environmental Protection Act*. According to the Consolidation of Spill Contingency Planning and Reporting Regulations of the *Environmental Protection Act (*1990), where there is a reasonable likelihood of a spill in an amount equal to or greater than the amounts set out in Table 4.1, the spill must be reported to

NT-NU 24-HOUR SPILL REPORT LINE
Phone: 867.920.8130
Facsimile: 867.873.6924

&

Peter Kusugak, INAC Manager of Field Operations
Phone: 867.975.4295
Facsmile: 867.975.4560

As a precaution, if there is any doubt as to whether the quantity spilled meets the minimum reportable thresholds listed in Table 4.1, the spill incident shall be reported. Furthermore, AEM will maintain a detailed log of all spills of hazardous materials, including non-reportable spills. As part of AEM's overall environmental management system and in the spirit of a continuous improvement of environmental performance, procedures will be implemented to encourage all employees to communicate non-reportable spill incidents.

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, shall be reported immediately to the NT-NU 24-HOUR SPILL REPORT LINE (at 867.920.8130) where the release:

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

**Table 4.1:**
**Spill Quantities that must be Reported to the NT-NU 24-HOUR SPILL REPORT LINE**

| ***Transportation Class*** | ***Type of Substance*** | ***Compulsory Reporting Amount*** |
|---|---|---|
| 1 | Explosives | Any amount |
| 2.1 | Compressed gas (flammable) | Any amount of gas from containers with a capacity exceeding 100 L |
| 2.2 | Compressed gas (non-corrosive, non-flammable) | Any amount from containers with a capacity exceeding 100 L |
| 2.3 | Compressed gas | Any amount |
| 2.4 | Compressed gas (corrosive) | Any amount |
| 3.1, 3.2, 3.3 | Flammable liquid | 100 L |
| 4.1 | Flammable solid | 25 kg |
| 4.2 | Spontaneously combustible solid | 25 kg |
| 4.3 | Water reactant solids | 25 kg |
| 5.1 | Oxidizing substances | 50 L or 50 kg |
| 5.2 | Organic peroxides | 1 L or 1 kg |
| 6.1 | Poisonous substances | 5 L or 5 kg |
| 7 | Radioactive substances | Any amount |
| 8 | Corrosive substances | 5 L or 5 kg |
| 9.1 (in part) | Miscellaneous substances | 50 L or 50 kg |
| 9.2 | Environmentally hazardous | 1 L or 1 kg |
| 9.3 | Dangerous wastes | 5L or 5 kg |
| 9.1 (in part) | PCB mixtures of 5 ppm or more | 0.5 L or 0.5 kg |
| None | Other contaminants | 100 L or 100 kg |
| | | |

**Note**: L = litre; kg = kilogram; PCB = polychlorinated biphenyls; ppm = parts per million.

## 4.3. SPILL PREVENTION MEASURES

### General

The first step in spill response is to take actions to prevent the spill from occurring. Regular worksite inspections will be conducted to identify measures to minimize the risk of chemical spills. All personnel will be trained to be aware of the potential hazards associated with the fuel/chemicals with which they are assigned to work. AEM will support the following general principles for spill prevention:

- provide up to date and accessible Material Safety Data Sheets (MSDS) for all hazardous materials
- install fuel tanks in a manner that meets current requirements including stable platforms
- regularly inspect fuel/chemical storage areas for leaks (including flex connectors and plumbing) and platform shifting
- train workers in the use of safe work procedures for hazardous materials, and procedures to clean up spills

- encourage workers to take reasonable measures to prevent spills
- keep drums/containers sealed or closed,
- place drums/containers within a suitable form of secondary or spill containment
- keep "overpak" or "salvage" drums nearby to contain leaking drums
- keep storage areas secure from unauthorized access
- segregate incompatible materials
- ensure chemical storage areas are adequately protected from weather and physical damage
- removal of snow, water and other debris from secondary containment to prevent the migration of potential contaminants
- provide adequate spill response materials at storage areas (details of spill prevention equipment are outlined in Section 10)

## 5. RESPONSIBILITES DURING FUEL AND HAZARDOUS MATERIAL TRANSPORTATION TO SITE

The following are the due diligence responsibilities for fuel and other hazardous goods transportation to the site.

- Shipper:
    - Ensures proper loading and containment and documentation, which complies with TDG guidelines
    - Ensures that goods are classified and labelled appropriately. Provide placards if required.
    - Ensures safety at all times.
    - Ensures proper communication with carrier

- Carrier:
    - Supervises and ensures proper loading and containment and documentation which comply with all TDG regulations
    - Ensures correct volumes for transport, attach placards if necessary, maintains or replaces safety marks
    - Checks and delivers TDG manifest to receiver
    - Ensures safety of all personnel and equipment

- Receiver:
    - Supervises unloading procedures
    - Complies with TDG guidelines.
    - Ensures safety of containment facilities.
    - Ensures maintenance of all pumps and loading/unloading equipment on site.
    - Provides on-site emergency communications (telephone, radio).
    - Completes regular site inspections of storages facilities.
    - Records all shipment manifests.
    - Keeps on-site inventory of all dangerous goods
    - Maintains safety procedures at all times.

- On-Site Coordinator:
    - Supervises and organises spill containment equipment and personnel
    - Reports to internal and external resources
    - Ensures proper safety equipment is available
    - Notifies all personnel of current hazards
    - Maintains proper safety procedures at all times
    - Must be compliant with all TDG guidelines.

# 6. ACTION PLAN

## 6.1. INITIAL ACTION

Initial actions for spills include ensuring personnel and site safety, identifying and containing spill materials, reporting the spills to the on-site coordinator, alerting AEM personnel and ERT, notifying government agencies, and recording the incident.

This section provides information on the general procedures for reacting to a spill. The response sequence is illustrated in Figure 6.1 and 6.2. Additional information regarding roles and responsibilities of each party is provided in Section 7.

Spills may be the result of any of the following occurrences:

- tanks, drums or containers may develop leaks or rupture
- failure of equipment such as valves, piping or containment structures
- overfilling
- improper storage
- spills during transfer of fuel, chemicals or waste products
- spills resulting from accidents during transportation

In all cases the initial action, by the first responder to the site, will be to ensure the safety of all people at the site. If necessary, people will be immediately evacuated from the area affected by the spill. The second activity will be to notify the On-Scene Coordinator of the occurrence and to provide an initial assessment of the problem. The first responder should not attempt to deal with a spill that represents a potential immediate danger to human health, property or environment.

### 6.1.1. ENSURING SAFETY

Ensuring personnel and site safety is the responsibility of all parties, particularly the first responder who has the most knowledge of the spill. In the event of a spill, the following general precautions and steps will be taken to ensure site and personnel safety:

• be alert – ensure safety of yourself and others by notifying them of the incident
• assess the hazard to persons in the vicinity of the spill by assessing the dangers of exposure to the spill material
• shut off ignition sources such as vehicles and unplug electrical equipment – NO SMOKING;
• shut off operating equipment
• establish exhaust ventilation

• attend to the injured (refer to the MSDS in Appendix I)
• contact the On-Scene Coordinator, identify the location and request assistance as required
• do not contain compounds (e.g. gasoline, aviation fuel) if vapours might ignite – allow them to evaporate
• keep people away from the spill site using barrier tape and pylons, closing doors and placing warning signage, and limiting access by positioning vehicles to restrict traffic.

The primary form of ensuring safety is by using preventative measures. All personnel who deal with chemicals must have training in first aid and safe materials handling, including the Workplace Hazardous Materials Information System (WHMIS). In addition, regular training updates and site-specific exercises / drills are integral to preventing incidents.

### 6.1.2. IDENTIFYING, CONTAINING & REPORTING THE SPILL

Identifying the spill material is essential for both ensuring safety and containing the spill. The material properties must be known in order to:

(a) assess first aid measures to injured personnel and potential dangers, and
(b) assess the appropriate containment measure for the spill material.

If necessary, consult the appropriate MSDS at the nearest WHMIS station (see also Appendix I) and determine the principal types of health and safety hazards associated with the product or material.

In the event of a spill, the following steps should be taken to properly contain the spilled material:

- assess the severity of the spill;
- assess whether the spill, leak, or system failure can be readily stopped or brought under control;
- stop product flow or leak if possible and IF IT IS SAFE TO DO SO
- wear appropriate PPE such as impervious clothing, goggles, and gloves when containing the spill
- approach spill from upwind IF IT IS SAFE TO DO SO
- depending on the type of compound spilled and IF IT IS SAFE TO DO SO, consider the following general spill response procedures:

**Solids**

- prevent it from contacting water in order to avoid it from further mobilizing or reacting
- protect it from snow, rain or wind by covering the spill area with an appropriate tarp
- evaluate if absorbent materials or earth should be used to create dikes, or whether ditches should be constructed to protect the spill area from surface water runoff

**Liquids**

- if the spill has occurred on land: use appropriate adsorbent materials, earthen dikes or trenches to prevent it from flowing out of the spill area or towards sewers, surface water or nearby waterbodies.

- if the spill has occurred on water and the compound is immiscible in water: use floating booms to contain and skimmers to recover.
- IF IT IS SAFE TO DO SO, recover the spill as soon as possible and dispose of it.

Initial responsibilities for spill identification, containment, and reporting are outlined in Figure 6.1. The spill reporting procedure is depicted in Figure 6.2.

### 6.1.3. CLEANING UP MINOR SPILL

It is acceptable for a first responder to cleanup a spill if it is assessed to be a “minor” or “simple” spill.

A minor spill is defined as any hazardous chemical spill that does not involve highly toxic, highly reactive, or explosive chemicals in a situation that is not life threatening. Furthermore, this type of spill presents a manageable physical or health hazard to personnel who, when wearing proper personal protective equipment, will not be exposed to any chemical at a level that exceeds any recognized action level or permissible exposure limit. Minor or simple spills are still to be reported to the On-Scene Coordinator and the Environmental Advisor but they are not expected to involve emergency responders.

Before cleaning up a minor spill, the first responder will ensure that it can be done safely. The first responder will also wear the right personal protective equipment, including, at a minimum, appropriate eye protection, protective gloves, and protective clothes. Additional protective equipment may be required for spills that present special hazards (such as corrosive or reactive spills or spills that have a splash potential). As a rule of thumb, if a respirator is required, outside assistance will be sought because the spill is no longer a minor spill. Similar response procedures are required to clean up minor or simple spills as are required for those involving the ERT as described in Section 6. Consult the MSDS for specific requirements (see Appendix I)

## 6.2. INVESTIGATION AND RECOMMENDATIONS

To minimise the probability of reoccurrence, the Environmental Advisor or the Emergency Response and Safety coordinator might decide that for a particular spill, the initial action plan should be followed by an investigation.

In such a case, the Exploration Manager will appoint an investigation team comprised of:
- a senior level manager as team leader
- employees with the relevant expertise to the particular situation
- one employee independent of the operation
- representatives from the environmental and safety departments.

The investigation report, including recommended course of action, should be forwarded to the Exploration Manager within 20 days of the investigation team establishment.

## Figure 6.1: AEM Action Plan

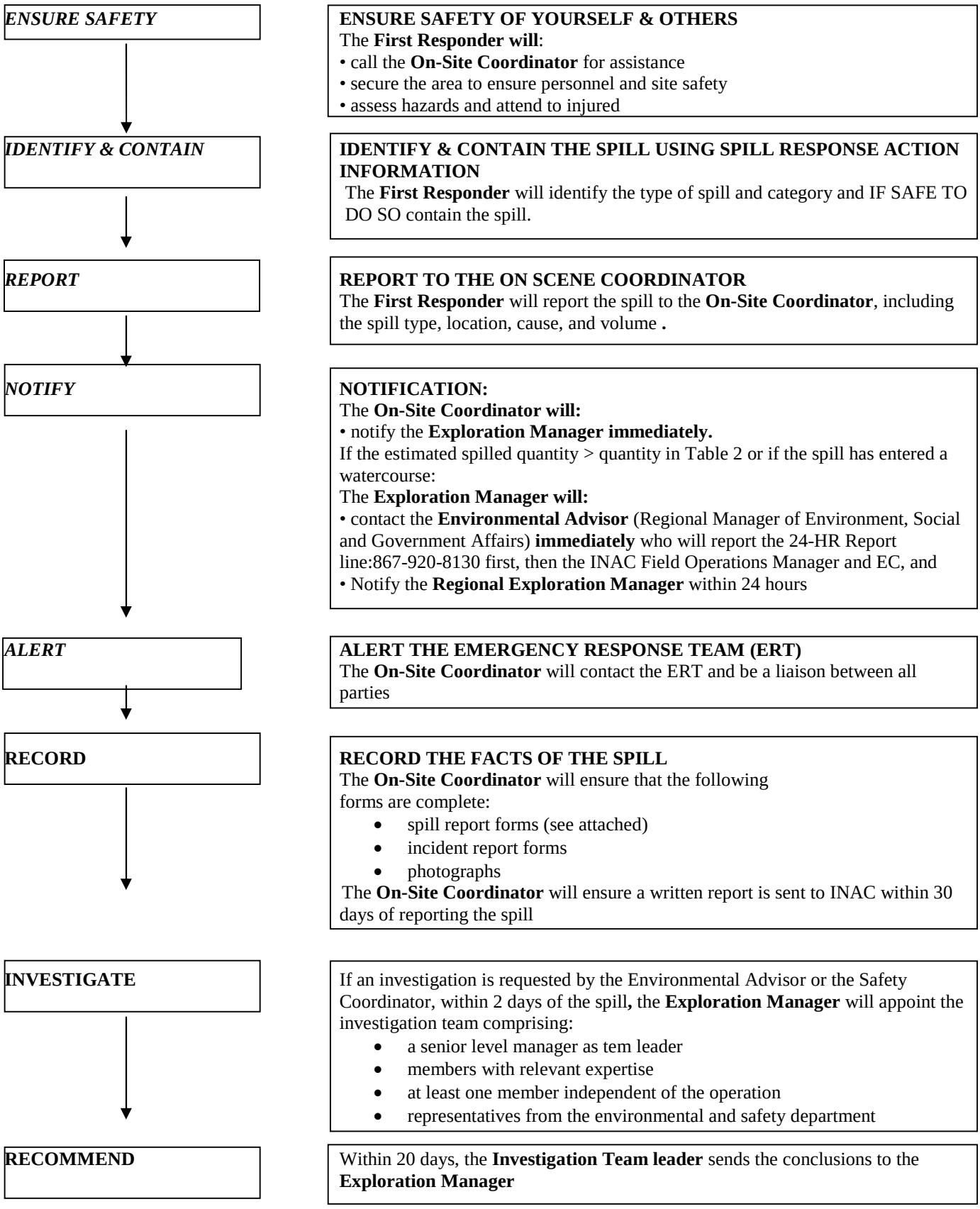
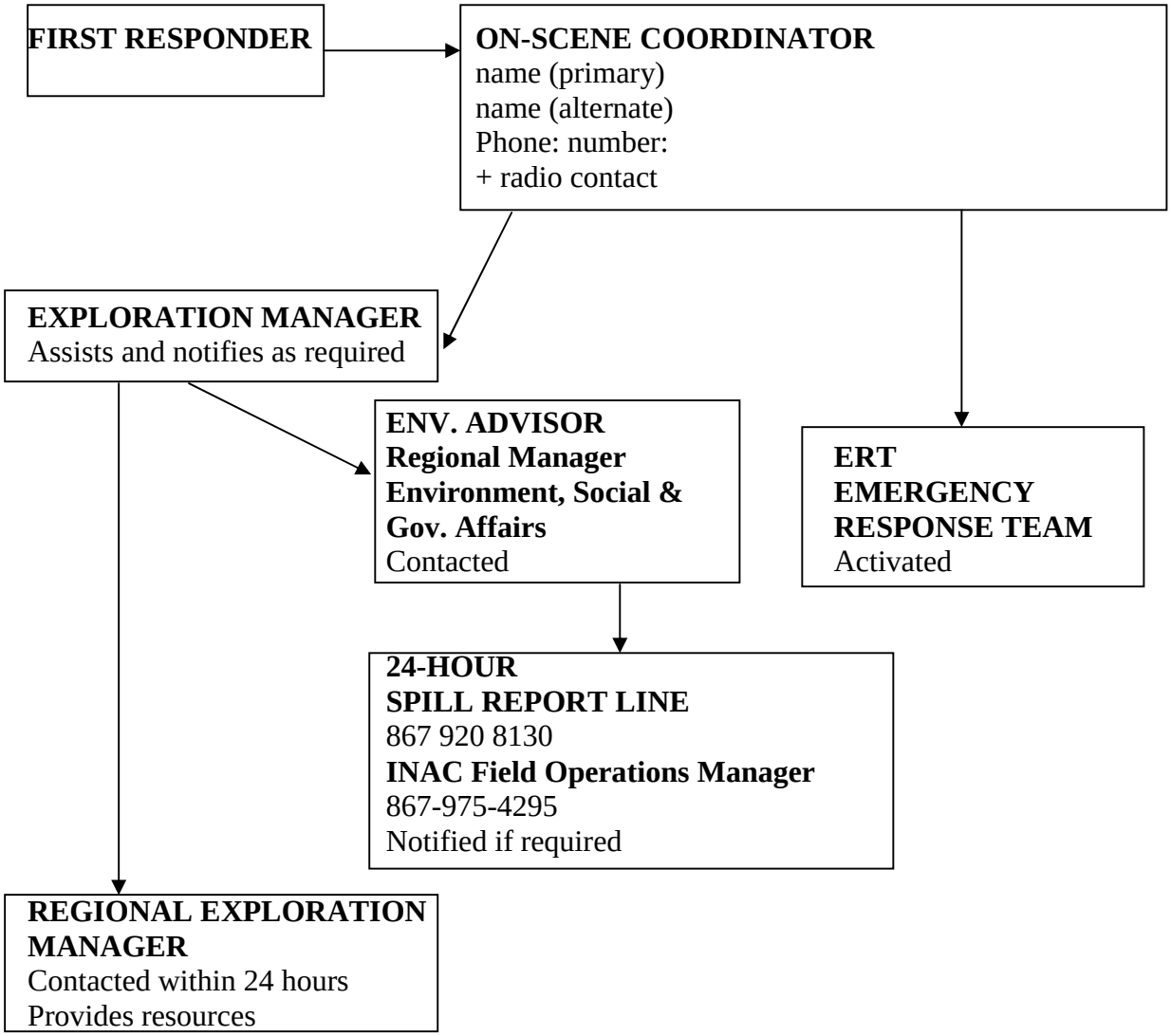


**Figure 6.2**
**Spill Reporting Procedure**



## 7. RESPONSE ORGANIZATION

In accordance with the action plan described in Section 5, the response organization details the roles and responsibilities of each party involved in the spill response. In the event that it is not safe to attempt a cleanup effort internally, the On-Scene Coordinator will contact the Environmental Advisor and General Mine Manager, who will in turn contact the NT-NU 24-HOUR SPILL REPORT LINE to coordinate cleanup using external resources.

### 7.1. FIRST RESPONDER

The person who has caused a spill or is the first to observe the spill is the first responder. The responsibilities of the first responder are as follows:

- ensure site and personnel safety
- assess the preliminary severity and source of the spill
- identify and contain the spill, IF SAFE TO DO SO
- immediately report to and work with the On-Scene Coordinator
- participate in spill response as a member of the clean up crew.

### 7.2. ON-SCENE COORDINATOR

The On-Scene Coordinator must be knowledgeable with regard to the exploration camp operations, initial response actions, and spill response equipment and facilities.

Responsibilities of the On-Scene Coordinator are as follows:

- assume complete authority over cleanup personnel and the spill scene, as well as assume responsibility for all mitigation efforts
- evaluate the initial situation and assess the magnitude of the problem
- activate the initial response plan
- alert and assemble key personnel in the response team, as deemed appropriate, to handle the situation
- in consultation with the General Mine Manager develop the overall plan of action for containment and cleanup of the specific incident, as well as direct and implement the plan
- ensure assigned responsibilities are carried out and the activities of team members are coordinated
- assess the requirements for people, equipment, materials, and tools to contain the spill in light of what resources are immediately available; urgency will depend on the nature of the spill
- in consultation with the General Mine Manager mobilize any additional resources that may be required and arrange for the transportation of necessary personnel and/or materials to the site
- with aid of the Emergency Response Team Coordinator, ensuring that the ERT is provided with proper personal protective equipment (PPE)

## 7.3. EMERGENCY RESPONSE TEAM (ERT)

AEM will have an Emergency Response Team (ERT) that will be trained and responsible for controlling and clean-up of spills, and assisting with medical and other emergencies that may occur at the exploration camp. These team members will attend regular training sessions.

## 7.4. EMERGENCY RESPONSE TEAM COORDINATOR (ERTC)

The responsibilities of the Emergency Response Team Coordinator (ERTC) are as follows:

- ensure on-site resources for spill response and cleanup are available
- mobilize all ERT personnel, equipment, personal protective equipment and supplies as required to the site of the spill
- assist On-Scene Coordinator in obtaining any additional resources not available on site
- ensure that appropriate PPE is worn properly
- conduct cleanup of spills under the direction of the on-scene coordinator
- liaise with On-Scene Coordinator and keep him/her informed of cleanup activities
- assist in developing and implementing emergency response training programs and exercises
- ensure that all spill response personnel receive adequate training to fulfil their responsibilities as part of the ERT.

## 7.5. ENVIRONMENTAL ADVISOR

The Environmental Advisor will be part of the AEM organisation and will be responsible for the following:

- liaise with the On-Scene Coordinator
- provide technical advice on the anticipated environmental impacts of the spill
- advise on the effectiveness of various containment, recoveries, and disposal options, and suggest the most appropriate approach
- report the spill to the NT-NU 24-HOUR SPILL REPORT LINE at 867.920.8130 and Peter Kusugak, INAC Manager of Field Operations at 867.975.4295 as soon as possible, as required (see table 4.1)
- assist the General Mine Manager with regulatory and licensing reporting requirements, including gathering relevant information and submitting any formal reports (within the required time frame) to the applicable regulatory agencies and AEM management detailing the occurrence of a spill; this includes submitting an incident reporting form (see forms in Appendix J)
- recommend an investigation into the spill, if deemed necessary,
- if authorized by the General Mine Manager, act as a spokesperson with the public, media, and government agencies, as required
- within the context of the exploration camp water management plan, implement a sampling protocol for the collection and analysis of samples to identify and monitor possible contaminant levels resulting from the spill
- monitor the effectiveness of the cleanup operation and recommend further work, if necessary

- complete and fax (867.873.6924) or email (spills@gov.nt.ca) a NT-NU Spill Report Form to the NT-NU 24-HOUR SPILL REPORT LINE.

## 7.6. EXPLORATION MANAGER

The Exploration Manager is responsible for implementing and maintaining the SCP. In addition, the Exploration Manager's responsibilities in the case of a spill are to:

- contact the Environmental Advisor to see if official reporting is necessary
- act as a spokesperson on behalf of AEM with the public, media, and government agencies, as required
- prepare and submit any formal reports (within the required time frame) to regulators and AEM management detailing the occurrence of a spill; this includes submitting an incident reporting form
- contact the Regional Exploration Manager within 24 hours for a reportable spill.
- ensure that enough resources are available for all spill response personnel to receive adequate training to fulfil their responsibilities as part of the ERT
- establish an investigation team at the request of the environmental advisor or the safety coordinator..

## 7.7. HUMAN RESOURCES SUPERINTENDENT

The following are the responsibilities of the Human Resources (HR) Superintendent:

- maintain emergency and health and safety records
- assist in conducting emergency spill response exercises
- track all emergency and health and safety training that on-site staff have received, and when retraining will be required
- notify the On-Scene Coordinator when retraining is required
- ensure that employees are retrained in appropriate emergency response skills, Workplace Hazardous Materials Information System (WHMIS) training, Hazard Communication (HAZCOM), Occupational Health and Safety Administration (OHSA) training, first aid, and respirator fit-testing prior to expiry of existing training certification
- consult with appropriate organizations regarding retraining requirements and schedules.

## 7.8. HEALTH PROFESSIONAL

Health Professionals are responsible for the following:

- providing on-site first aid and other medical support
- providing additional training for ERT members

In addition to the health professional on site, the Baker Lake Hamlet health professionals will be first called on the scene. .

## 8. SPILL RESPONSE TEAM CONTACT INFORMATION

Emergency spill response personnel, their duties, location, and phone numbers are listed in Table 8.1 Important external contacts such as regulatory agencies, health organizations and transportation companies providing evacuation support are listed in Table 8.2. External spill response contractor contact information is listed in Table 8.3. AEM will identify off-site contractors with expertise in spill response. AEM will periodically review their qualifications, response time and equipment.

**Table 8.1: Spill Response Team Contact Information Chart**

| Position | Name/Location | 24 hours contact |
|---|---|---|
| Nunavut Territorial Government | NT-NU 24-HOUR SPILL REPORT LINE | Ph: 867.920.8130<br>Fax: 867-873-6924 |
| INAC Manager of Field Operations | Peter Kusugak | Ph: 867-975-4295<br>Fax: 867-975-4560 |
| On-Site Coordinator | Denis Contre | Ph: 867-793-4610<br>Fax: 867-793-4611 |
| Emergency Response and Safety Coordinator | Jeannot Harvie | Ph: 867-793-4610<br>Fax: 867-793-4611 |
| Emergency Response Team | Ryan VanEngen<br>Sylvain Doire<br>Nicolas Saucier | Ph: 867-793-4610<br>Fax: 867-793-4611 |
| Exploration Manager | Denis Vaillancourt | Ph: 819-874-5980<br>Fax: 819-874-3318<br>Cell: 819-354-902 |
| Health Professional | Nurse at camp site | Ph: 867-793-4610<br>Fax: 867-793-4611 |
| Environmental Advisor (Regional Manager Environment, Social and Government Affairs) | Larry Connell | Ph: 604-608-2557<br>Fax: 604-608-2559<br>Cell: 604-765-5504 |
| Regional Exploration Manager | Guy Gosselin | Ph: 819-874-5980<br>Fax: 819-874-3318 |

**Table 8.2: Other Important Emergency Phone Numbers**

| Organisation/Authority | Telephone No. | Fax No. |
|---|---|---|
| NT-NU 24-HOUR SPILL REPORT LINE | 867.920.8130 | 867.873.6924 |
| Nunavut Water Board | 867.360.6338 | 867.360.6369 |
| Environment Canada, Environmental Protection Branch | 867.669.4700 | 867.873.8185 |
| Environment Canada 24 hours emergency pager monitored by Emergency and Enforcement | 867.766.3737 | |
| Manager Pollution Control & Air Quality Environmental Protection, Government of Nunavut | 867.975.5907 | 867.975.5981 |
| Indian and Northern Affairs Canada (INAC) – Manager Nunavut Regional Office | 867.975.4550 | 867.975.4585 |
| Indian and Northern Affairs Canada (INAC)- Manager of Field Operations | 867.975.4295 | 867.975.4560 |
| Indian and Northern Affairs Canada (INAC) – Land Administration Department – Nunavut Regional Office | 867.975.4280 | 867.975.4286 |
| Indian and Northern Affairs Canada (INAC)– General Enquiries | 867.975.4275 | |
| Kivalliq Inuit Association – Reporting Line | 867.645.2810<br>867.646.2800 | |
| Department of Fisheries and Ocean (DFO) – Nunavut Regional Office | 867.979.8000 | 867.979.8039 |
| Keewatin Health Services – Baker Lake<br>(Health Centre)<br>(Donna Brown, Head Nurse) | <br>867.793.2816<br>867.793.2813 | |
| Baffin Regional Hospital (Iqaluit) | 867.979.7300 | |
| Royal Canadian Mounted Police (RCMP)<br>Baker Lake – emergency number<br>Cambridge Bay RCMP | 867.793.0123<br>867.793.1111<br>867.983.2111 | |
| Baker Lake Hamlet Office | 867.793.2874 | |
| Baker Lake Fire Emergency | 867.793.2900 | |
| Baker Lake Fire Marshall Office | 867.873.7944 | |
| Baker Lake Radio Station | 867.793.2962 | |
| Baker Lake Airport | 867.793.2564 | |
| Department of Environment Health | 867.983.7328 | |
| Poison Control Centre | 867.920.4111 | |
| CANUTEC (Spill Support Information) | 613.996.6666 | |
| Charter Aircraft/Helicopter Companies | | |
| Air Tindi | 867.669.8200 | |
| First Air | 867.873.4464 | |
| Arctic Sun West | 867.873.3306 | |
| Ookpik Aviation | 867.793.2234 | |
| Kivalliq Air | 1.877.855.1500 | |
| Calm Air | 867.793.2873 | |
| Nunasi Helicopters | 867.873.3306 | |
| Canadian Helicopters | 867.669.9604 | |

| | |
|---|---|
| Great Slave Helicopters | 867.873.2081 |
| Adlair Aviation | 867.983.2569 |

**Table 8.3: Spill Response Contractor Phone Numbers**

| Company Name and Contact | Mobilisation Location/Estimated Time | Phone Number | Area of expertise |
|---|---|---|---|
| **Local** | | | |
| **Sanavik Co-operative Association (representative of NTCL)** | | **867.793.2801** | |
| **Baker Lake Contracting & Supplies** | | **867.793.2831** | **General Contracting and repairs** |
| **Peter's Expediting** | | **867.793.2703** | **Transportation** |
| **S.K. Construction Ltd** | | **867.793.2965** | **General Contracting and repairs** |
| **T.& M. Enterprise** | | **867.793.2319** | **General Contracting and repairs** |
| **NWT Ltd (Arctic Fuel)** | | **867.793.2311** | **General Contracting and repairs** |
| **Tuuapak** | | **867.793.2965** | **General Contracting and repairs** |
| **ZDYB Services** | | **867.793.2918** | **General Contracting and repairs** |
| **External** | | | |
| **Northern Transportation Company Limited** | **Halifax Within 24 hours** | **902.482.6825 Emergency: 902.225.2951 902.832.1582** | **Emergency response involving barge or fuel transfer from barge** |
| **NTCL** | **7 to 10 days to Baker Lake** | | **Ice breaker vessel** |

## 9. ACTION PLANS FOR SPECIFIC MATERIALS AT THE EXPLORATION CAMP

This SCP is designed to introduce the basic requirements for the efficient and safe cleanup of the materials that may be spilled during the operation of the Exploration Camp.

The main hazardous materials found at the exploration camp are:

- Compressed gas (propane, welding tanks, etc.)
- Flammable and combustible liquids (diesel fuel, Jet- A or B fuel, engine oil)

Actions plans for these types of hazardous materials are detailed here.

In the event that small amounts of other hazardous substances are used from time to time for equipment cleaning, welding or other usage, they also included in the action plans.

Copies of the MSDS for these hazardous are provided in Appendix I.

### 9.1. COMPRESSED GASES

Compressed gases such as acetylene are not expected to be stored in large quantities. However, they are flammable gases and can ignite and explode, if exposed to an ignition source. Vapours cannot be contained when released, and it is important that personnel withdraw immediately from any such release. If tanks are damaged, the gas should be allowed to disperse, with no attempt at recovery.

Compressed gas spills/leaks can generally be divided into two categories.

- The first are those leaks which occur away from the gas cylinder in lines, tubing, or apparatus. These types of leaks can generally be stopped by closing the main cylinder valve, if it is otherwise safe to do so.
- The second category of leak occurs at the cylinder itself, and cannot be stopped by closing the cylinder valve.

In some cases it may not be possible to close a cylinder valve due to age or poor condition, and as such, this situation falls into the second category of gas leak. **All leaking gas cylinders are considered an emergency if the leak cannot be stopped by closing the cylinder valve.**

Leaks of oxygen or flammable gas are especially dangerous.

General action plans for spills of compressed gases are outlined in Appendix C. AEM will review this information prior to operations to assess the requirement for chemical-specific spill response plans for compressed gasses. According to the *Environmental Emergency Regulations* (federal) a specific spill response plan for acetylene gas is required if it will be stored in quantities in excess of 4.5 tonnes. AEM will verify expected quantities prior to operations.

## 9.2. FLAMMABLE AND COMBUSTIBLE LIQUIDS

Flammable liquids have **flash points below 37.8$^{o}$C**, evaporate quickly, and within a short period of time can reach high vapour concentrations in air. Flammable liquids that will be stored and used at the site. This includes but is not limited to aviation fuel, possibly gasoline and solvents.

Spills of flammable liquids represent an extreme fire and explosion hazard if vapour concentrations exceed the lower explosion limit (LEL). They are generally harmful if inhaled and can also be absorbed through the skin.

Combustible liquids such as diesel fuel have a **flash point above 37.8$^{o}$C but below 93.3$^{o}$C** and are not fire hazards at room temperature. The principal hazard from non-flammable, volatile liquid spills is exposure to the vapour by inhalation or skin absorption.
The most common flammable and combustible materials stored and handled on site are liquids such as aviation fuel, diesel fuel, solvents and waste oils. For the purposes of spill response actions, lubricants and motor oil have been included with the flammable and combustible compounds given their petroleum hydrocarbon based nature. Action plans for spills of flammable and combustible liquids are outlined in Appendix D. AEM will review this information prior to operations to assess the requirement for chemical-specific spill response plans for flammable and combustible liquids.

## 9.3. OXIDIZING SUBSTANCES

Oxidizing compounds tend to promote combustion and can ignite organic solvents and combustible materials. They may also be harmful if inhaled or absorbed through the skin. Where an oxidizing substance such as ammonium nitrate, sodium nitrate or hydrogen peroxide is spilled, general safety measures include avoiding inhalation (e.g., by using a dust mask or half faced respirator), ingestion, and eye contact. In addition, ignition sources and combustible materials should be removed from the spill area. Spills on land will be contained by diking or barrier using non-combustible materials. Ammonium nitrate in particular mixes with water. Spills near or in water will therefore be dammed or diverted.

Action plans for spills of oxidizing substances are outlined in Appendix E. AEM will review this information prior to operations to assess the requirement for chemical-specific spill response plans for the oxidizing substances that will be used for the Meadowbank Project. According to the *Environmental Emergency Regulations* (federal) a specific spill response plan for hydrogen peroxide is required if it will be stored in quantities in excess of 3.4 tonnes. AEM will verify expected quantities prior to operations.

## 9.4. POISONOUS & TOXIC SUBSTANCES

Highly toxic chemicals include those with high acute systemic toxicity, and substances with chronic toxic effects such as carcinogens, reproductive or developmental (embryotoxins, teratogens) toxins, and mutagens. Also included in this category are compounds that can easily produce toxic products such as sodium cyanide which reacts with acids, water and weak alkalies to form lethal hydrogen cyanide (HCN) gas. Poisoning can result from breathing cyanide gas, dust or solution; absorption through the skin; and from ingestion.

Because of the toxicity of sodium cyanide, all persons working with it must be completely familiar with, and observe the established safety practises.

## 9.5. INFECTIOUS SUBSTANCES

Infectious substances are biological wastes from sewage. The Camp sewage is eliminated in an incinerators (some camps use electrical toilets which burn the waste immediately). No infectious substance contamination is expected at the camp site.

## 9.6. CORROSIVE SUBSTANCES

Corrosive substances include acids, bases and alkali compounds. Some corrosive substances could be used at the camp site in very small quantities for metal cleaning purposes. Dilute acid solutions irritate the skin, while concentrated solutions can result in burns and also react violently with water.

Many acids give off toxic fumes and are harmful if inhaled. Some acids are also flammable or oxidizers and can start a fire if in contact with organic matter. The resulting fire may produce irritating or poisonous gas.

Hydrofluoric acid can penetrate deeply and damage underlying tissue. Like acids, the principal concern with basic or alkali compounds is their corrosive effects. Dilute solutions irritate the skin, while concentrated solutions can result in burns. Concentrated alkali compounds can penetrate deeply and damage underlying tissue. Most bases do not wash off the skin and eyes with cold water. Consequently warm water must be used to wash the effected areas, often for prolonged periods of time up to several hours. They may be in solid form and cause airborne dust which is harmful if inhaled. Fires may produce irritating or poisonous gas.

Personnel dealing with these substances will be limited to selectively trained staff. Personnel will be trained regularly in prevention, storage, and handling and will be drilled regularly with spill exercises. In the event of a spill, safety measures will be implemented immediately. Personnel will be removed from the area of the spill until appropriate spill containment is acquired and protective gear is donned. Before handling corrosive materials, personnel must review safety, storage, and handling measures. The general method of dealing with acid or base/alkali spills is to apply a neutralizing agent that reacts with the original material to form a much less hazardous, often benign neutralized product.

Action plans for spills of corrosive substances are outlined in Appendix G.

## 9.7. DISPOSAL METHODS

The wastes produced from response to spills depend on the nature of the spill and the method for responding. In some cases, particularly for solid spills, much of the spilled material can be recovered and re-used for its intended purpose.

In the case of acid or base spills, neutralizing agents may render the recovered liquids suitable for disposal back into the ore extraction process and/or to the sanitary sewer system on site.

In the case of spills of flammable and combustible materials, the recovered wastes may be suitable for on-site incineration (as is currently being proposed for used oil), or for landfarming at a licensed facility. The feasibility of an on-site landfarm facility will be evaluated during the mine design and engineering phase of the Meadowbank Gold Project.

In the case of spills of flammable and combustible materials on snow or ice, the contaminated snow or ice will be recovered and stored in 205 L drums within a secondary containment area. Prior to the construction of the landfarm at the mine facility (which has a snow and ice remediation area), the contents of the drums will be stored at the site within a constructed hazardous materials storage facility (bermed and HDPE containment area), melted during the spring and summer months and the fuel contents will be recovered through decantation. The remaining fuel will be separated using absorbent pads which will be incinerated. The remaining contents of the drums will be passed through an oil/water separator, and if the contents do not meet regulatory standards, the water will be processed with activated carbon. The clean water will be monitored and subsequent to achieving regulatory standards for treatment, will be discharged into the environment. (GNWT, 1995[1]).

Deteriorated or damaged ANFO should be destroyed or disposed of. Appropriate method of disposal or destruction and subsequent course of action will be determined by authorized personnel or the explosive supplier.

Some materials will not be suitable for reuse, treatment or disposal on site, and they will have to be packaged and sent off-site for recycling, treatment or disposal. AEM intends to use only approved methods, transporters and waste facilities for residual materials resulting from spill cleanup. Each case will have to be assessed on its own merits.

As part of its waste management plan for the Meadowbank Gold Project, AEM will establish acceptable disposal procedures and options for known and anticipated wastes.

## 9.8. CONTAMINATED SOILS AND WATER

It is possible that some spill events will result in significant, longer-term environmental impact to soil, groundwater or surface water. Each spill incident will be assessed by the On-Scene Coordinator and the Environmental Advisor for additional sampling and testing required to complete cleanup in accordance with the Water Quality and Flow Monitoring Plan, or to assess potential impacts to the environment and allow for additional remediation beyond the initial spill response. If required, the assessment and remediation of contaminated soil will be carried out in accordance with the *Environmental Guideline for Contaminated Site Remediation,* the *Canadian Council for Ministers of Environment - Canadian Environmental Quality Guidelines*, and other relevant environmental quality guidelines.

[1] GNWT Government of North West Territories (1995), Generic Plans and Operating Procedures of A Remediation Facility for Hydrocarbon Materials in NWT. Environmental Protection Division, Department of Renewable Resources GNWT. Pp 27-33

## 10. RESPONSE EQUIPMENT

### 10.1. GENERAL EQUIPMENT

AEM's spill response resource inventory for the Exploration camp is listed in Table 10.1. Fire extinguishers are provided at the tank farm, in all the buildings, at the helicopter pad and in any other area where flammable substances are stored and/or handled. Spill kits will be located at the tank farm, fuelling stations, airstrip, and other locations where spills of hazardous substances could occur.

A checklist of the required items for each spill response kit or equipment storage area will be provided. Spill response supplies will be checked against the lists on a quarterly basis and any deficiencies remedied immediately. The checklists will be reviewed whenever new chemicals are added to on-site activities to ensure that relevant spill cleanup supplies are present. MSDS for all the chemicals present in the vicinity of the spill kit will be kept near the kits, and will be updated as necessary to ensure that all MSDS data are up to date. The expiry dates of the MSDS will be tracked for every chemical present on site to help identify and replace those that are about to expire. MSDS are provided by the chemical suppliers. (See Appendix I for sample MSDS).

**Table 10.1**
**Exploration Camp Spill Response Resource Inventory**

| 24 hour response equipment | Number |
|---|---|
| Hydraulic Excavator | 1 |
| Single Axle truck | 1 |
| Front-end Loader | |
| Tractor dozers/snow plough | 1 |
| **Spill Equipment Availability** | |
| Fuel detention boom | x |
| Absorbent booms | x |
| Absorbent material | x |
| Portable oil skimmer | x |
| Portable pumps and hoses | x |
| Shop vacuum | x |
| Used drumss (210 L capacity) | x |
| Ice Auger | x |
| Tiger torch | x |
| Chain saw | x |
| Hand tools (shovels, rakes) | x |

**Note:** This list will be updated as the mine construction activities are proceeding.

## 10.2. SPILL KITS

The locations and types of spill kits available at the camp site are listed in Table 10.2. The size and contents of the various spill kits are listed in Table 10.3.

**Table 10.2: Types of Spill Kits at Each Location**

| Facility | Location | Kit |
|---|---|---|
| Tank Farm | Near the fuelling station | 2 x 210 L kit<br>Absorbent sheets |
| Weather Haven Garage | | 2 x 210 L kit<br>Absorbent sheets |

**Note**: L = litre.

**Table 10.3: 210 L Spill Kit Contents**

| Number | Size | Description |
|---|---|---|
| 5 piece | 3'' x 4' | Oil selective boom |
| 50 pieces | 18'' x 18'' | Universal pads |
| 1piece | 36'' x 48'' | Polyethylene disposable bag |
| 1pair | | Chemical resistant gloves |
| 1 | | Shovel |
| 1 each | 210 L | Metal container drum |

**Note**: L = litre.

## 10.3. MOBILE ENVIRONMENTAL RESPONSE UNIT

Spill contingency planning for possible incidents during the transportation of fuel from Baker Lake to the Meadowbank site is coordinated by NWT Ltd (Artic Fuel) who operates the overland transportation equipment and is responsible for the operations.

1. Stop the equipment
2. Alert AEM and NWT Ltd (Artic Fuel) (see numbers on Tables 8.1 and 8.3)
3. Contain spill and initiate clean-up (see action plan for appropriate substance)
4. Report as outlined in Figure 6-1 as required.

# 11. TRAINING & EMERGENCY / SPILL EXERCISE

## 11.1. EFFECTIVENESS OF THE PLAN

To ensure the effectiveness of the SCP, the Exploration Manager will be responsible for:

- evaluating what training is required by all staff, and ensuring that all staff are given appropriate training and are retrained as needed

- completing an annual detailed review and update of the plan, with particular stress on the objectives and methods of the plan
- ensuring that this SCP remains up-to-date, and that updated versions are distributed to the personnel on site, and external agencies, organizations and selected qualified external responders
- ensuring that updates to new emergency communications information (new phone numbers, changes in reporting structure, etc.) are distributed as soon as the new information becomes available
- keeping a formal record of distribution and amendments to the SCP
- ensuring that emergency spill response exercises and inspections are conducted at least semiannually
- ensuring that the results of the regular inspections are used to improve spill response practices, and improve relevant plans accordingly
- completing annual internal audits of the EMS, including SCP, and arranging for external audits of the system every three years by independent specialists.

## 11.2. TRAINING

### 11.2.1. On-Site Personnel

A designated ERT consisting of on-site personnel will be established. AEM will ensure that the ERT is trained and present at all times. All members of the team will be trained and familiar with emergency and spill response resources, including their location and access, the SCP, and appropriate emergency spill response methodologies. ERT training will be conducted annually by qualified personnel to ensure that sufficient team members are present and to ensure that training is up to date.

The following training will be included:

- a review of the spill response plan and responsibilities of the ERT members
- the nature, status, and location of fuel and chemical storage facilities
- the on-site and off-site spill response equipment, and how to use it
- emergency contact lists
- desktop exercises of “worst case” scenarios
- the likely causes and possible effects of spills.

All instructors will be highly qualified in spill response and prevention methods; the qualifications and background of the instructors will be provided. All personnel and contractors at the project site will be familiar with spill reporting requirements.
This will be ensured by conducting an orientation and training program on initial spill response procedures for all contractors and new personnel. Attendance will be tracked on site and re-training will be completed annually.

Fuel-handling crews will be fully trained in the safe operation of the facilities, spill prevention techniques, and initial spill response. Similarly, staff involved with the process, tailings, and wastewater systems will be trained in the safe operation of these systems. These crews will be re-trained annually; retraining schedules will be tracked on site.

Training programs will include regular WHMIS and Transportation of Dangerous Goods (TDG) training for all employees who use or are responsible for chemicals on site. A qualified trainer will provide WHMIS and TDG training. Additional safe chemical handling training will be conducted for employees handling or working in the vicinity of dangerous chemicals such as caustic soda, hydrochloric acid, explosives, and fuels. Completion dates of this training will be tracked and retraining done annually.

Re-training for TDG will be completed every three years. Employee TDG training status will be tracked by on-site personnel so that re-training can be completed before expiry of previous TDG training. All new staff handling or responsible for chemical use will receive Occupational Safety and Health Association (OSHA) training and annual refresher courses. Dates of course attendance will be tracked so that refresher courses can be offered prior to expiry of the previous course. Qualified trainers will provide the OSHA training.

Other specialist training will be considered for key Emergency Response Personnel including:

- Incident Command System National Training
- First Aid (Red Cross or similar)
- CPR (Red Cross or similar)
- Wildlife response (several types of classes available)
- Watercraft Safety - 241 FW 1 or (Coast Guard or equivalent)
- Natural Resource Damage Assessment
- Spill Response
- Media Relations

AEM will create a training matrix, which will identify specific spill and health and safety related training for generic classes of personnel on the ERT. The HR Representative, together with the Exploration Manager, will ensure that records of current training are retained, employee training expiry dates are tracked, and re-training is completed in a timely manner.

### 11.2.2. Contractors

Where pertinent, contractors will be required to have WHMIS, TDG and OSHA training as well as undergo site-specific health and safety training. Specialist responders will be expected to have technical environmental, health and safety training specific to their role as a qualified external contractor. AEM will request proof of qualifications for the areas external contractors are intended to support. All contractors working on site will be expected to complete site-specific training to ensure they are familiar with the risk and processes at the site.

## 11.3. EMERGENCY/SPILL EXERCISE

AEM will conduct semi-annual emergency/spill exercises to test the response of the ERT to system failures, emergencies, or spills. The type of drill/exercise will be varied between tests. The On-Scene Coordinator will document and prepare a report for the Exploration Manager noting the response time, personnel involved, and any problems or deficiencies encountered. This report will be used to evaluate the ability of personnel to respond to spills and to determine areas requiring improvement. The results of this report will be used in subsequent training exercises in order to continually improve the training program. The results of actual

spill events and the success of the associated response will also be evaluated. Any deficiencies in the actual response will be investigated as to route cause and used to design new exercises and to test new procedures resulting from the corrective actions. The SCP will be revised and updated accordingly

## 12. LIST OF ACRONYMS

ANFO Ammonium Nitrate Fuel Oil
CCME Canadian Council of Ministers of the Environment
DFO Fisheries and Oceans Canada
EMS Environmental Management System
ERP Emergency Response Plan
ERT Emergency Response Team
ERTC Emergency Response Team Coordinator
FS Fuel Storage Area
GN Government of Nunavut
HAV Hepatitis A Virus
HCN Hydrogen Cyanide
HM Hazardous Materials Storage Area
HMMP Hazardous Materials Management Plan
HR Human Resources
HW Hazardous Waste Storage Area
INAC Indian and Northern Affairs Canada
LEL Lower Explosion Limit
AEM Meadowbank Mining Corporation (Cumberland)
MSDS Materials Safety Data Sheets
NIOSH National Institute for Occupational Safety and Health
OHSP Occupational Health & Safety Plan
PCB Polychlorinated Biphenyls
PPE Personal Protective Equipment
SCP Spill Contingency Plan
TDG Transportation of Dangerous Goods
WHMIS Workplace Hazardous Materials Information System

## APPENDIX A
## FUEL STORAGE MONITORING PLAN

The fuel storage monitoring plan at the Meadowbank exploration camp will consist of the following daily and weekly inspections conducted by AEM personnel that have been trained in the use of fuel pumping equipment and fuel spill response.

The following inspections will be conducted and recorded on a daily basis:

1. All tanks, lines, pumps, hoses, valves and fittings will be inspected for leaks or damage.
2. Ensure proper fuel only is dispensed into the correct tanks and barrels for use in the camp and associated exploration work sites.
3. Ensure that the 'No Smoking' signs posted in the area of the fuel tanks are always clearly visible.
4. Ensure that all personnel on site abide by the 'No Smoking' rule within the distances outlined in the regulations for fuel tanks.
5. Ensure that all fuel pumping and spill response equipment is clearly visible and easily accessed.

The following inspections will be conducted on a weekly basis:

1. Fuel levels in all primary tanks checked and compared against the fuel dispensed from each primary tank for each week.
2. Outer tanks checked for fuel leakage from the primary tank.
3. Spill response equipment checked.
4. Pumping equipment checked.

## APPENDIX B
## General Response Procedures for Spilled Chemical Substances Explosives

**Ammonium Nitrate B.1**
**Ammonium Nitrate Fuel Oil (ANFO) B.2**

## Appendix B.1
## Ammonium Nitrate

AEM commits to review, modify and approve as required to establish this procedure as appropriate for use at the Meadowbank camp.

The first step against prevention of potential spills and association hazards is the application of proper storage procedures for bulk Ammonium Nitrate, including the following

- Good house keeping of the storage facility will prevent spilling and or contamination of materials.
- Ammonium nitrate should be stored away from combustible materials and fuels, as well as other blasting accessories (i.e. boosters, delays, detonating cords and detonators).
- The storage facility should be well ventilated.
- Proper signage restricting the use/exposure of ammonium nitrate to ignition sources should be posted (e.g. no hot work, smoking or vehicle maintenance).
- The storage facility should be locked at all times with only authorized personnel allowed access.

The following is a general spill response procedure for ammonium nitrate. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required. AEM commits to review and test, and if necessary, modify and update thus spill response procedure on an annual basis.

For an **ammonium nitrate spill (solid)**:
1) Isolate and evacuate the spill area.

2) Contact the On-Scene Coordinator who will assemble ERT members and the appropriate spill response materials outside the spill area. **Obtain and read the MSDS** for the substance to determine the chemical-specific hazards and to identify any special precautions that must be taken.

3) Put on appropriate personal protective equipment. For an ammonium nitrate spill this includes:
a. Gloves **as recommended by the MSDS or glove manufacturer**
b. Protective eyeglasses or chemical safety goggles or face shield **as recommended by the MSDS**
c. Lab coat, coveralls or TyvekTM coveralls **as recommended by the MSDS**
d. Half mask air-purifying respirator with cartridges and/filters **as recommended by the MSDS or respirator manufacturer**

4) Ventilate (open windows/doors to outdoors) closed spaces before entering.

5) Remove all sources of heat and ignition (no smoking, flares, sparks or flames in immediate area) and remove uncontaminated combustible materials and organic compounds (wood, paper, oil, etc.,) from spill area.

6) For spills to land, protect the spill area from storm water runoff by constructing a ditch or dike using suitable absorbent materials, soil or other appropriate barrier.

7) Vacuum or sweep the spill residue using non-metal, non-sparking tools and place the residue in a labelled, plastic, container (plastic pail with lid or double heavy duty plastic bags) for re-use or off-site disposal at a licensed disposal facility.

Note: Recovered solid, if generally free from impurities, may be suitable for its intended use. In this case, place solid in suitable container with lid, and **clearly label the container per WHMIS Guidelines**. Note: Minimize dust generation during the operation.

8) Remove and bag personal protective equipment for cleaning, informing laundry personnel of contaminant hazards, or disposal at a licensed disposal facility. Thoroughly wash potential skin contact locations after handling.

## Appendix B.2
## Ammonium Nitrate Fuel Oil (ANFO)

Currently no ANFO is stored at the site. ANFO is fabricated as required, with ammonium nitrate and fuel oil. In the event that ANFO would be stored at the camp, AEM commits to review, modify and approve as required to establish this procedure as appropriate for use at the Meadowbank exploration camp site. Proper handling and disposal of ANFO is an important first step in mitigating against spills and associated hazards.

The proper storage procedures are as follows:

- ANFO should only be used under the supervision of authorized trained personnel.
- ANFO should be kept away from heat, sparks, and flames, as well as initiating explosives, oxidizing agents, combustibles, and other sources of heat.
- Containers should be protected from physical damage and in dry, well ventilated conditions.
- Transportation to the Mine site will be in accordance with Section 14 of the *Mines Act* and Regulations and the *Transportation of Dangerous Goods Act*. Transport vehicles will be in sound mechanical condition and equipped with proper safety equipment. Loaded vehicles will not be left unattended and only authorized personnel will be responsible for the security of the explosives under their control.
- Explosives that have been identified as deteriorated or damaged will need to be disposed of or destroyed. The appropriate method of disposal or destruction and subsequent course of action will be determined by authorized personnel or the explosive supplier.

The following is a general spill response procedure for ammonium nitrate fuel oil – ANFO. The following procedure does not apply to emulsions or other explosives. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required. AEM commits to review and test, and if necessary, modify and update thus spill response procedure on an annual basis.

For an **ANFO spill (solid)**:
1) Isolate and evacuate the spill area.

2) Immediately extinguish any open flames and remove ignition sources (no smoking, flares,sparks in immediate area) IF SAFE TO DO SO. **Fires involving large quantities of ANFO should not be fought.**

3) Contact the On-Scene Coordinator who will assemble ERT members and the appropriate spill response materials outside the spill area. **Obtain and read the MSDS** for the substance to determine the chemical-specific hazards and to identify any special precautions that must be taken.

4) Put on appropriate personal protective equipment. For an ANFO spill this includes:
a. Gloves **as recommended by the MSDS or glove manufacturer.**
b. Protective eyeglasses or chemical safety goggles or face shield **as recommended by the MSDS.**
c. Lab coat, coveralls or TyvekTM coveralls **as recommended by the MSDS.**
d. Shoe covers or rubber boots.

e. Half mask air-purifying respirator with cartridges and/filters **as recommended by the MSDS or respirator manufacturer.**

5) If the spill has occurred outdoors, stay upwind and avoid low lying areas. Ventilate (open windows/doors to outdoors) closed spaces before entering. Ensure adequate explosion proof ventilation for clean-up.

6) Remove all sources of heat and ignition (no smoking, flares, sparks or flames in immediate area) and remove uncontaminated combustible materials and organic compounds (wood, paper, oil, etc.,) from spill area.

7) Do not operate radio transmitters within 100 m of electric detonators.

8) For spill on land, protect the spill area from storm water runoff by constructing a ditch or dike using suitable absorbent materials, soil or other appropriate barrier. For spill to water, utilize damming, and/or water diversion to minimize the spread of contamination.

9) Collect, sweep or shovel spilled material and the other contaminated material/soil using non-metallic, spark-proof tools and place residue into a labelled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags) for off-site disposal at a licensed disposal facility.

Note: Recovered solid, if generally free from impurities, may be suitable for its intended use. In this case, place solid in suitable container with lid, and **clearly label the container per WHMIS Guidelines.**

Note: The drums/containers/residues are to be stored in ventilated areas away from incompatible materials for eventual off-site disposal at a licensed disposal facility.

10) Remove and bag personal protective equipment for cleaning, informing laundry personnel of contaminant hazards, or disposal at a licensed disposal facility. Thoroughly wash with soap potential skin contact locations after handling. Properly dispose of contaminated leather articles including shoes that cannot be decontaminated.

## APPENDIX C
## General Response Procedures for Spilled Chemical Substances

**Compressed Gases C.1**
AEM commits to review, modify and approve as required to establish this procedure as appropriate for Meadowbank exploration camp.

The following is a general spill response procedure for compressed gases. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required. AEM commits to review and test, and if necessary, modify and update thus spill response procedure on an annual basis.

For a **compressed (inert and flammable) gas leak:**

1) IF SAFE TO DO SO and it will stop the gas leak, turn off cylinder valve.

2) If the leak cannot be stopped by closing the cylinder valve, and it is **an inert atmospheric gas** (e.g. nitrogen, carbon dioxide, etc) isolate and evacuate the affected area. If the leak is a **flammable gas** and the leak is outside of a ventilated building enclosure that will contain the gas, immediately activate the fire alarm system and evacuate the area/building.

3) Contact the On-Scene Coordinator who will assemble spill response team members and the appropriate spill response materials outside the spill area. **Obtain and read the MSDS** for the substance to determine the chemical-specific hazards and to identify any special precautions that must be taken.

4) If possible and safety permits, adjust leaking cylinder so that gas escapes rather than liquid.

5) If possible and safety permits, eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area) and turn off electrical equipment.

6) If the spilled has occurred outdoors, stay upwind and avoid low lying areas. If the spill has occurred inside a building, prevent spread of vapour throughout the building by closing doors to other rooms and hallways. If the room's air exchange system distributes air throughout the building, then it may also be necessary to have it shut-down. Allow vapours to ventilate outdoors by opening windows and doors to the exterior.

7) Isolate area until gas has dispersed. On-Scene Coordinator to verify safe conditions.

## APPENDIX D
## General Response Procedures for Spilled Chemical Substances

### Flammable and Combustible Liquids D.1

AEM commits to review, modify and approve as required to establish this procedure as appropriate for use at the Meadowbank exploration camp. The following is a general spill response procedure for flammable or combustible liquids, particularly petroleum hydrocarbon products. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required.

AEM commits to review and test, and if necessary, modify and update thus spill response procedure on an annual basis.

For a **spill of flammable or combustible petroleum hydrocarbon product (liquid):**

1) Isolate and evacuate the spill area.

2) Immediately extinguish any open flames and remove ignition sources (no smoking, flares, sparks in immediate area) IF SAFE TO DO SO.

3) Stop leak and contain spill (**see Step 9**) IF SAFE TO DO SO.

4) Contact the On-Scene Coordinator who will assemble ERT members and the appropriate spill response materials outside the spill area. **Obtain and read the MSDS** for the substance to determine the chemical-specific hazards and to identify any special precautions that must be taken.

5) Put on appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
a. Gloves **as recommended by the MSDS or glove manufacturer.**
b. Splash goggles or face shield.
c. Shoe covers or rubber boots.
d. Lab coat or TyvekTM coveralls.
e. Half mask air-purifying respirator with **organic vapour or combination** cartridges, or **as otherwise recommended by the MSDS or respirator manufacturer**.

6) If the spilled has occurred outdoors, stay upwind and avoid low lying areas. If the spill has occurred inside a building, prevent spread of vapour throughout the building by closing doors to other rooms and hallways. If the room's air exchange system distributes air throughout the building, then it may also be necessary to have it shut-down.

7) Ventilate (open windows/doors to outdoors) closed spaces before entering. Ensure adequate explosion-proof ventilation for clean-up. A vapour suppressing foam or water spray may be used to reduce vapours.

8) Remove all sources of ignition (no smoking, flares, sparks or flames in immediate area) and combustible materials (wood, paper, oil, etc.) within the spilled area.

9) Contain spill by using spill absorbent, spill pads or pillows, soil or snow to construct a dike that limits flow and prevents entry to sewer, waterways or onto ice. For spills to land, excavation of trenches/pits to capture spill flow may also be appropriate. If possible, compact soil or snow dikes, and place plastic tarps over the dike and at its foot to allow the product to pool on the plastic for easy recovery.

Note: Do not use paper towels to absorb spill as this increases the rate of evaporation and vapour concentration in the air.
Note: Do not flush with water into drainage areas or ditches as this will spread spill.
Note: Snow works well as a natural absorbent to collect and contain spilled petroleum hydrocarbons. However, its use in containing a spill will result in a water-contaminant mixture that may be more difficult to manage. It is important to scrape up the contaminated snow and ice as soon as possible.

10) Carefully cover the spill area with spill absorbent, spill pads, soil or snow, starting at the outside and working inward. Do not touch or walk through spilled material.

11) Sweep up or shovel the residue using non-metallic, spark-proof tools and place the residue into a labelled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags). For larger spills to land, excavate impacted absorbent material and soil, place in lined and bermed temporary storage area or directly into sealed drums/containers.

Note: The Territorial Government may give permission to burn off pools of recovered fuel or product. Environmental Advisor to confirm by contacting the NT-NU 24-HOUR SPILL REPORT LINE. Inert or non-combustible absorbents (vermiculite, sand, snow) are not suitable for incineration.
Note: The drums/containers/residues are to be stored in ventilated areas away from incompatible materials for eventual treatment at on-site landfarm (if present) or off-site disposal at a licensed disposal facility. Electrically ground all containers and transporting equipment.
Note: If appropriate, product may be recovered from absorbent pads for re-use by squeezing to release absorbed fuel into empty drums. Larger pools of product may be pumped into empty storage tanks or drums.

12) If spill is indoors, mop the affected area using detergent and water. Dispose of this water to drums for eventual off-site disposal at a licensed disposal facility. Spills to land may require further excavation or remediation of contaminated soil until acceptable soil quality is achieved. The On-Scene Coordinator and/or Environmental Advisor will assess this requirement.

13) For spills to water, immediately limit the area of the spill on water using absorbent pads and booms and similar materials to capture small spills on water. Deploy and slowly draw in absorbent booms to encircle and absorb the spilled product. Recover larger spills on water with floating skimmers and pumps, as required, and discharge recovered product to drums or tanks.

Note: Petroleum hydrocarbons are generally hydrophobic, and as such, do not readily dissolve in water. They typically tend to float on the water's surface. Absorbent booms are often relied on to recover hydrocarbons that escape land containment and enter water.

Note: Antifreeze sinks and mixes with water. If released to water, attempt to isolate/confine the spill by damming or diverting the spill. Pump contaminated water to tanks or drums.

14) Remove and bag personal protective equipment for cleaning, informing laundry personnel of contaminant hazards, or disposal at a licensed disposal facility. Thoroughly wash with soap potential skin contact locations after handling. Properly dispose of contaminated leather articles, (including shoes) that cannot be decontaminated.

## APPENDIX E
## General Response Procedures for Spilled Chemical Substances

**Oxidizing Substances - Liquids E.1**
**Oxidizing Substances - Solids E.2**

**Appendix E.1**
**Oxidizing Substances - Liquids**

AEM commits to review, modify and approve as required and to establish this procedure as appropriate for use at the Meadowbank exploration camp. The following is a general spill response procedure for liquid oxidizer compounds. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required.

AEM commits to review and test, and if necessary, modify and update thus spill response procedure on an annual basis.

For a **liquid oxidizer spill**:

1) Isolate and evacuate the spill area.

2) Stop leak and contain spill (**see Step 8**) IF SAFE TO DO SO.

3) Contact the On-Scene Coordinator who will assemble ERT members and the appropriate spill response materials outside the spill area. **Obtain and read the MSDS** for the substance to determine the chemical-specific hazards and to identify any special precautions that must be taken.

4) Put on the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
a. Gloves **as recommended by the MSDS or glove manufacturer.**
b. Splash goggles or face shield.
c. Shoe covers or rubber boots.
d. Lab coat, coveralls or TyvekTM coveralls **as recommended by the MSDS.**
e. Half mask air-purifying respirator with cartridges and/or filters **as recommended by the MSDS or respirator manufacturer**.

5) Ventilate closed spaces before entering. Ensure adequate explosion-proof ventilation for clean-up.

6) Remove and/or moisten with water any combustible material (wood, paper, oil, etc.) affected by the spill.

7) Use water spray to reduce vapours or divert vapour cloud drift, if required.

8) Contain spill by using non-combustible spill absorbent, soil or snow to construct a dike that limits flow and prevents entry to sewer, waterways or onto ice. For spills to land, excavation of trenches/pits to capture spill flow may also be appropriate.

Note: Flushing area with flooding quantities of water may also be appropriate assuming this does not make clean up and waste management more difficult– **refer to the MSDS**.

9) Carefully cover the spill area with spill absorbent, soil or snow, starting at the outside and working inward. Use non-combustible absorbent. Do not touch or walk though spilled material.

10) Sweep up or shovel the spill residue using non-metal, non-sparking tools and place the residue into a labelled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags) for off-site disposal at a licensed disposal facility.

11) For indoor spills, mop the affected area using detergent and water. Flushing area with flooding quantities of water may also be appropriate – **refer to the MSDS**. Dispose of this water to the sanitary sewer, process stream or waste drums as appropriate. Spills to land may require further excavation or remediation of contaminated soil until acceptable soil quality is achieved. The On-Scene Coordinator and/or Environmental Advisor will assess this requirement.

12) Remove and bag personal protective equipment for cleaning, informing laundry personnel of contaminant hazards, or disposal at a licensed disposal facility. Thoroughly wash with soap potential skin contact locations after handling. Properly dispose of contaminated clothing that cannot be decontaminated.

## Appendix E.2
## Oxidizing Substances - Solids

AEM commits to review, modify and approve as required to establish this procedure as appropriate for use at the Meadowbank exploration camp.

The following is a general spill response procedure for solid oxidizer compounds. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required.

AEM commits to review and test, and if necessary, modify and update thus spill response procedure on an annual basis.

For a **solid oxidizer spill:**

1) Isolate and evacuate the spill area.

2) Contact the On-Scene Coordinator who will assemble ERT members and the appropriate spill response materials outside the spill area. **Obtain and read the MSDS** for the substance to determine the chemical-specific hazards and to identify any special precautions that must be taken.

3) Put on the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
a. Gloves **as recommended by the MSDS or glove manufacturer.**
b. Safety glasses or goggles.
c. Lab coat.
d. Half mask air-purifying respirator with **N95 or greater protection** particulate filter or **as recommended by the MSDS or respirator manufacturer**.

4) Remove all sources of heat and ignition (no smoking, flares, sparks or flames in immediate area) and remove uncontaminated combustible materials and organic compounds (wood, paper, oil, etc.,) from spill area.

5) For spills to land, protect the spill area from storm water runoff by constructing a ditch or dike using suitable non-combustible absorbent materials, soil or other appropriate barrier. For spill to water, utilize damming, and/or water diversion to minimize the spread of contamination.

6) Vacuum, sweep or shovel the spill residue using non-metal, non-sparking tools and place the residue into a labelled, plastic, container (plastic pail with lid or double heavy duty plastic bags) for re-use or off-site disposal at a licensed disposal facility.

Note: Recovered solid, if generally free from impurities, may be suitable for its intended use. In this case, place solid in suitable container with lid, and **clearly label the container per WHMIS Guidelines**.

Note: Minimize dust generation.

7) If there is still oxidizer residue left in the spill area, neutralize with appropriate agent **as recommended by the MSDS**, or for spills to land continue to excavate until no visible spilled solid remains. Use non-combustible spill absorbent or soil to absorb the neutralized residue. Place in suitable drums/containers for disposal to a licensed facility.

8) For indoor spills, mop the affected area using detergent and water. Dispose of this water to the sanitary sewer, process stream or waste drums as appropriate.

9) Remove and bag personal protective equipment for cleaning, informing laundry personnel of contaminant hazards, or disposal at a licensed disposal facility. Thoroughly wash with soap potential skin contact locations after handling. Properly dispose of contaminated clothing that cannot be decontaminated.

## APPENDIX F
## General Response Procedures for Spilled Chemical Substances

### Poisonous and Toxic Substances (Sodium Cyanide) F.1

AEM commits to review, modify and approve as required to establish this procedure as appropriate for use at the Meadowbank exploration camp.

The following is a general spill response procedure for solid Sodium Cyanide.
AEM commits to review and test, and if necessary, modify and update thus spill response procedure on an annual basis.

For a **Sodium Cyanide (solid) spill:**

1) Isolate and evacuate the spill area.

2) Contact the On-Scene Coordinator who will assemble ERT members and the appropriate spill response materials outside the spill area. **Obtain and read the MSDS** for the substance to determine the chemical-specific hazards and to identify any special precautions that must be taken.

3) Put on the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
e. Gloves **as recommended by the MSDS or glove manufacturer.**
f. Safety glasses or goggles.
g. Lab coat.
h. Half mask air-purifying respirator **as recommended by the MSDS or respirator manufacturer**.

Note: For worker safety, maintain readily accessible supply of cyanide antidote kits on site.

4) Ventilate area of spill or leak.

5) Avoid exposure to acids, water or weak alkalies which can react to form toxic hydrogen cyanide (HCN) gas.

6) Contain spill to prevent release to sewer, waterway or onto ice. For spills to land, protect the spill area from storm water runoff by constructing a ditch or dike using absorbent materials, soil or other appropriate barrier. If raining, cover spill area with tarp or plastic to minimize contact with water and prevent subsequent runoff. For spill to water, utilize damming, and/or water diversion to minimize the spread of contamination.

7) Shovel the spilled material into labelled drums, containers or plastic bags for re-use or off-site disposal at a licensed disposal facility.

Note: Recovered solid, if generally free from impurities, may be suitable for its intended use. In this case, place solid in suitable container with lid, and **clearly label the container per WHMIS Guidelines**.

Note: Minimize dust generation.

8) If there is still spilled sodium cyanide residue left in the spill area, neutralize with appropriate agent **as recommended by the MSDS** (sodium or calcium hypochlorite solution), or for spills to land continue to excavate until no visible spilled solid remains. Use suitable spill absorbent or soil to absorb the neutralized residue. Place in suitable drums/containers for disposal to a licensed facility. Collect material and place in a closed container for recovery or disposal.

9) For indoor spills, mop the affected area using detergent and water. Dispose of this water to waste drums/containers for disposal to a licensed facility.

10) Remove and bag personal protective equipment for disposal at a licensed disposal facility. Thoroughly wash with soap potential skin contact locations after handling. Properly dispose of contaminated clothing that cannot be decontaminated.

## APPENDIX G
## General Response Procedures for Spilled Chemical Substances

**Corrosive Substances**
**Acids, Liquids G.1**
**Acids, Solids G.2**
**Bases/Alkali, Liquids G.3**
**Bases/Alkali, Solids G.4**

**Appendix G.1**
**Corrosive Substances – Acids, Liquids**

AEM commits to review, modify and approve as required to establish this procedure as appropriate for use at the Meadowbank exploration camp.
The following is a general spill response procedure for liquid acid compounds. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required. AEM commits to review and test, and if necessary, modify and update thus spill response procedure on an annual basis.

For a **liquid acid spill**:

1) Isolate & evacuate the spill area.

2) Stop leak and contain spill (**see Step 8 below**) IF SAFE TO DO SO.

3) Contact the On-Scene Coordinator who will assemble ERT members and the appropriate spill response materials outside the spill area. **Obtain and read the MSDS** for the substance to determine the chemical-specific hazards and to identify any special precautions that must be taken.

4) Put on appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
a. Gloves **as recommended by the MSDS or glove manufacturer.**
b. Splash goggles or face shield.
c. Shoe covers or rubber boots.
d. Lab coat or TyvekTM coveralls.
e. Half mask air-purifying respirator with **acid gas or combination** cartridges, or **as otherwise recommended by the MSDS or respirator manufacturer**.

5) If the spill has occurred outdoors, stay upwind and stay out of low areas. If the spill has occurred inside a building, prevent spread of vapour throughout the building by closing doors to other rooms and hallways. If the room's air exchange system distributes air throughout the building, then it may also be necessary to have it shut-down.

6) Ventilate (open windows/doors to outdoors) closed spaces before entering.

7) Remove all sources of ignition (no smoking, flares, sparks or flames in immediate area).

8) Contain spill by using spill absorbent, spill pads or pillows, or dry soil to construct a dike that limits flow and prevents entry to sewer, waterways or onto ice. For spills to land, excavation of trenches/pits to capture spill flow may also be appropriate. Ideally, use spill absorbent that contains a mild neutralizing agent **as recommended by the MSDS**.

Note: Many acids, particularly concentrated acids react violently in the presence of water. Do not flush spill area with water unless the **MSDS** indicates acceptable.

Note: Nitric Acid reacts violently and explosively with organic chemicals and organic material such as wood, cotton and paper; therefore, do not use organic absorbent material on Nitric acid.

Note: Hydrofluoric acid will fume during neutralization. Provide adequate ventilation and approach from upwind. Neutralize carefully with sodium bicarbonate, soda ash or lime. Use water spray to disperse the gas/vapour if required. Remove all sources of ignition.

9) Carefully cover the spill area with spill absorbent, spill pads or dry soil, starting at the outside and working inward. If practical, neutralize spill using **MSDS-recommended** or commercially available neutralizers. Use pH indicator paper to determine if spill is neutralized (pH 7).

Note: Use caution as neutralization reactions generate heat.

10) Sweep or shovel the neutralized spill residue using non-metal, non-sparking tools and place the residue into a labelled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags) for off-site disposal at a licensed disposal facility.

11) Check the pH of the spill area. If it is less than pH 6, then further neutralize with a dilute solution of a suitable reagent **as identified on the MSDS** or for spill to land continue to excavate contaminated soil.

12) For indoor spills, mop the affected area using detergent and water. Dispose of this water to the sanitary sewer, process stream or waste drums as appropriate.

13) Remove and bag personal protective equipment for cleaning, informing laundry personnel of contaminant hazards, or disposal at a licensed disposal facility. Thoroughly wash with soap potential skin contact locations after handling. Properly dispose of contaminated clothing that cannot be decontaminated.

14) After the spill has been cleaned up, the area should be free of vapours. However, if personnel note odours or irritation, isolate the spill area, re-clean the area as per **Steps 11 and 12** or wait at least **1 hour** before re-entering or until considered safe by the On-Scene Coordinator or Environmental Advisor.

**Appendix G.2**
**Corrosive Substances – Acids, Solids**

AEM commits to review, modify and approve as required to establish this procedure as appropriate for use on the Meadowbank exploration camp.

The following is a general spill response procedure for solid acid compounds. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required.

AEM commits to review and test, and if necessary, modify and update thus spill response procedure on an annual basis.

For a **solid acid spill**;

1) Isolate and evacuate the spill area.

2) Contact the On-Scene Coordinator who will assemble ERT members and the appropriate spill response materials outside the spill area. **Obtain and read the MSDS** for the substance to determine the chemical-specific hazards and to identify any special precautions that must be taken.

3) Put on the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
a. Gloves **as recommended by the MSDS or glove manufacturer.**
b. Safety glasses or goggles.
c. Lab coat.
d. Half mask air-purifying respirator with **N95 or greater protection** particulate filter, or **as otherwise recommended by the MSDS or respirator manufacturer**.

4) Contain spill to prevent release to sewer, waterway or onto ice. For spills to land, protect the spill area from storm water runoff by constructing a ditch or dike using absorbent materials, dry soil or other appropriate barrier. If raining, cover spill area with tarp or plastic to minimize contact with water and prevent reaction and/or subsequent runoff. For spill to water, utilize damming, and/or water diversion to minimize the spread of contamination.

5) If necessary to minimize dust production, slightly moisten the solid. Use water, or if the material is water reactive, another inert liquid **as recommended by the MSDS**.

6) Sweep up or shovel the residue using non-metallic, spark-proof tools and place the residue into a labelled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags) for reuse or off-site disposal at a licensed disposal facility

Note: Recovered solid, if generally free from impurities, may be suitable for its intended use. In this case, place solid in suitable container with lid, and **clearly label the container per WHMIS Guidelines**.

7) Remaining solid acid residue may be neutralized using a dilute solution of appropriate agent **as recommended by the MSDS** (e.g. sodium bicarbonate - baking soda), or for spills to land continue to excavate until no visible spilled solid remains. Check the pH of the spill area;

the final pH should be between pH 6 and 10. Use spill absorbent, spill pads or dry soil to absorb the neutralized residue.

Note: Use caution as neutralization reactions generate heat.

8) For indoor spills, mop the affected area using detergent and water. Dispose of this water to the sanitary sewer, process stream or waste drums as appropriate.

9) Remove and bag personal protective equipment for cleaning, informing laundry personnel of contaminant hazards, or disposal at a licensed disposal facility. Thoroughly wash with soap potential skin contact locations after handling. Properly dispose of contaminated clothing that cannot be decontaminated.

**Appendix G.3**
Corrosive Substances – Bases/Alkali, Liquids

AEM commits to review, modify and approve as required to establish this procedure as appropriate for use at the Meadowbank exploration camp.

The following is a general spill response procedure for liquid alkali or base compounds. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required.

AEM commits to review and test, and if necessary, modify and update thus spill response procedure on an annual basis.

For a **liquid alkali or base spill**:

1) Isolate & evacuate the spill area.

2) Stop leak and contain spill (**see Step 8**) IF SAFE TO DO SO.

3) Contact the On-Scene Coordinator who will assemble ERT members and the appropriate spill response materials outside the spill area. **Obtain and read the MSDS** for the substance to determine the chemical-specific hazards and to identify any special precautions that must be taken.

4) Put on the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
a. Gloves **as recommended by the MSDS or glove manufacturer.**
b. Splash goggles or face shield.
c. Shoe covers or rubber boots.
d. Lab coat or TyvekTM coveralls.
e. Half mask air-purifying respirator with cartridges/filters **as recommended by the MSDS or respirator manufacturer**.

5) If the spill has occurred outdoors, stay upwind and stay out of low areas. If the spill has occurred inside a building, prevent spread of vapour throughout the building by closing doors to other rooms and hallways. If the room's air exchange system distributes air throughout the building, then it may also be necessary to have it shut-down.

6) Ventilate (open/windows to outdoors) closed spaces before entering.

7) Remove all sources of ignition (no smoking, flares, sparks or flames in immediate area) and combustible materials (wood, paper, oil, etc.).

8) Contain spill by using spill absorbent, spill pads or pillows, or dry soil to construct a dike that limits flow and prevents entry to sewer, waterways or onto ice. For spills to land, excavation of trenches/pits to capture spill flow may also be appropriate. Ideally, use spill absorbent that contains a mild neutralizing agent **as recommended by MSDS**.

Note: Use caution as neutralization reactions generate heat.

9) Carefully cover the spill area with spill absorbent, spill pads or dry soil, starting at the outside and working inward. If practical, neutralize spill using MSDS-recommended or commercially available neutralizers. Use pH indicator paper to determine if spill is neutralized (pH 7).

Note: Use caution as neutralization reactions generate heat.

10) Sweep or shovel the neutralized spill residue using non-metal, non-sparking tools and place the residue into a labelled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags) for off-site disposal at a licensed disposal facility.

11) Check the pH of the spill area. If it is greater than pH 10, then further neutralize with a dilute solution of a suitable reagent **as identified on the MSDS**, or for spill to land continue to excavate contaminated soil.

12) For indoor spills, mop the affected area using detergent and water. Dispose of this water to the sanitary sewer, process stream or waste drums as appropriate.

13) Remove and bag personal protective equipment for cleaning, informing laundry personnel of contaminant hazards, or disposal at a licensed disposal facility. Thoroughly wash with soap potential skin contact locations after handling. Properly dispose of contaminated clothing that cannot be decontaminated.

14) After the spill has been cleaned up, the area should be free of vapours. However, if personnel note odours or irritation, isolate the spill area, re-clean as per **Steps 11 and 12** or wait at least **1 hour** before re-entering or until it is considered to be safe by the On-Scene Coordinator or Environmental Advisor.

**Appendix G.4**
**Corrosive Substances – Bases/Alkali, Solids**

AEM commits to review, modify and approve as required to establish this procedure as appropriate for use at the Meadowbank exploration camp.

The following is a general spill response procedure for solid alkali or base compounds. Consult the MSDS for the specific spilled compound to determine whether deviations from the general guidance are required.

AEM commits to review and test, and if necessary, modify and update thus spill response procedure on an annual basis.

For a **solid alkali or base spill**;
1) Isolate and evacuate the spill area.

2) Contact the On-Scene Coordinator who will assemble ERT members and the appropriate spill response materials outside the spill area. **Obtain and read the MSDS** for the substance to determine the chemical-specific hazards and to identify any special precautions that must be taken.

3) Put on the appropriate personal protective equipment. Depending on the scale of the spill and properties of the spilled substance, this can include:
a. Gloves **as recommended by the MSDS or glove manufacturer.**
b. Safety glasses or goggles.
c. Lab coat.
d. Half mask air-purifying respirator with **N95 or greater protection** particulate filter or **as recommended by the MSDS or respirator manufacturer**.

4) Contain spill to prevent release to sewer, waterway or onto ice. For spills to land, protect the spill area from storm water runoff by constructing a ditch or dike using absorbent materials, dry soil or other appropriate barrier. If raining, cover spill area with tarp or plastic to minimize contact with water and prevent reaction and/or subsequent runoff. For spill to water, utilize damming, and/or water diversion to minimize the spread of contamination.

5) If necessary to minimize dust production, slightly moisten the solid. Use water, or if the material is water reactive, another inert liquid **as recommended by the MSDS**.

Note: Do not use water to flush bases in powdered form, such as calcium oxide (lime), as this material is not very soluble.

6) Sweep or shovel the residue using non-metallic, spark-proof tools and place the residue into a labelled, plastic, waste container (plastic pail with lid or double heavy duty plastic bags) for offsite disposal at a licensed disposal facility.

Note: Recovered solid, if generally free from impurities, may be suitable for its intended use. In this case, place solid in suitable container with lid, and **clearly label the container per WHMIS Guidelines**.

7) Remaining solid alkali or base residue may be neutralized using a dilute solution of appropriate acid. Check the pH of the spill area; the final pH should be between pH 6 and 10. Use spill absorbent, spill pads or dry soil to absorb the neutralized residue.

8) For indoor spills, mop the affected area using detergent and water. Dispose of this water to the sanitary sewer, process stream or waste drums as appropriate.

9) Remove and bag personal protective equipment for cleaning, informing laundry personnel of contaminant hazards, or disposal at a licensed disposal facility. Thoroughly wash with soap potential skin contact locations after handling. Properly dispose of contaminated clothing that cannot be decontaminated.

## APPENDIX H

### TRANSPORTATION LOAD MANIFEST

| | |
|---|---|
| **Agnico-Eagle Mines Limited**<br>**Meadowbank Division** | **Date:** |

| | |
|---|---|
| **VEHICLE TYPE:**<br>**ESTIMATED DEPARTURE:**<br>**ESTIMATED ARRIVAL:** | **OWNER:**<br>**FROM:**<br>**TO:** |

### SUPPLY LIST

| **FUEL** | **TYPE** | **VOLUMES** |
|---|---|---|
| | P-50 | |
| | GASOLINE | |
| | JET – B/A | |
| | PROPANE | |
| | ACETYLENE | |
| | **VOLUMES OR WEIGHT** | |
| **SALT** | | |
| **CORE/BOXES** | | |
| **CORE RACKS** | | |
| **GRAVEL** | | |
| **LUMBER** | | |
| **DRILL SUPPLIES** | | |
| **OTHER** | | |
| | **TOTAL WEIGHT:** | |
| **DRIVER/ASSISTANT** | | |

# APPENDIX I

# MSDS DATA SHEETS

# Material Safety Data Sheet

Printing date 08/11/2006 Version 1 Reviewed on 08/11/2006

## 1 Identification of substance

· **Product details**

· **Trade name: Acetylene**

· **Article number:** 030-01-0003BOC

· **Creation date:** 08/09/2006

· **Manufacturer/Supplier:**
BOC Canada Limited
5860 Chedworth Way
Mississauga, Ontario L5R 0A2
www.bocgases.ca

TELEPHONE NUMBER: (905) 501-1700
24-HOUR EMERGENCY TELEPHONE NUMBER: (905) 501-0802
EMERGENCY RESPONSE PLAN NO: 2-0101

Please ensure that this MSDS is received by the appropriate person

· **Information department:** Customer Service Centre: 1-866-385-5349

## 2 Composition/Data on components

· **Chemical characterization:**
· **CAS No. Description**
74-86-2 Acetylene
· **Identification number(s)**
· **EINECS Number:** 200-816-9
· **EU Number:** 601-015-00-0

## 3 Hazards identification

· **Hazard description:**

Extremely flammable

· **WHMIS-symbols:**
A - Compressed gas
B1 - Flammable gas

· **HMIS-ratings (scale 0 - 4)**

Health = 0
Fire = 4
Reactivity = 3

(Contd. on page 2)

# Material Safety Data Sheet

Printing date 08/11/2006 Version 1 Reviewed on 08/11/2006

**Trade name: Acetylene**

(Contd. of page 1)

· **NFPA ratings (scale 0 - 4)**

Health = 0
Fire = 4
Reactivity = 3

· **Information pertaining to particular dangers for man and environment:**
Heating may cause an explosion.
Explosive with or without contact with air.
Extremely flammable.
· **Classification system:**
The classification is in line with internationally approved calculation standards. It is expanded, however, by information from technical literature and by information furnished by supplier companies.

* 
## 4 First aid measures

· **After inhalation:**
Supply fresh air. If required, provide artificial respiration and consult doctor. Keep patient warm.
· **After skin contact:** Generally the product does not irritate the skin.
· **After eye contact:** Rinse opened eye for several minutes under running water. Then consult a doctor.
· **After swallowing:** Not applicable

* 
## 5 Fire fighting measures

· **Suitable extinguishing agents:**
Use fire fighting measures that suit the environment.
In the case of fires caused by ignited acetylene leaks:
- DO NOT extinguish unless it is possible (without risk) to shut-off gas flow; explosive vapours could form and re-ignition may occur.
Evacuate area as soon as possible.
· **Protective equipment:** Wear self-contained respiatory protective device.

* 
## 6 Accidental release measures

· **Person-related safety precautions:**
Wear protective equipment. Keep unprotected persons away.
Ensure adequate ventillation.
· **Measures for environmental protection:** Prevent seepage into sewage system, workpits and cellars.
· **Measures for cleaning/collecting:** Ensure adequate ventillation.

## 7 Handling and storage

· **Handling:** Do not mix with air or oxygen above atmospheric pressure.
· **Information for safe handling:** Open and handle cylinder with care.
· **Information about protection against explosions and fires:**
Keep ignition sources away - Do not smoke.
Protect from heat.

(Contd. on page 3)

# Material Safety Data Sheet

Printing date 08/11/2006 Version 1 Reviewed on 08/11/2006

**Trade name: Acetylene**

(Contd. of page 2)

Protect against electrostatic charges.
Pressurized container: protect from sunlight and do not expose to temperatures exceeding 50°C. Do not pierce or burn, even after use.
Prevent impact and friction.

· **Storage:**
· **Requirements to be met by storerooms and receptacles:**
Store in a cool location.
Do not expose cylinder to temperatures higher than 50°C (122 °F)
· **Information about storage in one common storage facility:** Store away from oxidizing agents.
· **Further information about storage conditions:**
Keep cylinder valve tightly closed.
Store in cool, dry conditions in well sealed receptacles.
Protect from heat and direct sunlight.
Store cylinder in a well ventilated area.
Store in accordance with local fire code and/or building code or any pertaining regulations.

* 

## 8 Exposure controls and personal protection

· **Additional information about design of technical systems:** Adequate local ventillation.

| · **Components with limit values that require monitoring at the workplace:** | |
|---|---|
| **74-86-2 Acetylene (50-100%)** | |
| EL | Simple asphyxiant |

· **Additional information:** The lists that were valid during the creation were used as basis.

· **Personal protective equipment:**
· **General protective and hygienic measures:** Wash hands before breaks and at the end of work.
· **Breathing equipment:**
Use atmosphere-supplying respirators (e.g. supplied-air: demand, pressure-demand, or continuous-flow or self-contained breathing apparatus: demand or pressure-demand or combination supplied-air with auxiliary self-contained air supply atmosphere-supplying respirator in case of insufficient ventilation.
· **Protection of hands:** Protective gloves
· **Material of gloves**
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer.
· **Eye protection:**

Tightly sealed goggles

* 

## 9 Physical and chemical properties

| · **General Information** | |
|---|---|
| **Form:** | Gaseous. |
| **Color:** | Colorless |
| **Odor:** | Ether-like |

(Contd. on page 4)

# Material Safety Data Sheet

Printing date 08/11/2006 Version 1 Reviewed on 08/11/2006

**Trade name: Acetylene**

(Contd. of page 3)

| | |
|---|---|
| · **Change in condition** | |
| **Melting point/Melting range:** | -80.8°C |
| **Boiling point/Boiling range:** | -83°C |
| · **Flash point:** | < 0°C |
| · **Ignition temperature:** | 325°C |
| · **Danger of explosion:** | Explosive with or without contact with air. |
| · **Explosion limits:** | |
| **Lower:** | 2.3 Vol % |
| **Upper:** | 78 Vol % |
| · **Solubility in / Miscibility with** | |
| **Water at 20°C:** | 1.185 g/l |

* 

## 10 Stability and reactivity

· **Thermal decomposition / conditions to be avoided:** To avoid thermal decomposition do not overheat.
· **Dangerous reactions** Forms explosive gas mixture with air.
· **Dangerous products of decomposition:** No dangerous decomposition products known.

## 11 Toxicological information

· **Acute toxicity:**
· **Primary irritant effect:**
· **on the skin:** No irritating effect.
· **on the eye:** No irritating effect.
· **Sensitization:** No sensitizing effects known.

## 12 Ecological information

· **General notes:** Generally not hazardous for water

## 13 Disposal considerations

· **Product:**
· **Recommendation:**
Cylinder and unused product should be returned to vendor. Disposable cylinder must be disposed of in accordance with local regulations.

· **Uncleaned packagings:**
· **Recommendation:**
Cylinder and unused product should be returned to vendor. Disposable cylinder must be disposed of in accordance with local regulations.

(Contd. on page 5)

# Material Safety Data Sheet

Printing date 08/11/2006 Version 1 Reviewed on 08/11/2006

**Trade name: Acetylene**

(Contd. of page 4)

· **Recommended cleansing agent:** Water, if necessary with cleansing agents.

## 14 Transport information

· **TDG and DOT regulations:**

· **Hazard class:** 2
· **Identification number:** UN1001
· **Packing group:** -
· **Proper shipping name (technical name):** ACETYLENE, DISSOLVED
· **Label** 2.1
· **Packaging group:** -

· **Maritime transport IMDG:**

· **IMDG Class:** 2.1
· **UN Number:** 1001
· **Label** 2.1
· **Packaging group:** -
· **EMS Number:** F-D,S-U
· **Marine pollutant:** No
· **Propper shipping name:** ACETYLENE, DISSOLVED

· **Air transport ICAO-TI and IATA-DGR:**

· **ICAO/IATA Class:** 2
· **UN/ID Number:** 1001
· **Label** 2.1
· **Packaging group:** -
· **Propper shipping name:** ACETYLENE, DISSOLVED

## 15 Regulations

· **Sara**

· **Section 355 (extremely hazardous substances):**

Substance is not listed.

(Contd. on page 6)

# Material Safety Data Sheet

Printing date 08/11/2006 Version 1 Reviewed on 08/11/2006

**Trade name: Acetylene**

(Contd. of page 5)

· **Section 313 (Specific toxic chemical listings):**
Substance is not listed.

· **TSCA (Toxic Substances Control Act):**
Substance is listed.

· **Proposition 65**

· **Chemicals known to cause cancer:**
Substance is not listed.

· **Chemicals known to cause reproductive toxicity for females:**
Substance is not listed.

· **Chemicals known to cause reproductive toxicity for males:**
Substance is not listed.

· **Chemicals known to cause developmental toxicity:**
Substance is not listed.

· **Cancerogenity categories**

· **EPA (Environmental Protection Agency)**
Substance is not listed.

· **NTP (National Toxicology Program)**
Substance is not listed.

· **TLV (Threshold Limit Value established by ACGIH)**
Substance is not listed.

· **NIOSH-Ca (National Institute for Occupational Safety and Health)**
Substance is not listed.

· **OSHA-Ca (Occupational Safety & Health Administration)**
Substance is not listed.

· **Canadian substance listings:**

· **Canadian Domestic Substances List (DSL)**
Substance is listed.

· **Canadian Ingredient Disclosure list (limit 0.1%)**
Substance is not listed.

· **Canadian Ingredient Disclosure list (limit 1%)**
Substance is not listed.

· **Product related hazard informations:**
The product has been classified and marked in accordance with directives on hazardous materials.

· **Hazard symbols:**
Extremely flammable

· **Risk phrases:**
Heating may cause an explosion.
Explosive with or without contact with air.
Extremely flammable.

· **Safety phrases:**
Keep out of the reach of children.

(Contd. on page 7)

# Material Safety Data Sheet

Printing date 08/11/2006 Version 1 Reviewed on 08/11/2006

**Trade name: Acetylene**

(Contd. of page 6)

Keep container in a well-ventilated place.
Keep away from sources of ignition - No smoking.
Take precautionary measures against static discharges.

## 16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· **Department issuing MSDS:** Customer Service Centre: 1-866-385-5349
· **Contact:** Canada Technical Services: 1-866-385-5349

# Material Safety Data Sheet
## Carbon, Activated

ACC# 04250

## Section 1 - Chemical Product and Company Identification

**MSDS Name:** Carbon, Activated
**Catalog Numbers:** S79959, S80029, C270C, C272-212, C272-500, D127-500
**Synonyms:** Black Pearls; Charcoal Black; Graphite Nautural; Purified Charcoal; Activated Carbon.
**Company Identification:**

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

**For information, call:** 201-796-7100
**Emergency Number:** 201-796-7100
**For CHEMTREC assistance, call:** 800-424-9300
**For International CHEMTREC assistance, call:** 703-527-3887

## Section 2 - Composition, Information on Ingredients

| CAS# | Chemical Name | Percent | EINECS/ELINCS |
|---|---|---|---|
| 7440-44-0 | Charcoal, activated | 100 | 231-153-3 |

## Section 3 - Hazards Identification

### EMERGENCY OVERVIEW

Appearance: black solid.
**Caution!** May cause mechanical eye and skin irritation. May cause respiratory tract irritation. May cause central nervous system effects. May cause lung damage.
**Target Organs:** Lungs.

**Potential Health Effects**
**Eye:** Dust may cause mechanical irritation. May cause lacrimation (tearing), blurred vision, and photophobia. May cause chemical conjunctivitis and corneal damage.
**Skin:** Dust causes mechanical irritation.
**Ingestion:** May cause nausea, vomiting, abdominal pain, and increased salivation.
**Inhalation:** May cause lung damage. Olfactory fatigue may occur. Can produce delayed pulmonary edema. Inhalation of dusts cause severe irritation of the upper respiratory tract, gastrointestinal disturbances, albuminuria, gradual loss of weight, and increasing weakness.
**Chronic:** Chronic inhalation may lead to decreased pulmonary function.

## Section 4 - First Aid Measures

**Eyes:** Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and

lower eyelids. Get medical aid.
**Skin:** Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists. Wash clothing before reuse.
**Ingestion:** Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.
**Inhalation:** Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
**Notes to Physician:** Treat symptomatically and supportively.

## Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Will burn if involved in a fire.
**Extinguishing Media:** For large fires, use water spray, fog or regular foam. For small fires, use dry chemical, carbon dioxide, sand, earth, water spray or regular foam. Cool containers with flooding quantities of water until well after fire is out.
**Flash Point:** Not applicable.
**Autoignition Temperature:** 452 deg C ( 845.60 deg F)
**Explosion Limits, Lower:**Not available.
**Upper:** Not available.
**NFPA Rating:** (estimated) Health: 1; Flammability: 1; Instability: 0

## Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.
**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Scoop up with a nonsparking tool, then place into a suitable container for disposal. Avoid generating dusty conditions. Remove all sources of ignition.

## Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Avoid ingestion and inhalation. Activated Carbon, especially when wet, can deplete oxygen from air in enclosed spaces, and dangerously low levels of oxygen may result.
**Storage:** Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances.

## Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local explosion-proof ventilation to keep airborne levels to acceptable levels.

**Exposure Limits**

| Chemical Name | ACGIH | NIOSH | OSHA - Final PELs |
|---|---|---|---|
| Charcoal, activated | none listed | none listed | none listed |

**OSHA Vacated PELs:** Charcoal, activated: No OSHA Vacated PELs are listed for this chemical.
**Personal Protective Equipment**
**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
**Skin:** Wear appropriate gloves to prevent skin exposure.
**Clothing:** Wear appropriate protective clothing to minimize contact with skin.
**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

## Section 9 - Physical and Chemical Properties

**Physical State:** Solid
**Appearance:** black
**Odor:** odorless
**pH:** Not available.
**Vapor Pressure:** 1 mm Hg @ 3586C
**Vapor Density:** Not available.
**Evaporation Rate:**Negligible.
**Viscosity:** Not available.
**Boiling Point:** Not available.
**Freezing/Melting Point:**3652 deg C
**Decomposition Temperature:**Not available.
**Solubility:** insoluble in water.
**Specific Gravity/Density:**1.8-2.1
**Molecular Formula:**C
**Molecular Weight:**12

## Section 10 - Stability and Reactivity

**Chemical Stability:** Stable under normal temperatures and pressures.
**Conditions to Avoid:** Dust generation, moisture, excess heat.
**Incompatibilities with Other Materials:** Oxidizing agents, alkali metals, iron oxide, lead oxide, liquid oxygen, manganese oxide, metallic salts, chlorinated paraffins, dibenzoyl peroxide, 1,4-diazabicyclo{2.2.2}octane, molybdenum(IV) oxide, nitrobenzaldehyde, potassium hydroxide, sodium hydrogen carbonate.
**Hazardous Decomposition Products:** Carbon monoxide, carbon dioxide.
**Hazardous Polymerization:** Has not been reported.

## Section 11 - Toxicological Information

**RTECS#:**
**CAS#** 7440-44-0: FF5250100

**LD50/LC50:**
Not available.

**Carcinogenicity:**
CAS# 7440-44-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:** No information found
**Teratogenicity:** No information found
**Reproductive Effects:** No information found
**Mutagenicity:** No information found
**Neurotoxicity:** No information found
**Other Studies:**

## Section 12 - Ecological Information

No information available.

## Section 13 - Disposal Considerations

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

## Section 14 - Transport Information

| | US DOT | Canada TDG |
|---|---|---|
| **Shipping Name:** | Not Regulated | Not Regulated |
| **Hazard Class:** | | |
| **UN Number:** | | |
| **Packing Group:** | | |

## Section 15 - Regulatory Information

### US FEDERAL

**TSCA**
CAS# 7440-44-0 is listed on the TSCA inventory.
**Health & Safety Reporting List**
None of the chemicals are on the Health & Safety Reporting List.
**Chemical Test Rules**
None of the chemicals in this product are under a Chemical Test Rule.
**Section 12b**
None of the chemicals are listed under TSCA Section 12b.
**TSCA Significant New Use Rule**
None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**
None of the chemicals in this material have an RQ.
**SARA Section 302 Extremely Hazardous Substances**
None of the chemicals in this product have a TPQ.
**SARA Codes**
CAS # 7440-44-0: immediate.
**Section 313** No chemicals are reportable under Section 313.
**Clean Air Act:**
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
**Clean Water Act:**
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
**OSHA:**
None of the chemicals in this product are considered highly hazardous by OSHA.
**STATE**
CAS# 7440-44-0 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

**California Prop 65**

California No Significant Risk Level: None of the chemicals in this product are listed.

## European / International Regulations

**European Labeling in Accordance with EC Directives**
**Hazard Symbols:**
Not available.
**Risk Phrases:**

**Safety Phrases:**
S 24/25 Avoid contact with skin and eyes.

**WGK (Water Danger/Protection)**
CAS# 7440-44-0: 0
**Canada - DSL/NDSL**
CAS# 7440-44-0 is listed on Canada's DSL List.
**Canada - WHMIS**
This product has a WHMIS classification of B6, D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.
**Canadian Ingredient Disclosure List**

## Section 16 - Additional Information

**MSDS Creation Date:** 9/28/1998
**Revision #4 Date:** 5/19/2004

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

# Material Safety Data Sheet
## Ammonium nitrate

ACC# 01290

## Section 1 - Chemical Product and Company Identification

**MSDS Name:** Ammonium nitrate
**Catalog Numbers:** AC205860000, AC205860010, AC205861000, AC205865000, AC423350000, AC423350010, AC423350250, S70708, S70711, S707111, S93123, S93124, A676-212, A676-500, S75244, XXA676100LB
**Synonyms:** Nitric acid, ammonium salt; Norway saltpeter.
**Company Identification:**

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

**For information, call:** 201-796-7100
**Emergency Number:** 201-796-7100
**For CHEMTREC assistance, call:** 800-424-9300
**For International CHEMTREC assistance, call:** 703-527-3887

## Section 2 - Composition, Information on Ingredients

| CAS# | Chemical Name | Percent | EINECS/ELINCS |
|---|---|---|---|
| 6484-52-2 | Ammonium nitrate | > 98 | 229-347-8 |

## Section 3 - Hazards Identification

### EMERGENCY OVERVIEW

Appearance: white to gray to brown solid.
**Danger!** Strong oxidizer. Contact with other material may cause a fire. Causes eye, skin, and respiratory tract irritation. May cause methemoglobinemia. Hygroscopic (absorbs moisture from the air). Ammonium nitrate when contaminated with oil, charcoal, or other organic materials should be considered an explosive capable of detonation by combustion or by explosion of adjacent explosive materials.
**Target Organs:** Blood, respiratory system, eyes, skin.

### Potential Health Effects

**Eye:** Causes eye irritation.
**Skin:** Causes skin irritation.
**Ingestion:** Ingestion of large amounts may cause gastrointestinal irritation. Methemoglobinemia is characterized by dizziness, drowsiness, headache, shortness of breath, cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood), rapid heart rate and chocolate-brown colored blood.
**Inhalation:** Causes respiratory tract irritation. May cause methemoglobinemia, cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood), convulsions, tachycardia, dyspnea (labored breathing), and death. Methemoglobinemia is characterized by dizziness, drowsiness, headache, shortness of breath, cyanosis (bluish discoloration of skin due to deficient oxygenation

of the blood), rapid heart rate and chocolate-brown blood. Inhalation can cause systemic acidosis and methemoglobinemia.
**Chronic:** May cause methemoglobinemia, which is characterized by chocolate-brown colored blood, headache, weakness, dizziness, breath shortness, cyanosis (bluish skin due to deficient oxygenation of blood), rapid heart rate, unconsciousness and possible death. May cause digestive tract disturbances.

## Section 4 - First Aid Measures

**Eyes:** Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
**Skin:** Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
**Ingestion:** If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.
**Inhalation:** Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
**Notes to Physician:** Absorption of this product into the body may cause cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood). Moderate degrees of cyanosis need to be treated only by supportive measures: bed rest and oxygen inhalation. For methemoglobinemia, administer oxygen alone or with Methylene Blue depending on the methemoglobin concentration in the blood. Cleansing of the entire contaminated area of the body is of utmost importance.

## Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Strong oxidizer. Contact with other material may cause fire. May explode under confinement and high temperatures, especially if contaminated.
**Extinguishing Media:** Use water spray to cool fire-exposed containers. Use flooding quantities of water as spray.
**Flash Point:** Not available.
**Autoignition Temperature:** Not applicable.
**Explosion Limits, Lower:**Not available.
**Upper:** Not available.
**NFPA Rating:** (estimated) Health: 2; Flammability: 0; Instability: 2; Special Hazard: OX

## Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.
**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation. Keep combustibles (wood, paper, oil, etc.,) away from spilled material.

## Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Keep away from heat, sparks and flame. Keep from contact with clothing and other combustible materials. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Avoid breathing dust. Inform laundry personnel of contaminant's hazards. Avoid localized heating of ammonium nitrate, potentially leading to development of high temperature areas. Ensure that ammonium nitrate is not exposed to strong shock waves from explosives. Avoid low pH (acidic) conditions.
**Storage:** Do not store near combustible materials. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from acids. Keep away from reducing agents. Avoid storage on wood floors.

## Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

**Exposure Limits**

| Chemical Name | ACGIH | NIOSH | OSHA - Final PELs |
|---|---|---|---|
| Ammonium nitrate | none listed | none listed | none listed |

**OSHA Vacated PELs:** Ammonium nitrate: No OSHA Vacated PELs are listed for this chemical.
**Personal Protective Equipment**
**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
**Skin:** Wear appropriate gloves to prevent skin exposure.
**Clothing:** Wear appropriate protective clothing to prevent skin exposure.
**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

## Section 9 - Physical and Chemical Properties

**Physical State:** solid
**Appearance:** white to gray to brown
**Odor:** odorless
**pH:** 5.4 (0.1 M solution)
**Vapor Pressure:** Negligible.
**Vapor Density:** Not available.
**Evaporation Rate:**Negligible.
**Viscosity:** Not available.
**Boiling Point:** Not available.
**Freezing/Melting Point:**169 deg C
**Decomposition Temperature:**210 deg C
**Solubility:** Soluble.
**Specific Gravity/Density:**1.725 @ 25°C

**Molecular Formula:**NH4NO3
**Molecular Weight:**80.04

## Section 10 - Stability and Reactivity

**Chemical Stability:** Stable at room temperature in closed containers under normal storage and handling conditions. Risk of explosion if heated under confinement. Deliquescent (tending to absorb atmospheric water vapor and become liquid).
**Conditions to Avoid:** Dust generation, contamination, heating in a confined space.
**Incompatibilities with Other Materials:** Strong reducing agents, strong acids, finely powdered metals, organic matter, chlorides, combustible materials.
**Hazardous Decomposition Products:** Oxides of nitrogen.
**Hazardous Polymerization:** Has not been reported.

## Section 11 - Toxicological Information

**RTECS#:**
**CAS#** 6484-52-2: BR9050000
**LD50/LC50:**
CAS# 6484-52-2:
Oral, rat: LD50 = 2217 mg/kg;
.

**Carcinogenicity:**
CAS# 6484-52-2: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:** No data available.
**Teratogenicity:** No data available.
**Reproductive Effects:** No data available.
**Mutagenicity:** No data available.
**Neurotoxicity:** No data available.
**Other Studies:**

## Section 12 - Ecological Information

No information available.

## Section 13 - Disposal Considerations

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

## Section 14 - Transport Information

| | US DOT | Canada TDG |
|---|---|---|
| **Shipping Name:** | AMMONIUM NITRATE | AMMONIUM NITRATE |
| **Hazard Class:** | 5.1 | 5.1 |
| **UN Number:** | UN1942 | UN1942 |
| **Packing Group:** | III | III |

## Section 15 - Regulatory Information

### US FEDERAL

**TSCA**

CAS# 6484-52-2 is listed on the TSCA inventory.

**Health & Safety Reporting List**

None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**

None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**

None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**

None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**

None of the chemicals in this material have an RQ.

**SARA Section 302 Extremely Hazardous Substances**

None of the chemicals in this product have a TPQ.

**SARA Codes**

CAS # 6484-52-2: immediate, fire, reactive.

**Section 313**

This material contains Ammonium nitrate (listed as Water Dissociable Nitrate Compounds), > 98%, (CAS# 6484-52-2) which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

**Clean Air Act:**

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**

None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**

CAS# 6484-52-2 can be found on the following state right to know lists: New Jersey, Pennsylvania, Massachusetts.

**California Prop 65**

California No Significant Risk Level: None of the chemicals in this product are listed.

### European / International Regulations

**European Labeling in Accordance with EC Directives**
**Hazard Symbols:**
XI O
**Risk Phrases:**
R 36/37/38 Irritating to eyes, respiratory system and skin.
R 8 Contact with combustible material may cause fire.
R 9 Explosive when mixed with combustible material.

**Safety Phrases:**
S 17 Keep away from combustible material.
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 37/39 Wear suitable gloves and eye/face protection.

**WGK (Water Danger/Protection)**
CAS# 6484-52-2: 1
**Canada - DSL/NDSL**
CAS# 6484-52-2 is listed on Canada's DSL List.
**Canada - WHMIS**
This product has a WHMIS classification of C, D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.
**Canadian Ingredient Disclosure List**
CAS# 6484-52-2 is not listed on the Canadian Ingredient Disclosure List.

## Section 16 - Additional Information

**MSDS Creation Date:** 12/12/1997
**Revision #6 Date:** 5/16/2006

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

Material Safety Data Sheet

**Orica Canada Inc.**
**Maple Street**
**Brownsburg, PQ**
For MSDS Requests: 450-533-4201

**Orica USA Inc.**
**33101 E. Quincy Avenue**
**Watkins, CO 80137**
For MSDS Requests: 303-268-5000

EMERGENCY CONTACTS
FOR EMERGENCIES INVOLVING CHEMICAL SPILL OR RELEASE:
IN CANADA 1-877-561-3636 OR IN USA CHEMTREC AT 1-800-424-9300.

## SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

**Product Name: AMEX, AMEX HD, ANFO** **MATS Index:** 59531
**MSDS Number:** 20100 **Date Issued:** 06/16/04
**Alternate Name(s):** Ammonium Nitrate Fuel Oil.

**Product Use:** A booster-sensitive blasting agent.

## SECTION 2 - COMPOSITION / INFORMATION ON INGREDIENTS

| HAZARDOUS INGREDIENT(S) | % (w/w) | ACGIH TWA | CAS NO. |
|---|---|---|---|
| Ammonium Nitrate | 90-95 | Not Listed. | 6484-52-2 |
| Diesel Fuel Oil No. 2 | 5-10 | Not Listed. | 68476-34-6 |

## SECTION 3 - HAZARD IDENTIFICATION

**Emergency Overview:** Risk of explosion when burning. Irritating to eyes. May cause methemoglobinemia. May cause central nervous system (CNS) depression. Read the entire MSDS for a more thorough evaluation of the hazards.

## SECTION 4 - FIRST AID MEASURES

**General:** If you feel unwell seek medical advice (show the label where possible).
**Inhalation:** Move victim to fresh air. Give artificial respiration ONLY if breathing has stopped. Give cardiopulmonary resuscitation (CPR) if there is no breathing AND no pulse. Oxygen administration may be beneficial in this situation but should only be administered by personnel trained in its use. Obtain medical attention IMMEDIATELY.
**Skin Contact:** Wash affected areas thoroughly with soap and water. If irritation, redness, or a burning sensation develops and persists, obtain medical advice.
**Eye Contact:** Immediately flush eyes with running water for a minimum of 20 minutes. Hold eyelids open during flushing. If irritation persists, repeat flushing and obtain medical advice.
**Ingestion:** If victim is alert and not convulsing, rinse mouth out and give 200-300 mL (1 cup) of water to dilute material. DO NOT induce vomiting. Never give anything by mouth to an unconscious person. If spontaneous vomiting occurs, have victim lean forward with head positioned to avoid breathing in of vomitus, rinse mouth and administer more water. Obtain medical attention IMMEDIATELY.

**Note to Physicians:** Symptomatic. Administer oxygen if there are signs of cyanosis. If clinical condition deteriorates, consider administering 10 cc Methylene Blue intravenously. It is unlikely for this to be required with methemoglobin level of less than 40%.

## SECTION 5 - FIRE-FIGHTING MEASURES

**Flash Point:** 52oC (125.6oF) (Diesel Fuel Oil No. 2)
**Flammable Limits (Lower):** Not applicable.
**Flammable Limits (Upper):** 4.7% (Diesel Fuel Oil No. 2)
**Auto Ignition Temperature:** 230-265oC (446-509oF)
**Decomposition Temperature:** Ammonium nitrate will spontaneously decompose at approximately 210oC (410oF)
**Rate of Burning:** Does not sustain burning at atmospheric pressure.
**Explosive Power:** 350 - 400 kJ/100 g.
**Sensitivity to Mechanical Impact:** 250 cm (USBM Report 7840). Not sensitive.
**Sensitivity to Static Discharge:** Not sensitive.
**Hazardous Reactions:** See 'Fire and Explosion Hazards'.
**Fire and Explosion Hazards:** Explodes on overheating when contained and, thus, fires involving large quantities of the material should not be fought. This product is an explosive with a mass detonation hazard. This product is classified as a flammable solid and may detonate under fire conditions.
**Extinguishing Media:** Water may be used on small fire. Do not attempt to fight large fires.
**Fire Fighting Procedures:** DO NOT FIGHT FIRES INVOLVING BLASTING AGENTS OR EXPLOSIVE MATERIALS. Immediately evacuate all personnel from the area.
**Fire Fighting Protective Equipment:** Use self-contained breathing apparatus and special protective clothing.
**NOTE:** Also see "Section 10 - Stability and Reactivity".

## SECTION 6 - ACCIDENTAL RELEASE MEASURES

**Spills, Leaks, or Releases:** Collect product for re-use or disposal. For release to land, contain storm water runoff by dyking with earth or other barrier, for release to water, utilize damming, and/or water diversion to minimize the spread of contamination. Collect contaminated soil and water for disposal. Notify applicable government authority if release is reportable or could adversely affect the environment.
**Deactivating Chemicals:** None known.

## SECTION 7 - HANDLING AND STORAGE

**Handling:** This product is an explosive and should only be used under the supervision of trained personnel. Locate safety shower and eyewash station close to chemical handling area. Use normal good industrial hygiene and housekeeping practices.
**Storage Requirements:** Store under moderate temperatures recommended by technical service representative. Store under dry conditions in a well ventilated

magazine that has been approved for either blasting agent storage or explosive storage.
Do NOT store explosives in a detonator magazine or detonators in an explosive magazine. Keep away from heat, sparks and flames. Keep containers closed. Blasting agents should be kept well away from initiating explosives; protected from physical damage; separated from oxidizing materials, combustibles, and sources of heat. Keep away from incompatibles.
**Storage Temperature:** Ideal storage temperature is 10-27oC (50-80.6oF).

## SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

**PREVENTIVE MEASURES:**
Recommendations listed in this section indicate the type of equipment that will provide protection against overexposure to this product. Conditions of use, adequacy of engineering or other control measures, and actual exposures will dictate the need for specific protective devices at your workplace.
**Engineering Controls:** Full handling precautions should be taken at all times. General ventilation is recommended. Provide adequate ventilation where operational procedures demand it.
**PERSONAL PROTECTIVE EQUIPMENT:**
**Eye Protection:** Use chemical safety goggles when there is potential for eye contact.
**Skin Protection:** Gloves and protective clothing made from rubber should be impervious under conditions of use. User should verify impermeability under normal conditions of use prior to general use.
**Respiratory Protection:** A NIOSH/MSHA-approved respirator, if required.
**EXPOSURE GUIDELINES:**
**PRODUCT:**
None established for product.
**HAZARDOUS INGREDIENT(S):**
Ammonium Nitrate:
Internal Guideline 5 mg/m3 (internal TWA)

## SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

**Chemical Name:** Not applicable.
**Chemical Family:** Explosive.
**Molecular Formula:** Not applicable.
**Appearance:** Off-white prills.
**Odour:** Smell of fuel oil.
**pH:** Not available.
**Vapour Pressure (mm Hg at 20°C/68°F):** 0.4 (Diesel Fuel Oil No. 2)
**Vapour Density (Air=1):** Not available.
**Boiling Point:** 176oC (Diesel Fuel Oil No. 2) to 370oC (Diesel Fuel Oil No. 2) (348.8 to 698oF)
**Melting Point:** 170oC (338oF)
**Solubility (Water):** Will dissolve slowly with prolonged exposure to water.
**Solubility (Other):** Not available.

**Specific Gravity:** (Similar to water).
**Evaporation Rate:** Not available.
**Additional Properties:** Bulk density: 0.8 - 0.88 (poured); 0.92 - 1.10 (pneum. loaded).

## SECTION 10 - STABILITY AND REACTIVITY

**Hazardous Decomposition Products:** Thermal decomposition products are toxic and may include hydrocarbons, oxides of carbon and nitrogen. Toxic gases and vapours (oxides of nitrogen) will be released by thermal decomposition (about 210oC). At higher temperatures, decomposition may be explosive, especially if confined.
**Chemical Stability:** Stable at room temperature.
**Conditions to Avoid:** Keep away from heat, impact, and friction. High temperatures, sparks, open flames and all other sources of ignition.
**Incompatibility with other Substances:** Avoid oxidizable materials, metal powder, bronze & other copper alloys, fuels (e.g. lubricants, machine oils), fluorocarbon lubricants, acids, corrosive liquids, chlorates, sulphur, charcoal, coke and other finely divided combustibles. Reducing agents.
**Hazardous Polymerization:** Will not occur.

## SECTION 11 - TOXICOLOGICAL INFORMATION

**Summary:** May cause irritation. May cause central nervous system (CNS) depression. May cause methemoglobinemia.
**TOXICOLOGICAL DATA:**
**PRODUCT:**
None established for product.
**INGREDIENTS:**
Ammonium Nitrate:

Oral LD50 (rat) = 2217 mg/kg
Dermal LD50 (rabbit) = 3000 mg/kg
Diesel Fuel Oil No. 2:
LD50 (oral, rat) = >5 g/kg
LD50 (dermal, rabbit) = >5 g/kg

**POTENTIAL HEALTH EFFECTS:**
**Inhalation:** Inhalation is not a likely route of exposure at normally encountered temperatures and is thus not applicable.
**Skin Contact:** May cause skin irritation. Repeated and/or prolonged contact may cause dermatitis.
**Eye Contact:** Moderate irritant causing moderate initial pain.
**Ingestion:** Highly unlikely under normal industrial use. Ingestion may cause irritation of the gastrointestinal tract.
**Subchronic Effects:** Ingestion may cause methemoglobinemia. initial manifestation of methemoglobinemia is cyanosis, characterized by navy blue lips, tongue and mucous membranes, with skin colour being slate grey. Further manifestation is characterized by headache, weakness, dyspnea, dizziness, stupor, respiratory distress and death due to anoxia. If ingested, nitrates may be

reduced to nitrites by bacteria in the digestive tract. Signs and symptoms of nitrite poisoning include methemoglobinemia, nausea, dizziness, increased heart rate, hypotension, fainting and, possibly, shock. CNS depression is characterized by headache, dizziness, drowsiness, nausea, vomiting and incoordination. Severe overexposures may lead to coma and possible death due to respiratory failure.
**Chronic Effects:** None known.
**Carcinogenicity:** The ingredients of this product are not classified as carcinogenic by ACGIH (American Conference of Governmental Industrial Hygienists) or IARC (International Agency for Research on Cancer), not regulated as carcinogens by OSHA (Occupational Safety and health Administration) and not listed as carcinogens by NTP (National Toxicology Program).
**Mutagenicity:** There is no evidence of mutagenic potential.
**Reproductive Effects:** No information is available and no adverse reproductive effects are anticipated.
**Teratogenicity and Fetotoxicity:** No information is available and no adverse teratogenic/embryotoxic effects are anticipated.
**Synergistic Materials:** None known.

## SECTION 12 - ECOLOGICAL INFORMATION

**Ecotoxicological Information:** Harmful to aquatic life at low concentrations.
**Environmental Effects:** Can be dangerous if allowed to enter drinking water intakes. Do not contaminate domestic or irrigation water supplies, lakes, streams, ponds, or rivers.

## SECTION 13 - DISPOSAL CONSIDERATIONS

Burn under supervision of an expert at an approved explosive burning ground or destroy, by detonation in boreholes, in accordance with applicable local, state or provincial, and federal regulations. Call upon the services of an Orica Technical Representative if needed.

## SECTION 14 - TRANSPORT INFORMATION

**TDG Name:** Explosive, Blasting, Type B
**TDG Class/Division:** 1.5D
**Product Identification Number (PIN):** UN0331
**Packing Group:** II
**Transportation Emergency Telephone Number:** 1-877-561-3636.
**DOT Class:** Explosive, Blasting, Type B

## SECTION 15 - REGULATORY INFORMATION

**CANADIAN CLASSIFICATION:**
This product has been classified in accordance with the hazard criteria of the CPR (Controlled Products Regulations) and this MSDS (Material Safety Data Sheet) contains all the information required by the CPR.
**Controlled Products Regulations (WHMIS) Classification:** This product is an explosive and is not regulated by WHMIS.

**CEPA / Canadian Domestic Substances List (DSL):** The substance(s) in this product is/are on the Canadian Domestic Substances List (CEPA DSL).
**IARC Classification:** None of the components of this product are listed on IARC.
**USA CLASSIFICATION:**
**Physical:** Explosive. Oxidizer.
**Health:** Irritant.
**Target Organ:** Eye. Skin. Respiratory tract. Central nervous system. Blood/hematopoietic system.
**SARA Regulations Sections 313 and 40 CFR 372:** This product contains the following toxic chemical(s) subject to reporting requirements: 94% Ammonium Nitrate (6484-52-2).
**Ozone Protection and 40 CFR 42:** This product does not contain nor is it manufactured with ozone depleting substances.
**Other Regulations/Legislation that apply to this product:** Massachusetts Right-to-Know, Pennsylvania Right-to-Know, New Jersey Right-to-Know.

## SECTION 16 - OTHER INFORMATION

**MATS Index:** 59531
**Label Text:** Danger! Explosive! Strong Oxidizer! May be harmful if ingested. Avoid contact with skin and eyes.
**REFERENCES:**
RTECS-Registry of Toxic Effects of Chemical Substances, CCINFOdisc, Canadian Centre for Occupational Health and Safety RTECS database, National Institute for Occupational Safety and Health, U.S. Dept. of Health and Human Services, Cincinnati, 1998.
Supplier's Material Safety Data Sheets.
"CHEMINFO", through "CCINFOdisc" Canadian Centre for Occupational Health and Safety, Hamilton, Ontario, Canada
Sax, N. Irving, Dangerous Properties of Industrial Materials, 7th ed., Van Nostrand Reinhold Co., New York, 1989.

**Prepared by: Safety, Health and Environment (303) 268-5000.**
The information contained herein is offered only as a guide to the handling of this specific material and has been prepared in good faith by technically knowledgeable personnel. It is not intended to be all-inclusive and the manner and conditions of use and handling may involve other and additional considerations. No warranty of any kind is given or implied and Orica will not be liable for any damages, losses, injuries or consequential damages that may result from the use of or reliance on any information contained herein.

# Material Safety Data Sheet

PETRO-CANADA ARCTIC 0W30 MOTOR OIL

## 1 . Product and company identification

**Common name** : PETRO-CANADA ARCTIC 0W30 MOTOR OIL

**Synonym** : Not available

**Code** : MAXSP03, 410-338

**Material uses** : A high performance synthetic motor oil designed to provide excellent performance in gasoline, propane and CNG engines where the manufacturer recommends an oil of ILSAC GF-4, API SM or API CF quality.

**Manufacturer** : PETRO-CANADA
P.O. Box 2844
150 – 6th Avenue South-West
Calgary, Alberta
T2P 3E3

**In case of emergency** : **Petro-Canada: 403-296-3000**
**Canutec Transportation:**
**613-996-6666**
**Poison Control Centre: Consult local telephone directory for emergency number(s).**

## 2 . Hazards identification

**Physical state** : Viscous liquid.

**Odour** : Mild petroleum oil like.

**OSHA/HCS status** : While this material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200), this MSDS contains valuable information critical to the safe handling and proper use of the product. This MSDS should be retained and available for employees and other users of this product.

**Emergency overview** : No specific hazard.

**Routes of entry** : Dermal contact. Eye contact. Inhalation. Ingestion.

**Potential acute health effects**

**Eyes** : Slightly irritating to the eyes.

**Skin** : Slightly irritating to the skin.

**Inhalation** : No known significant effects or critical hazards.

**Ingestion** : No known significant effects or critical hazards.

**Medical conditions aggravated by over-exposure** : Repeated or prolonged contact with spray or mist may produce chronic eye irritation and severe skin irritation. Repeated skin exposure can produce local skin destruction or dermatitis.

**See toxicological information (section 11)**

## 3 . Composition/information on ingredients

| Name | CAS number | % |
|---|---|---|
| Mixture of severely hydrotreated and hydrocracked base oil (petroleum). | Mixture. | - |

## 4 . First-aid measures

**Eye contact** : In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

**Skin contact** : Wash skin thoroughly with soap and water or use recognised skin cleanser. Get medical attention if irritation occurs. Remove contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse.

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

## 4 . First-aid measures

**Ingestion** : Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If potentially dangerous quantities of this material have been swallowed, call a physician immediately.

**Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

## 5 . Fire-fighting measures

**Flammability of the product** : May be combustible at high temperature.

**Products of combustion** : Carbon oxides (CO, CO2), nitrogen oxides (NOx), sulphur oxides (SOx), phosphorus oxides (POx), zinc oxides (ZnOx), calcium oxides (CaOx), molybdenum oxides (MoOx), boron oxides (BOx), smoke and irritating vapours as products of incomplete combustion.

**Extinguishing media**

**Suitable** : Use an extinguishing agent suitable for the surrounding fire.

**Not suitable** : None known.

**Special exposure hazards** : In a fire or if heated, a pressure increase will occur and the container may burst.

Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

**Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

**Special remarks on fire hazards** : Low fire hazard. This material must be heated before ignition will occur.

**Special remarks on explosion hazards** : Do not pressurise, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.

## 6 . Accidental release measures

**Personal precautions** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Avoid breathing vapour or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).

**Environmental precautions** : Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

**Methods for cleaning up** : Large spill : Stop leak if without risk. Move containers from spill area. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilt product. Note: see section 1 for emergency contact information and section 13 for waste disposal.

## 7 . Handling and storage

**Handling** : Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk. Evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/vapour/spray. Wear suitable protective clothing. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles.

**Storage** : Keep container tightly closed. Store away from incompatible materials (see section 10). Keep container in a cool, well-ventilated area.

# 8 . Exposure controls/personal protection

| Product name | Exposure limits |
|---|---|
| Mixture of severely hydrotreated and hydrocracked base oil (petroleum). | **ACGIH TLV (United States). Notes: (oil mist)**<br>TWA: 5 mg/m³ 8 hour(s).<br>STEL: 10 mg/m³ 15 minute(s). |

**Consult local authorities for acceptable exposure limits.**

**Engineering measures** : No special ventilation requirements. Good general ventilation should be sufficient to control worker exposure to airborne contaminants. If this product contains ingredients with exposure limits, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure below any recommended or statutory limits.

**Personal protection**

**Eyes** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts.

**Skin** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

**Respiratory** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
Recommended: organic vapour filter

**Hands** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
Recommended: neoprene, nitrile, polyvinyl alcohol (PVA), Viton.

**Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

# 9 . Physical and chemical properties

**Physical state** : Viscous liquid.
**Flash point** : Open cup: 233°C (451.4°F) [Cleveland.]
**Auto-ignition temperature** : Not available.
**Flammable limits** : Not available.
**Colour** : Amber.
**Odour** : Mild petroleum oil like.
**pH** : Not available.
**Boiling/condensation point** : Not available.
**Pour Point** : -45ºC (-49ºF)
**Melting/freezing point** : Not available.
**Relative density** : 0.8435 kg/L @ 15ºC (59ºF)
**Vapour pressure** : Not available.
**Vapour density** : Not available.
**Volatility** : Not available.
**Odour threshold** : Not available.
**Evaporation rate** : Not available.
**Viscosity** : 58.5 cSt @ 40ºC (104ºF), 10.6 cSt @ 100ºC (212ºF), VI=172
**Solubility** : Insoluble in water.
**$LogK_{ow}$** : Not available.
**Softening Point** : Not available.

## 9 . Physical and chemical properties

**Dropping Point** : Not available.

**Penetration** : Not available.

**Physical/chemical properties comments** : Not available.

## 10 . Stability and reactivity

**Stability and reactivity** : The product is stable.

**Conditions of instability** : Not available.

**Incompatibility with various substances** : Reactive with acids and oxidising agents .

**Hazardous decomposition products** : May release COx, H2S, methacrylate monomers, alkyl mercaptans, smoke and irritating vapours when heated to decomposition.

**Hazardous polymerisation** : Will not occur.

## 11 . Toxicological information

**Toxicity data**

| Product/ingredient name | Test | Result | Route | Species |
|---|---|---|---|---|
| Mixture of severely hydrotreated and hydrocracked base oil (petroleum). | LD50<br>LD50<br>LC50 | >5000 mg/kg<br>>2000 mg/kg<br>>2500 mg/m³ (4 hours) | Oral<br>Dermal<br>Inhalation | Rat<br>Rabbit<br>Rat |

**Specific effects**

**Carcinogenic effects** : Not listed as carcinogenic by OSHA, NTP or IARC.

**Mutagenic effects** : No known significant effects or critical hazards.

**Teratogenicity / Reproductive toxicity** : No known significant effects or critical hazards.

**Sensitisation**

**Ingestion** : No known significant effects or critical hazards.

**Inhalation** : No known significant effects or critical hazards.

**Eyes** : Slightly irritating to the eyes.

**Skin** : Slightly irritating to the skin.

**Synergistic products** : Not available.

## 12 . Ecological information

**Ecotoxicity data**

| Product/ingredient name | Species | Period | Result |
|---|---|---|---|

**Environmental precautions** : No known significant effects or critical hazards.

**Bioconcentration factor** Not available.

**BOD and COD** Not available.

**Biodegradable/OECD** Not available.

**Mobility** Not available.

**Special remarks on the products of biodegradation** Not available.

## 13 . Disposal considerations

**Disposal 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 information presented below only applies to the material as supplied. The identification based on characteristic(s) or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations.**

**Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.**

**Waste disposal** : The generation of waste should be avoided or minimised wherever possible. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

## 14 . Transport information

| Regulatory information | UN number | Proper shipping name | Class | PG* | Label | Additional information |
|---|---|---|---|---|---|---|
| TDG Classification | Not regulated. | - | - | - | | - |
| DOT Classification | Not available. | Not available. | Not available. | - | | - |

PG* : Packing group

## 15 . Regulatory information

**United States**

**HCS Classification** : Not regulated.

**Canada**

**WHMIS (Canada)** : Not controlled under WHMIS (Canada).

**This product has been classified according to the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.**

**EU regulations**

**Risk phrases** : This product is not classified according to EU legislation.

**International regulations**

**International lists**

**Canada inventory status** : Not determined.

**EC INVENTORY (EINECS/ELINCS)** : Listed

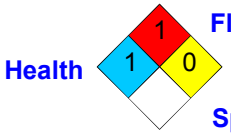
**TSCA 8(b) inventory** : Listed

## 16 . Other information

**Hazardous Material Information System (U.S.A.)** :

| | |
|---|---|
| Health | 1 |
| Fire hazard | 1 |
| Reactivity | 0 |
| Personal protection | B |

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



# 16 . Other information

**References** : Available upon request.
* Marque de commerce de Petro-Canada - Trademark

**Date of printing** : **2/13/2007.**

**Date of issue** : **2/13/2007.**

**Date of previous issue** : **No previous validation.**

**Responsible name** : **Product Safety - RS**

**Version** : **1**

**For Copy of (M)SDS** : The Canadian Controlled Products Regulations (CPR) (Under the Hazardous Products Act, part of the WHMIS legislation) only apply to WHMIS Controlled (i.e., hazardous) products. Therefore, the CPR and the 3-year update rule specified therein do not apply to WHMIS Non-Controlled products. Although this is true, customarily Petro-Canada reviews and updates Non-Controlled product MSDS if a customer requests such an update. These Non-Controlled product updates are given a lower priority than Controlled products but are handled as soon as practicable. If you would like to verify if the MSDS you have is the most current, or you require any further information, please contact:

Internet: www.petro-canada.ca/msds

Lubricants:
Western Canada, telephone: 1-800-661-1199; fax: (780) 464-9564
Ontario & Central Canada, telephone: 1-800-268-5850 and (905) 822-4222; fax: 1-800-201-6285
Quebec & Eastern Canada, telephone: 1-800-576-1686; fax: 1-800-201-6285

For Product Safety Information: (905) 804-4752

## Notice to reader

**To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.**
**Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.**

Material Safety Data Sheet

**Orica Canada Inc.**
**Maple Street**
**Brownsburg, PQ**
For MSDS Requests: 450-533-4201

**Orica USA Inc.**
**33101 E. Quincy Avenue**
**Watkins, CO 80137**
For MSDS Requests: 303-268-5000

EMERGENCY CONTACTS

FOR CHEMICAL EMERGENCIES(24 HOUR) INVOLVING TRANSPORTATION, SPILL, LEAK, RELEASE, FIRE OR ACCIDENTS: IN CANADA CALL THE ORICA CANADA TRANSPORTATION EMERGENCY RESPONSE SYSTEM AT 1-877-561-3636; IN THE U.S. CALL CHEMTREC (800) 424-9300. IN THE U.S. FOR LOST, STOLEN OR MISPLACED EXPLOSIVES CALL: BATF (800) 424-9555.

## SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

**Product Name:** **Pentex Boosters**
**MSDS Number:** 60000 **Date Issued:** 11-07-05
**Manufactured By**: Orica Brazil Inc.
**Product Use:** Booster used in blasting systems

## SECTION 2 - COMPOSITION / INFORMATION ON INGREDIENTS

| HAZARDOUS INGREDIENT(S) | % (w/w) | ACGIH TWA | CAS NO. |
|---|---|---|---|
| Trinitrotoluene (TNT) | 30-50 | 0.1 mg/$M^3$(skin) | 118-96-7 |
| Pentaerythritol Tetranitrate (PETN) | 50-70 | Not Listed | 78-11-5 |

Ingredients that are not listed above, that are used in the product are not hazardous as defined under current legislation.

## SECTION 3 - HAZARD IDENTIFICATION

**Emergency Overview:** Risk of explosion by shock, friction, fire or other sources of ignition. Very toxic if swallowed. Irritating to eyes, respiratory system and skin. May cause methemoglobinemia. May cause sensitization by skin contact. Read the entire MSDS for a more thorough evaluation of the hazards.

## SECTION 4 - FIRST AID MEASURES

**Inhalation:** If detonation fumes are inhaled, remove to fresh air. If not breathing, give artificial respiration, preferably mouth to mouth. If breathing is difficult, give oxygen and contact a physician. Note: Oxygen should only be administered by a person trained in its use.
**Skin Contact:** Wash skin with soap and water
**Eye Contact:** Flush eyes with clean water for 15 minutes, then seek medical attention
**Ingestion:** If victim is alert and not convulsing, rinse mouth out and give 200-300 mL (1 cup) of water to dilute material. DO NOT induce vomiting. If spontaneous vomiting occurs, have victim lean forward with head positioned to avoid breathing in of vomitus, rinse mouth and administer more water. Obtain medical attention IMMEDIATELY.
**Note to Physicians:** Symptomatic. Administer oxygen if there are signs of cyanosis. If clinical condition deteriorates, administer 10 cc Methylene Blue intravenously. It is unlikely for this to be required with methemoglobin level of less than 40%. Symptomatic. Do not give vasopressor drugs (e.g. epinephrine, adrenalin, ephedrine, etc.) as there may be danger of producing cardiac arrhythmia. Medical conditions that may be aggravated by exposure to this product include hypotension and skin disorders.

## SECTION 5 - FIRE-FIGHTING MEASURES

**Flash Point:** This product does not flash.
**Flammable Limits (Lower):** Not Applicable
**Flammable Limits (Upper):** Not applicable
**Auto Ignition Temperature:** Not available
**Decomposition Temperature:** Not available
**Rate of Burning:** Not available
**Explosive Power:** Not available
**Sensitivity to Mechanical Impact:** Not available

**Sensitivity to Static Discharge:** Not available
**Hazardous Reactions:** Will detonate if suitably primed by heat, flame or **significant** impact. Hazardous gases produced in fire are Nitrogen Oxides and Carbon monoxide.
**Fire and Explosion Hazards:**
**Extinguishing Media:** None
**Fire Fighting Procedures:** DO NOT FIGHT FIRES INVOLVING EXPLOSIVE MATERIALS. Immediately evacuate all personnel from the area to a safe distance. Guard against re-entry. Note: Division 1.1 explosives: Evacuate to 5000 feet (1 Mile). Consult the *North American Emergency Response Guide* number 112 for more details
**Fire Fighting Protective Equipment:** Not applicable.

## SECTION 6 - ACCIDENTAL RELEASE MEASURES

**Spills, Leaks, or Releases:** Review fire and explosion hazards before proceeding with clean up. Remove and protect ignition sources. Wear protective equipment during clean up. Mop up with water using non sparking tools. It is suggested that only personnel trained in emergency response should respond. Verify complete account of the product (s). Notify authorities and follow applicable spill reporting requirements.
**Deactivating Chemicals:** Not Applicable.

## SECTION 7 - HANDLING AND STORAGE

**Storage Requirements:** Store in compliance with applicable regulatory requirements. Keep away from ignition sources, strong shock, flames and heat. Store in a cool, dry location designed for explosives storage.
**Storage Temperature:** Store in accordance with the requirements of local legislation respecting explosive storage.

## SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

**PREVENTIVE MEASURES:**

**Engineering Controls:** General ventilation should be appropriate under conditions of use.
**PERSONAL PROTECTIVE EQUIPMENT:**
**Eye Protection:** Chemical/Safety goggles are recommended.
**Skin Protection:** Cotton or leather gloves, clothing to protect exposed skin such as flameproof coveralls and conductive boots.
**Respiratory Protection:** Wear NIOSH approved respirator if concentrations are above acceptable limits.
**EXPOSURE GUIDELINES:**
**PRODUCT:** None established for product

**HAZARDOUS INGREDIENT(S):**

| | |
|---|---|
| Trinitrotoluene (TNT) | ACGIH TLV – 0.1 mg/$M^3$ (skin) |

## SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

**Alternate Name(s):** Pentex CD 3 * 90, Pentex CD 5.5 * 150, Pentex CD 8 * 227, Pentex CD 12 * 340, Pentex CD 16 * 454, Pentex SB 8, Pentex SB 20, Pentex SB 60, Pentex SL 8 * 227, Pentex SL 12 * 340, Pentex SL 16 * 454
**Chemical Name:** Not applicable
**Chemical Family:** Booster explosives
**Molecular Formula:** Not applicable
**Appearance:** Tan to brown solid
**Odour:** No noticeable odour
**pH:** Not applicable
**Vapour Pressure (mm Hg at 20°C/68°F):** Not applicable
**Vapour Density (Air=1):** Not applicable
**Boiling Point:** Not applicable
**Melting Point:** 176$^{o}$F
**Solubility (Water):** Insoluble
**Solubility (Other):** Not available
**Specific Gravity:** 1.5 - 1.65
**Evaporation Rate:** Not applicable
**Additional Properties:** None

## SECTION 10 - STABILITY AND REACTIVITY

**Hazardous Decomposition Products:** Oxides of Nitrogen and Carbon.
**Chemical Stability:** Stable under normal conditions.
**Conditions to Avoid:** Ignition sources, strong shock, heat and flame.
**Incompatibility with other Substances:** Not compatible with strong acids such as nitric acid.
**Hazardous Polymerization:** Will not polymerize.

## SECTION 11 - TOXICOLOGICAL INFORMATION

**Summary:** Detonation may cause severe injury and death. All explosives are dangerous and must be handled carefully using approved safety procedures under the direction of competent, experienced personnel. Inhalation of explosive powders may cause nervous system irregularities including headache and dizziness. Nitrogen and Carbon Oxides generated during detonation are skin, eye and respiratory irritants.
**TOXICOLOGICAL DATA:**
**PRODUCT:** None established for product

**INGREDIENTS:**

| | |
|---|---|
| **Trinitrotoluene (TNT)** | Oral LD50 (mouse) 25500 mg/kg |
| **Pentaerythritol Tetranitrate (PETN)** | Oral LD50 (rat) 795 mg/kg |

**POTENTIAL HEALTH EFFECTS:**
**Inhalation:** High concentrations of the material may be irritating to the respiratory tract. May cause dizziness and nausea.
**Skin Contact:** May cause skin irritation. Repeated or prolonged contact may cause dermatitis. Can be absorbed through the skin. Evidence has indicated that an ingredient in this product may cause skin sensitization.
**Eye Contact:** Moderate irritant causing moderate initial pain.
**Ingestion:** Harmful if swallowed. May cause headache, weakness, anemia or liver injury.
**Subchronic Effects:** None known
**Chronic Effects:** None known
**Carcinogenicity:** Ingredients of this product are not listed as carcinogens by the National Toxicology Program (NTP), International Agency for Research for Cancer (IARC) or the Occupational Safety and Health Administration (OSHA)
**Reproductive Effects:** The ingredients of this product are not reproductive toxicants.
**Teratogenicity and Fetotoxicity:** None known
**Synergistic Materials:** None known.

## SECTION 12 - ECOLOGICAL INFORMATION

**Ecotoxicological Information:** Harmful to aquatic life at low concentrations. (1.5 mg/L of TNT is toxic to fish)
**Environmental Effects:** Can be dangerous if allowed to enter drinking water intakes. Do not contaminate domestic or irrigation water supplies, lakes, streams, ponds or rivers.

## SECTION 13 - DISPOSAL CONSIDERATIONS

Burn under the supervision of an expert at an approved explosive burning ground or destroy by detonation in boreholes. Call upon the services of an Orica Canada Inc./Orica USA Inc. technical representative for assistance.

## SECTION 14 - TRANSPORT INFORMATION

**TDG Name:** Boosters
**TDG Class/Division:** 1.1D
**Product Indentification Number (PIN):** UN0042
**Packing Group:** II
**Transportation Emergency Telephone Number:** IN CANADA CALL 1-877-561-3636. IN THE US CALL CHEMTREC (800) 424-9300.
**Proper Shipping Name:** Boosters, without detonators
**DOT Label :** EXPLOSIVE 1.1D
**DOT Placard:** EXPLOSIVES 1.1

## SECTION 15 - REGULATORY INFORMATION

**CANADIAN CLASSIFICATION:**

**Controlled Products Regulations (WHMIS) Classification:** This product is an explosive and is not regulated by WHMIS.
**CEPA / Canadian Domestic Substances List (DSL):** All ingredients in this product are on the Canadian Domestic Substances List
**IARC Classification:** Not listed
**USA CLASSIFICATION:**
**OSHA Classification:**
**Physical:** Explosive
**Health:** Skin Sensitizer, Irritant.

**Target Organ:** Eye, skin, liver, urinary tract, gastrointestinal tract, cardiovascular system, immune system
**SARA Regulations Sections 313 and 40 CFR 372:** This product does not contain substances subject to reporting requirements.
**Ozone Protection and 40 CFR 42:** This product does not contain, nor is it manufactured with ozone depleting substances.
**Other Regulations/Legislation which apply to this product:** Massachusetts Right to Know, Pennsylvania Right to Know, New Jersey Right to Know.

## SECTION 16 - OTHER INFORMATION

**Prepared by: Orica Inc. Technical Personnel.**

**The information contained herein is offered only as a guide to the handling of this specific material and has been prepared in good faith by technically knowledgeable personnel. It is not intended to be all-inclusive and the manner and conditions of use and handling may involve other and additional considerations. No warranty of any kind is given or implied and Orica Canada Inc./Orica USA Inc. will not be liable for any damages, losses, injuries or consequential damages which may result from the use of or reliance on any information contained herein.**

U.S BORAX & CHEMICAL CORP -- BORAX ANHYDROUS -- 6810-00F006161

## Product Identification

Product ID:BORAX ANHYDROUS
MSDS Date:01/01/1987
FSC:6810
NIIN:00F006161
MSDS Number: BBVBH
=== Responsible Party ===
Company Name:U.S BORAX & CHEMICAL CORP/LOS ANGELES, CA 90010
Emergency Phone Num:(213) 381-5311
CAGE:FO177
=== Contractor Identification ===
Company Name:U S BORAX AND CHEMICAL CORP
Address:3075 WILSHIRE BLVD
Box:2781 T
City:LOS ANGELES
State:CA
ZIP:90010-1207
Country:US
CAGE:24611
Company Name:U.S BORAX & CHEMICAL CORP/LOS ANGELES, CA 90010
CAGE:FO177

## Composition/Information on Ingredients

Ingred Name:SODIUM TETRABORATE, DECAHYDRATE
CAS:1303-96-4
RTECS #:VZ2275000
Fraction by Wt: 100%
OSHA PEL:10 MG/M3
ACGIH TLV:5 MG/M3; 9192

## Hazards Identification

Effects of Overexposure:MODERATE SKIN & EYE IRRITANT

## First Aid Measures

First Aid:SKIN/EYES: WASH WITH WATER.

## Fire Fighting Measures

Extinguishing Media:NONE: MATERIAL HAS FIRE RETARDANT PROPERTIES.
Fire Fighting Procedures:NONE
Unusual Fire/Explosion Hazard:NONE

## Accidental Release Measures

Spill Release Procedures:STANDARD DISPOSAL PROCEDURES - PRESENTS NO HEALTH HAZARD.

## Handling and Storage

Handling and Storage Precautions:NONE NEEDED
Other Precautions:NONE NEEDED

## Exposure Controls/Personal Protection

Respiratory Protection:NO SPECIAL PROTECTION REQUIRED.
Ventilation:LOCAL EXHAUST: NORMAL
Protective Gloves:NOT NEEDED
Eye Protection:AVOID EYE CONTACT
Other Protective Equipment:NONE
Supplemental Safety and Health
MSDS UNDATED. THEORETICAL B2O3 VALUE IN ANHYDROUS BORAX: 69.2% B2O3.

========== Physical/Chemical Properties ==========

Spec Gravity:2.4
Solubility in Water:MODERATE
Appearance and Odor:WHITE, SOLID ODORLESS
Percent Volatiles by Volume:NONE

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
NONE
Stability Condition to Avoid:KEEP DRY: SLOWLY ABSORBS ATMOSPHERIC OR FREE WATER. _
Hazardous Decomposition Products:NONE
Conditions to Avoid Polymerization:KEEP DRY.

========== Disposal Considerations ==========

Waste Disposal Methods:STANDARD DISPOSAL PROCEDURES - PRESENTS NO HEALTH HAZARD.

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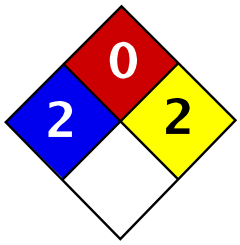



| | |
|---|---|
| Health | 2 |
| Fire | 0 |
| Reactivity | 1 |
| Personal Protection | C |

# Material Safety Data Sheet
## Calcium chloride, Anhydrous MSDS

### Section 1: Chemical Product and Company Identification

**Product Name:** Calcium chloride, Anhydrous

**Catalog Codes:** SLC5011, SLC2221, SLC4012, SLC4798, SLC1006

**CAS#:** 10043-52-4

**RTECS:** EV9800000

**TSCA:** TSCA 8(b) inventory: Calcium chloride, Anhydrous

**CI#:** Not available.

**Synonym:**

**Chemical Name:** Calcium Chloride, Anhydrous

**Chemical Formula:** CaCl2

**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 |
|---|---|---|
| Calcium chloride, Anhydrous | 10043-52-4 | 100 |

**Toxicological Data on Ingredients:** Calcium chloride, Anhydrous: ORAL (LD50): Acute: 1000 mg/kg [Rat]. 1940 mg/kg [Mouse].

### Section 3: Hazards Identification

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

**Potential Chronic Health Effects:**
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance may be toxic to heart, cardiovascular system.
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.

**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:** Not available.

**Special Remarks on Explosion Hazards:** Furan-2-peroxycarboxylic acid + calcium chloride causes explosion at room temperature.

## 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.

## Section 7: Handling and Storage

**Precautions:**
Keep locked up.. Do not ingest. Do not breathe dust. 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. Avoid contact with skin and eyes. Keep away from incompatibles such as moisture.

**Storage:**
Hygroscopic.
Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 30°C (86°F).

## 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. Synthetic apron. Gloves (impervious).

**Personal Protection in Case of a Large Spill:**
Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:** Not available.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Solid. (Crystalline solid.)

**Odor:** Odorless.

**Taste:** Saline.

**Molecular Weight:** 110.99 g/mole

**Color:** Colorless. White. Off-white.

**pH (1% soln/water):** 9 [Basic.]

**Boiling Point:** 1670°C (3038°F)

**Melting Point:** 772°C (1421.6°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 2.15 (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, acetone.

**Solubility:**
Easily soluble in cold water, hot water, acetone.
Freely soluble in alcohol.
Soluble in Acetic Acid.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Incompatible materials, moisture.

**Incompatibility with various substances:** Reactive with moisture.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:**
Hygroscopic.
Reacts violently (violent boiling) with water, generating heat.
Forms flammable gases and evolves hydrogen when reacted with zinc.
Solutions attack some metals.
Generates heat and violent polymerization occurs when mixed with methyl vinyl ether.
Bromine trifluoride reacts violently with and attacks calcium chloride.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Absorbed through skin. Inhalation. Ingestion.

**Toxicity to Animals:** Acute oral toxicity (LD50): 1000 mg/kg [Rat].

**Chronic Effects on Humans:**
MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast.
May cause damage to the following organs: heart, cardiovascular system.

**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:**
Lowest Published Lethal Dose:
LDL [Rabbit] - Route: Oral; Dose: 1384 mg/kg

**Special Remarks on Chronic Effects on Humans:**
May affect genetic material based on animal data.
May cause cancer (tumorigenic) based on animal data.

**Special Remarks on other Toxic Effects on Humans:**
Acute Potential Health Effects:
Skin: May cause severe irritation and possible burns, especially if skin is wet. Contact with dry skin causes mild irritation. Contact of solid with moist/wet skin or skin contact with strong solutions may cause marked irritation or possible burns.
Eyes: May cause severe irritation, possible transient corneal injury, and possible eye burns.
Inhalation: May cause severe irritation of the upper respiratory tract with pain, inflammation and possible burns.
Ingestion: May cause severe gastrointestinal (digestive) tract irritation with nausea, vomiting and possible burns. May affect cardiovascular system (cardiac disturbances, slow heart beat), behavior (seizures), metabolism, blood, and brain, respiration (rapid respiration).
Chronic Potential Health Effects: effects may be delayed.

## Section 12: Ecological Information

**Ecotoxicity:** Ecotoxicity in water (LC50): 100 mg/l 96 hours [Fish].

**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:** TSCA 8(b) inventory: Calcium chloride, Anhydrous

**Other Regulations:** EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

**Other Classifications:**

**WHMIS (Canada):** CLASS D-2B: Material causing other toxic effects (TOXIC).

**DSCL (EEC):**
R36- Irritating to eyes.
S2- Keep out of the reach of children.
S22- Do not breathe dust.
S24- Avoid contact with skin.

**HMIS (U.S.A.):**

**Health Hazard:** 2

**Fire Hazard:** 0

**Reactivity:** 1

**Personal Protection:** C

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

**Health:** 2

**Flammability:** 0

**Reactivity:** 2

**Specific hazard:**

**Protective Equipment:**
Gloves (impervious).
Synthetic apron.
Wear appropriate respirator when ventilation is inadequate.
Safety glasses.

## Section 16: Other Information

**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/09/2005 04:31 PM

**Last Updated:** 10/09/2005 04:31 PM

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

# MATERIAL SAFETY DATA SHEET

# Calcium Hydroxide

## Section 01 - Chemical And Product And Company Information

**Product Identifier** ..... Calcium Hydroxide

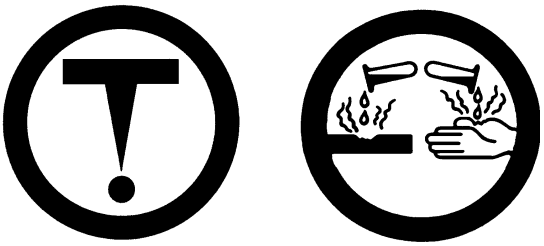
**Product Use** ..... Neutralization, flocculation, stabilization, absorption

**Supplier Name**..... ClearTech Industries Inc.
2302 Hanselman Avenue
Saskatoon, SK. Canada
S7L 5Z3

**Prepared By**..... ClearTech Industries Inc. Technical Department
Phone: (306)664-2522

**Preparation Date**..... February 13, 2006

**24-Hour Emergency Phone**..... 306-664-2522



## Section 02 - Composition / Information on Ingredients

| | | |
|---|---|---|
| **Hazardous Ingredients**..... | Calcium Hydroxide | >92% |
| **CAS Number**..... | Calcium Hydroxide | 1305-62-0 |
| **Synonym (s)**..... | High calcium hydrated lime, lime, slaked lime, lime putty, lime slurry, milk of lime, calcium hydroxide | |

## Section 03 - Hazard Identification

**Inhalation**..... Low concentrations may cause sore throat, coughing, choking, dyspnea, and variable symptoms of headache, dizziness, and weakness. Intense exposures may result in tightness in the chest and delayed pulmonary edema. The solubility of substance allows penetration that may continue for several days.

**Skin Contact / Absorption**..... Can penetrate the skin slowly, producing soft, necrotic, deeply penetrating areas on contact. The extent of damage depends on the duration of contact. Removes natural skin oils.

**Eye Contact**..... Severe eye irritation, intense watering of the eyes, possible lesions, possible blindness when exposed for prolonged period.

**Ingestion**..... Causes gastrointestinal tract burns. May cause circulatory system failure. May cause perforation of the digestive tract. Causes severe pain, nausea, vomiting, diarrhea, and shock. Effects may be delayed.

**Exposure Limits**..... ACGIH/TLV-TWA = 5mg/$m^3$
NIOSH/TLV-TWA = 5mg/$m^3$
OSHA/PEL-TWA= 15 mg/$m^3$(total dust); 5mg/$m^3$(respirable fraction)

## Section 04 - First Aid Measures

**Inhalation**..... Remove victim to fresh air. Give artificial respiration only if breathing has stopped. If breathing is difficult, give oxygen. Seek immediate medical attention.

**Skin Contact / Absorption**..... Remove contaminated clothing. Wash affected area with soap and water. Seek medical attention if irritation occurs or persists.

**Eye Contact**..... Flush immediately with water for at least 20 minutes. Forcibly hold eyelids apart to ensure complete irrigation of eye tissue. Seek immediate medical attention

**Ingestion**..... If victim is conscious, give 300mL of water, followed by diluted vinegar (1 part vinegar, 2 parts water) or fruit juice to neutralize the alkali. Do not induce vomiting. Contact a physician immediately.

**Additional Information**..... Consult a physician for all exposures except minor instances of inhalation.

## Section 05 - Fire Fighting

**Conditions of Flammability**..... Product does not burn.

**Means of Extinction**..... Calcium hydroxide does not burn. Use extinguishing media appropriate to surrounding fire conditions.

**Flash Point**..... Not applicable

**Auto-ignition Temperature**..... Not applicable

**Upper Flammable Limit** ..... Not applicable

**Lower Flammable Limit**..... Not applicable

**Hazardous Combustible Products**... None

**Special Fire Fighting Procedures**..... Wear NIOSH-approved self-contained breathing apparatus and protective clothing.

**Explosion Hazards**..... Not applicable

## Section 06 - Accidental Release Measures

**Leak / Spill**..... Wear appropriate personal protective equipment. Ventilate area. Only enter area with PPE. Stop or reduce leak if safe to do so. Prevent material from entering sewers.

**Deactivating Materials**..... Vinegar or hydrochloric acid.

## Section 07 - Handling and Storage

**Handling Procedures**..... Use proper equipment for lifting and transporting all containers. Use sensible industrial hygiene and housekeeping practices. Wash thoroughly after handling. Avoid all situations that could lead to harmful exposure.

**Storage Requirements**..... Store in a cool, DRY, well-ventilated place. Keep container tightly closed, and away from incompatible materials.

## Section 08 - Personal Protection and Exposure Controls

### Protective Equipment

**Eyes**..... Chemical goggles, full-face shield, or a full-face respirator is to be worn at all times when product is handled. Contact lenses should not be worn; they may contribute to severe eye injury.

**Respiratory**……..... Respiratory protection is not normally required. If use creates dust formations, then a NIOSH-approved respirator with a dust cartridge is recommended.

**Gloves**……..... Impervious gloves of chemically resistant material (rubber or PVC) should be worn at all times. Wash contaminated clothing with soap and water, dry thoroughly before reuse.

**Clothing**……..……..... Body suits, aprons, and/or coveralls of chemical resistant material should be worn at all times. Wash contaminated clothing with soap and water, dry thoroughly before reuse.

**Footwear**……..... Impervious boots of chemically resistant material should be worn at all times

### Engineering Controls

**Ventilation Requirements**……..... Mechanical ventilation (dilution or local exhaust), process or personnel enclosure, and control of process conditions. Supply sufficient replacement air to make up for air removed by exhaust systems.

**Other**……..... Emergency shower and eyewash should be in close proximity.

## Section 09 - Physical and Chemical Properties

**Physical State**.....……...……..... Solid

**Odor and Appearance**…..……..... Odourless greyish white powder

**Odor Threshold**.....……..... Not applicable

**Specific Gravity (Water=1)**…….. 2.3-2.4

**Vapor Pressure (mm Hg, 20C)**…….. Not available

**Vapor Density (Air=1)**..……..... Not available

**Evaporation Rate**.....……..…….. Not available

**Boiling Point**.....……..... Not available

**Freeze/Melting Point**.....……..... Not available

**pH.**.....…….. 12.4 (saturated solution at 25°C)

**Water/Oil Distribution Coefficient**.... Not available

**Bulk Density**..... 320-690 kg/$m^3$

**% Volatiles by Volume**..... Not available

**Solubility in Water**..... 0.165g/100g(saturated solution)

**Molecular Formula**..... $Ca(OH)_2$

**Molecular Weight**..... 74.09 (anhydrous)

## Section 10 - Stability and Reactivity

**Stability**..... Stable under normal conditions.

**Incompatibility**..... Boron tri-fluoride, chlorine tri-fluoride, ethanol, fluorine, hydrogen fluoride, phosphorus pentoxide; and acids

**Hazardous Products of Decomposition**.. Thermal decomposition at 540°C will produce calcium oxide and water. Reacts violently with strong acids. Reacts chemically with acids and many other compounds and chemical elements to form calcium based compounds. Explosive when mixed with nitro organic compounds.

**Polymerization**..... Will not occur

## Section 11 - Toxicological Information

**Irritancy**..... Severe to moist skin tissue and eyes. Irritant slso to respiratory system, nasal passages and exposed cuts.

**Sensitization**..... Not available

**Chronic/Acute Effects**..... Contact dermatitis

**Synergistic Materials**..... Not available

**Animal Toxicity Data**..... $LD_{50}$ (Oral, Mouse)= 7300mg/kg
$LD_{50}$ (Oral, Rat)= 7340mg/kg

**Carcinogenicity**..... Calcium Hydroxide is not listed on the MSHA, OSHA or IARC lists of carcinogens. However, hydrated lime could contain crystalline silica, which inhaled in the form of quartz or crystobalite from occupational sources, is classified by IARC as (Group 1) carcinogenic to humans.

**Reproductive Toxicity**..……..…….. Not available

**Teratogenicity**.....…...……... Not available

**Mutagenicity**.....…….....……. Not available

## Section 12 - Ecological Information

**Fish Toxicity**.....……... Not available

**Biodegradability**.....…….…... Not available

**Environmental Effects**……. Not available

## Section 13 - Disposal Consideration

**Waste Disposal**.....…...……...Dispose in accordance with all federal, provincial, and/or local regulations including the Canadian Environmental Protection Act.

## Section 14 - Transportation Information

**TDG Classification**

**Class**……..……..…... Not regulated

**Group**.....…….....……... Not regulated

**PIN Number**.....…….……..... Not regulated

**Other**……..... Secure containers (full and/or empty) with suitable hold down devises during shipment.

## Section 15 - Regulatory Information

**WHMIS Classification**.....……...D2A, E

**NOTE: THE PRODUCT LISTED ON THIS MSDS HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE CANADIAN CONTROLLED PRODUCTS REGULATIONS. THIS MSDS CONTAINS ALL INFORMATION REQUIRED BY THOSE REGULATIONS.**

**NSF Certification**.....Product is certified under ANSI/NSF Standard 60 for drinking water pH adustment at a maximum dosage of 650mg/L.

## Section 16 - Other Information

**Note: The responsibility to provide a safe workplace remains with the user. The user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment. The information contained herein is, to the best of our knowledge and belief, accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material. It is the responsibility of the user to comply with all applicable laws and regulations.**

## ClearTech Industries Inc. - Locations

**Corporate Head Office: 2302 Hanselman Avenue, Saskatoon, SK, S7L 5Z3**
**Phone: 306-664-2522**
**Fax: 306-665-6216**

**www.ClearTech.ca**

| Location | Address | Postal Code | Phone Number | Fax Number |
|---|---|---|---|---|
| Richmond, B.C. | 12431 Horseshoe Way | V7A 4X6 | 604-272-4000 | 604-272-4596 |
| Calgary, AB. | 5516E - 40th St. S.E. | T2C 2A1 | 403-279-1096 | 403-236-0989 |
| Edmonton, AB. | 11750 - 180th Street | T5S 1N7 | 780-452-6000 | 780-452-4600 |
| Saskatoon, SK. | 2302 Hanselman Avenue | S7L 5Z3 | 306-933-0177 | 306-933-3282 |
| Regina, SK. | 555 Henderson Drive | S42 5X2 | 306-721-7737 | 306-721-8611 |
| Winnipeg, MB. | 340 Saulteaux Crescent | R3J 3T2 | 204-987-9777 | 204-987-9770 |
| Mississauga, ON. | 7480 Bath Road | L4T 1L2 | 905-612-0566 | 905-612-0575 |

# 24 Hour Emergency Number - All Locations - 306-664-2522

# Material Safety Data Sheet
## Calcium Oxide

ACC# 04030

## Section 1 - Chemical Product and Company Identification

**MSDS Name:** Calcium Oxide
**Catalog Numbers:** C114-3, C114-50, C117-500
**Synonyms:** Lime; Quicklime; Burnt lime; Calx; Unslaked lime; Fluxing lime; Calcia; Pebble lime.
**Company Identification:**

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

**For information, call:** 201-796-7100
**Emergency Number:** 201-796-7100
**For CHEMTREC assistance, call:** 800-424-9300
**For International CHEMTREC assistance, call:** 703-527-3887

## Section 2 - Composition, Information on Ingredients

| CAS# | Chemical Name | Percent | EINECS/ELINCS |
|---|---|---|---|
| 1305-78-8 | Calcium oxide | >98 | 215-138-9 |

**Hazard Symbols:** C
**Risk Phrases:** 34

## Section 3 - Hazards Identification

### EMERGENCY OVERVIEW

Appearance: white, light yellow, light gray powder. **Danger!** Corrosive. May cause severe respiratory and digestive tract irritation with possible burns. Causes eye and skin irritation and possible burns. Moisture sensitive. Reacts with water releasing heat and forming alkaline Ca(OH)2 solution.
**Target Organs:** Respiratory system, eyes, skin, mucous membranes.

### Potential Health Effects

**Eye:** Produces irritation, characterized by a burning sensation, redness, tearing, inflammation, and possible corneal injury. Causes eye irritation and possible burns.
**Skin:** Contact with skin causes irritation and possible burns, especially if the skin is wet or moist. May cause deep, penetrating ulcers of the skin.
**Ingestion:** May cause severe gastrointestinal tract irritation with nausea, vomiting and possible burns. May cause circulatory system failure. May cause perforation of the digestive tract. May cause excess salivation, painful swallowing, rapid pulse and thermal burns.
**Inhalation:** May cause severe irritation of the upper respiratory tract with pain, burns, and inflammation. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema.
**Chronic:** Prolonged or repeated skin contact may cause dermatitis. Chronic inhalation may cause

nasal septum ulceration and perforation.

## Section 4 - First Aid Measures

**Eyes:** In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid immediately.
**Skin:** In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.
**Ingestion:** If swallowed, do NOT induce vomiting. Get medical aid immediately. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person.
**Inhalation:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
**Notes to Physician:** Treat symptomatically and supportively.

## Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Contact with moisture or water may generate sufficient heat to ignite nearby combustible materials.
**Extinguishing Media:** Do NOT use carbon dioxide. Do NOT use halogenated agents. Use flooding quantities of water as spray.
**Flash Point:** Not applicable.
**Autoignition Temperature:** Not available.
**Explosion Limits, Lower:**Not available.
**Upper:** Not available.
**NFPA Rating:** (estimated) Health: 3; Flammability: 0; Instability: 1

## Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.
**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Avoid generating dusty conditions. Provide ventilation.

## Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Do not get in eyes, on skin, or on clothing. Use only with adequate ventilation. Avoid breathing dust.
**Storage:** Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from water. Corrosives area. Storage under a nitrogen blanket has been recommended.

## Section 8 - Exposure Controls, Personal Protection

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

**Exposure Limits**

| Chemical Name | ACGIH | NIOSH | OSHA - Final PELs |
|---|---|---|---|
| Calcium oxide | 2 mg/m3 TWA | 2 mg/m3 TWA 25 mg/m3 IDLH | 5 mg/m3 TWA |

**OSHA Vacated PELs:** Calcium oxide: 5 mg/m3 TWA (not in effect as a result of reconsideration)

**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

## Section 9 - Physical and Chemical Properties

**Physical State:** Powder

**Appearance:** white, light yellow, light gray

**Odor:** Odorless.

**pH:** Not available.

**Vapor Pressure:** Negligible.

**Vapor Density:** Not available.

**Evaporation Rate:**Negligible.

**Viscosity:** Not available.

**Boiling Point:** 2850 deg C @ 760 mm Hg

**Freezing/Melting Point:**2570 deg C

**Decomposition Temperature:**Not available.

**Solubility:** reacts with water with evolution of heat

**Specific Gravity/Density:**3.3000g/cm3

**Molecular Formula:**CaO

**Molecular Weight:**56.08

## Section 10 - Stability and Reactivity

**Chemical Stability:** Absorbs carbon dioxide from the air. Hygroscopic: absorbs moisture or water from the air. Reacts with water releasing heat and forming alkaline Ca(OH)2 solution.

**Conditions to Avoid:** Exposure to moist air or water.

**Incompatibilities with Other Materials:** React with water to form calcium hydroxide and heat; reacts with carbon dioxide to form calcium carbonate. Incompatible with ethanol, boric oxide + calcium chloride, and interhalogens such as boron trifluoride, chlorine trifluride, fluorine, hydrofluoric acid, phosphorus pentoxide, perchlorates, nitrates, and permanganates, acids.

**Hazardous Decomposition Products:** Calcium hydroxide.

**Hazardous Polymerization:** Will not occur.

## Section 11 - Toxicological Information

**RTECS#:**
**CAS#** 1305-78-8: EW3100000
**LD50/LC50:**
Not available.

**Carcinogenicity:**
CAS# 1305-78-8: Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
**Epidemiology:** No data available.
**Teratogenicity:** No data available.
**Reproductive Effects:** No data available.
**Neurotoxicity:** No data available.
**Mutagenicity:** No data available.
**Other Studies:** No data available.

## Section 12 - Ecological Information

**Ecotoxicity:** No data available. Mosquito fish, TLm=240 ppm/24H, Sunfish, 100 ppm/3hr. is toxic. vector snail, 300 ppm/24hr is lethal.
**Environmental:** No information available.
**Physical:** No information available.
**Other:** None.

## Section 13 - Disposal Considerations

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

## Section 14 - Transport Information

| | US DOT | IATA | RID/ADR | IMO | Canada TDG |
|---|---|---|---|---|---|
| **Shipping Name:** | No information available. | | | | No information available. |
| **Hazard Class:** | | | | | |
| **UN Number:** | | | | | |
| **Packing Group:** | | | | | |

## Section 15 - Regulatory Information

## US FEDERAL

**TSCA**
CAS# 1305-78-8 is listed on the TSCA inventory.
**Health & Safety Reporting List**
None of the chemicals are on the Health & Safety Reporting List.
**Chemical Test Rules**
None of the chemicals in this product are under a Chemical Test Rule.
**Section 12b**
None of the chemicals are listed under TSCA Section 12b.
**TSCA Significant New Use Rule**
None of the chemicals in this material have a SNUR under TSCA.
**SARA**

**CERCLA Hazardous Substances and corresponding RQs**
None of the chemicals in this material have an RQ.
**SARA Section 302 Extremely Hazardous Substances**
None of the chemicals in this product have a TPQ.
**SARA Codes**
CAS # 1305-78-8: acute, reactive.
**Section 313**
No chemicals are reportable under Section 313.
**Clean Air Act:**
This material does not contain any hazardous air pollutants. This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.
**Clean Water Act:**
None of the chemicals in this product are listed as Hazardous Substances under the CWA. None of the chemicals in this product are listed as Priority Pollutants under the CWA. None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
**OSHA:**
None of the chemicals in this product are considered highly hazardous by OSHA.
**STATE**
CAS# 1305-78-8 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
California No Significant Risk Level: None of the chemicals in this product are listed.

## European / International Regulations

**European Labeling in Accordance with EC Directives**
**Hazard Symbols:**
C
**Risk Phrases:**
R 34 Causes burns.

**Safety Phrases:**
S 25 Avoid contact with eyes.
S 36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

**WGK (Water Danger/Protection)**

CAS# 1305-78-8: 1

**Canada - DSL/NDSL**

CAS# 1305-78-8 is listed on Canada's DSL List.

**Canada - WHMIS**

This product has a WHMIS classification of E.

**Canadian Ingredient Disclosure List**

CAS# 1305-78-8 is listed on the Canadian Ingredient Disclosure List.

**Exposure Limits**

CAS# 1305-78-8: OEL-AUSTRALIA:TWA 2 mg/m3 OEL-AUSTRIA:TWA 5 mg/m3 OEL-BELGIUM:TWA 2 mg/m3 OEL-DENMARK:TWA 2 mg/m3 OEL-FINLAND:TWA 2 mg /m3 OEL-FRANCE:TWA 2 mg/m3 OEL-GERMANY:TWA 5 mg/m3 OEL-INDIA:TWA 2 mg/m3 OEL-THE NETHERLANDS:TWA 2 ppm (5 mg/m3) OEL-THE PHILIPPINES:TW A 5 mg/m3 OEL-POLAND:TWA 2 mg/m3 OEL-SWEDEN:TWA 2 mg/m3;STEL 5 mg/m3 OEL-TURKEY:TWA 5 mg/m3 OEL-UNITED KINGDOM:TWA 2 mg/m3 OEL IN BULGA RIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV OEL IN NEW ZEALAND, SING APORE, VIETNAM check ACGI TLV

## Section 16 - Additional Information

**MSDS Creation Date:** 12/12/1997
**Revision #6 Date:** 10/10/2001

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

# MATERIAL SAFETY DATA SHEET

# Calcium Peroxide

## Section 01 - Chemical And Product And Company Information

**Product Identifier** ..... Calcium Peroxide

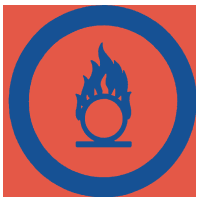
**Product Use** ..... Used as a curing agent in rubber, starch modification, dough conditioner, industrial oxidizer, ingedient in deoderizers, cosmetics and dentifrices.

**Supplier Name**..... ClearTech Industries Inc.
2302 Hanselman Avenue
Saskatoon, SK. Canada
S7L 5Z3

**Prepared By**..... ClearTech Industries Inc. Technical Department
Phone: (306)664-2522

**Preparation Date**..... May 8, 2006

**24-Hour Emergency Phone**..... 306-664-2522



## Section 02 - Composition / Information on Ingredients

| | | |
|---|---|---|
| **Hazardous Ingredients**..... | Calcium Peroxide | 75% |
| | Calcium Hydroxide | 25% |
| **CAS Number**..... | Calcium Peroxide | 1305-79-9 |
| | Calcium Hydroxide | 1305-62-0 |

**Synonym (s)**..... Calcium Superoxide, Solid peroxygen

## Section 03 - Hazard Identification

**Inhalation**..... No significant long term inhalation hazard. Irritation usually subsides after exposure ceases.

**Skin Contact / Absorption**…….... Modest skin irritant

**Eye Contact**.....…….... Airborne dust is irritating to eyes. Direct contact with powder is severely irritating.

**Ingestion**.....……If ingested, gastrointestinal irritation but not caustic burns are to be expected.

**Exposure Limits**…….. No established limits for calcium peroxide. Limits for calcium hydroxide are below:

OSHA/PEL-TWA= 5mg/$m^3$
ACGIH/TLV-TWA= 5mg/$m^3$

## Section 04 - First Aid Measures

**Inhalation**.....……..Remove victim to fresh air. Give artificial respiration only if breathing has stopped. If breathing is difficult or discomfort occurs, eek medical attention.

**Skin Contact / Absorption**……..Remove contaminated clothing. Wash affected area with soap and water. Seek medical attention if irritation occurs or persists.

**Eye Contact**.....…….... Flush immediately with water for at least 20 minutes. Forcibly hold eyelids apart to ensure complete irrigation of eye tissue. Seek immediate medical attention.

**Ingestion**.....……Do not induce vomiting. Dilute by giving one or two glasses of water. Do not give anything by mouth to an unconscious or convulsing person. Seek medical attention.

**Additional Information**.....…….. Notes to Physician: Modest irritation is only expected effect and should have no serious consequences except in the case of direct eye contact. If ingested, gastrointestinal irritation is to be expected. If large quantities are ingested, gastric evacuation via emesis or lavage may be used. Demulcents should be helpful. No systemic effects are expected.

## Section 05 - Fire Fighting

**Conditions of Flammability**…….... Non-flammable

**Means of Extinction**.....…….....Product does not burn. Use any appropriate fire fighting agent for surrounding material. Use flooding quantities of water and water spray to cool containers.

**Flash Point**.....……..Not applicable

**Auto-ignition Temperature**……..Not applicable

**Upper Flammable Limit** …….. Not applicable

**Lower Flammable Limit**..…….. Not applicable

**Hazardous Combustible Products**... Under fire conditions, product may decompose and release oxygen gas that supports combustion. Mixtures with polysulphide polymers may ignite.

**Special Fire Fighting Procedures**..... Wear NIOSH-approved self-contained breathing Apparatus and protective clothing.

**Explosion Hazards**……..... Oxidizable materials can be ignited by grinding and may become explosive.

## Section 06 - Accidental Release Measures

**Leak / Spill**.....…….. Confine spill and place into container. Dilute with a large quantity of water prior to disposal. Do not return product to original container. Flush area with water. Prevent runoff to sewer or waterways.

**Deactivating Materials**..…….... Water

## Section 07 - Handling and Storage

**Handling Procedures**.....…….. Use proper equipment for lifting and transporting all containers. Use sensible industrial hygiene and housekeeping practices. Wash thoroughly after handling. Avoid all situations that could lead to harmful exposure.

**Storage Requirements**.....……..….. Store in a cool, dry, well-ventilated place. Keep container tightly closed, and away from incompatible materials and sources of heat.

## Section 08 - Personal Protection and Exposure Controls

### Protective Equipment

**Eyes**……..…….... Chemical goggles, full-face shield, or a full-face respirator is to be worn at all times when product is handled. Contact lenses should not be worn; they may contribute to severe eye injury.

**Respiratory**……..... NIOSH-approved respirator for dust should be worn if needed.

**Gloves**……..... Impervious gloves of chemically resistant material (rubber or neoprene) should be worn at all times. Wash contaminated gloves and dry thoroughly before reuse.

**Clothing**……..…….....Body suits, aprons, and/or coveralls of chemical resistant material should be worn at all times. Wash contaminated clothing and dry thoroughly before reuse.

**Footwear**…….....Impervious boots of chemically resistant material should be worn.

**Other**…….……....No other information available.

### Engineering Controls

**Ventilation Requirements**…….....Mechanical ventilation (dilution or local exhaust), process or personnel enclosure and control of process conditions should be provided. Supply sufficient replacement air to make up for air removed by exhaust systems.

**Other**……...Emergency shower and eyewash should be in close proximity.

## Section 09 - Physical and Chemical Properties

**Physical State**.....……...……..... Solid

**Odor and Appearance**…..…….. White to yellow odourless powder

**Odor Threshold**....…….....Not applicable

**Specific Gravity (Water=1)**……..2.92

**Vapor Pressure (mm Hg, 20C)**……..Not applicable

**Vapor Density (Air=1)**..……... Not available

**Evaporation Rate**.....……..…….. Not applicable

**Boiling Point**.....…….... Not applicable

**Freeze/Melting Point**....…….... Decomposes around 275°C

**pH**.....……..12-13 (% solution)

**Water/Oil Distribution Coefficient**.... Not available

**Bulk Density**.....……...27 lb/ft$^3$

**% Volatiles by Volume**……..……...0%

**Solubility in Water**...……..... Insoluble

**Molecular Formula**.....…….…..... $CaO_2$

**Molecular Weight**.....……..... Not applicable, mixture

## Section 10 - Stability and Reactivity

**Stability**.....……...……..Stable under normal conditions. Decomposition could occur when exposed to heat or moisture.

**Incompatibility**.....……..…….. Incompatible with heat, heavy metals, organics, reducing agents, polysulphide polymers.

**Hazardous Products of Decomposition**.. Decomposition products include oxygen that supports combustion and calcium hydroxide.

**Polymerization**.....…….…….Will not occur.

## Section 11 - Toxicological Information

**Irritancy**.....……..……..… Mild irritant, especially to eyes.

**Sensitization**.....……...……. Not available

**Chronic/Acute Effects**……...……..None

**Synergistic Materials**...……...……...Data not available

**Animal Toxicity Data**.....…..……...$LD_{50}$(oral,rat)= > 5g/kg
$LD_{50}$(dermal,rat)= > 10g/kg
$LC_{50}$(inhalation,rat,1 hour)= > 17mg/L

**Carcinogenicity**.....……...…….. Not considered to be carcinogenic as per ACGIH, OSHA, NTP, and IARC

**Reproductive Toxicity**..…...……... Data not available

**Teratogenicity**.....…...…….. Data not available

**Mutagenicity**.....……...……Data not available

## Section 12 - Ecological Information

**Fish Toxicity**.....…….. Effect of low concentrations on aquatic life are unknown.

**Biodegradability**.....……..... Not available

**Environmental Effects**……As previously indicated, oxygen is released into environment when product is dissolved in water.

## Section 13 - Disposal Considerations

**Waste Disposal**.....Dispose in accordance with all federal, provincial, and/or local regulations including the Canadian Environmental Protection Act.

## Section 14 - Transportation Information

**TDG Classification**

**Class**..... 5.1

**Group**..... II

**PIN Number**..... UN 1457

**Other**.....Secure containers (full and/or empty) with suitable hold down devises during shipment.

## Section 15 - Regulatory Information

**WHMIS Classification**.....C, D2

**NOTE: THE PRODUCT LISTED ON THIS MSDS HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE CANADIAN CONTROLLED PRODUCTS REGULATIONS. THIS MSDS CONTAINS ALL INFORMATION REQUIRED BY THOSE REGULATIONS**

## Section 16 - Other Information

**Note: The responsibility to provide a safe workplace remains with the user. The user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment. The information contained herein is, to the best of our knowledge and belief, accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material. It is the responsibility of the user to comply with all applicable laws and regulations.**

## ClearTech Industries Inc. - Locations

**Corporate Head Office: 2302 Hanselman Avenue, Saskatoon, SK, S7L 5Z3**
**Phone: 306-664-2522**
**Fax: 306-665-6216**

**www.ClearTech.ca**

| Location | Address | Postal Code | Phone Number | Fax Number |
|---|---|---|---|---|
| Richmond, B.C. | 12431 Horseshoe Way | V7A 4X6 | 604-272-4000 | 604-272-4596 |
| Calgary, AB. | 5516E - 40th St. S.E. | T2C 2A1 | 403-279-1096 | 403-236-0989 |

| | | | | |
|---|---|---|---|---|
| Edmonton, AB. | 11750 - 180th Street | T5S 1N7 | 780-452-6000 | 780-452-4600 |
| Saskatoon, SK. | 2302 Hanselman Avenue | S7L 5Z3 | 306-933-0177 | 306-933-3282 |
| Regina, SK. | 555 Henderson Drive | S42 5X2 | 306-721-7737 | 306-721-8611 |
| Winnipeg, MB. | 340 Saulteaux Crescent | R3J 3T2 | 204-987-9777 | 204-987-9770 |
| Mississauga, ON. | 7480 Bath Road | L4T 1L2 | 905-612-0566 | 905-612-0575 |

## 24 Hour Emergency Number - All Locations - 306-664-2522

# Material Safety Data Sheet

Printing date 11/02/2006 Version 1 Reviewed on 11/02/2006

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## 1 Identification of substance

· **Product details**

· **Trade name: Carbon Dioxide**

· **Article number:** 014-01-0001BOC

· **Creation date:** 06/01/2006

· **Manufacturer/Supplier:**
BOC Canada Limited
5860 Chedworth Way
Mississauga, Ontario L5R 0A2
www.bocgases.ca

TELEPHONE NUMBER: (905) 501-1700
24-HOUR EMERGENCY TELEPHONE NUMBER: (905) 501-0802
EMERGENCY RESPONSE PLAN NO: 2-0101

Please ensure that this MSDS is received by the appropriate person

· **Information department:** Customer Service Centre: 1-866-385-5349

## 2 Composition/Data on components

· **Chemical characterization:**
· **CAS No. Description**
124-38-9 Carbon Dioxide
· **Identification number(s)**
· **EINECS Number:** 204-696-9

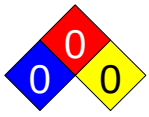
## 3 Hazards identification

· **Hazard description:**
· **WHMIS-symbols:**
A - Compressed gas

· **HMIS-ratings (scale 0 - 4)**

Health = 0
Fire = 0
Reactivity = 0

· **NFPA ratings (scale 0 - 4)**




Health = 0
Fire = 0
Reactivity = 0

· **Information pertaining to particular dangers for man and environment:** Not applicable.

(Contd. on page 2)

# Material Safety Data Sheet

Printing date 11/02/2006 Version 1 Reviewed on 11/02/2006

**Trade name: Carbon Dioxide**

(Contd. of page 1)

· **Classification system:**
The classification is in line with internationally approved calculation standards. It is expanded, however, by information from technical literature and by information furnished by supplier companies.

* 
## 4 First aid measures

· **After inhalation:** Supply fresh air; consult doctor in case of complaints.
· **After skin contact:** Generally the product does not irritate the skin.
· **After eye contact:** Rinse opened eye for several minutes under running water. Then consult a doctor.
· **After swallowing:** Not applicable

* 
## 5 Fire fighting measures

· **Suitable extinguishing agents:**
CO2, powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
· **Protective equipment:** Wear self-contained respiatory protective device.

* 
## 6 Accidental release measures

· **Person-related safety precautions:**
Wear protective equipment. Keep unprotected persons away.
Ensure adequate ventillation.
· **Measures for environmental protection:** Prevent seepage into sewage system, workpits and/or cellars.
· **Measures for cleaning/collecting:** Ensure adequate ventillation.
· **Additional information:** No dangerous substances are released.

* 
## 7 Handling and storage

· **Handling:**
· **Information for safe handling:** No special measures required.
· **Information about protection against explosions and fires:**
Keep ignition sources away - Do not smoke.
Pressurized container: protect from sunlight and do not expose to temperatures exceeding 50°C. Do not pierce or burn, even after use.

· **Storage:**
· **Requirements to be met by storerooms and receptacles:**
Do not expose cylinder to temperatures higher than 50°C (122 °F)
· **Information about storage in one common storage facility:** Not required.
· **Further information about storage conditions:**
Keep cylinder valve tightly closed.
Store cylinder in a well ventilated area.
Store in accordance with local fire code and/or building code or any pertaining regulations.



(Contd. on page 3)

# Material Safety Data Sheet

Printing date 11/02/2006 Version 1 Reviewed on 11/02/2006

**Trade name: Carbon Dioxide**

(Contd. of page 2)

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## 8 Exposure controls and personal protection

· **Additional information about design of technical systems:** Adequate local ventillation.

| · **Components with limit values that require monitoring at the workplace:** | |
|---|---|
| **124-38-9 Carbon Dioxide (23-100%)** | |
| EL | Short-term value: 15000 ppm<br>Long-term value: 5000 ppm |

· **Additional information:** The lists that were valid during the creation were used as basis.

· **Personal protective equipment:**
· **General protective and hygienic measures:**
The usual precautionary measures for handling chemicals should be followed.
· **Breathing equipment:**
Use atmosphere-supplying respirators (e.g. supplied-air: demand, pressure-demand, or continuous-flow or self-contained breathing apparatus: demand or pressure-demand or combination supplied-air with auxiliary self-contained air supply atmosphere-supplying respirator) in case of insufficient ventilation.
· **Protection of hands:**

Protective gloves.

· **Material of gloves**
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer.
· **Eye protection:** Safety glasses

## 9 Physical and chemical properties

| · **General Information** | |
|---|---|
| **Form:** | Gaseous. |
| **Color:** | Colorless |
| **Odor:** | Odorless |
| · **Change in condition** | |
| **Melting point/Melting range:** | -56.6°C |
| **Boiling point/Boiling range:** | -78°C |
| · **Flash point:** | Not applicable. |
| · **Danger of explosion:** | Product does not present an explosion hazard. |
| · **Solubility in / Miscibility with** | |
| **Water at 20°C:** | 2000 g/l |

* 

## 10 Stability and reactivity

· **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
· **Dangerous reactions** No dangerous reactions known.

(Contd. on page 4)

# Material Safety Data Sheet

Printing date 11/02/2006 Version 1 Reviewed on 11/02/2006

**Trade name: Carbon Dioxide**

(Contd. of page 3)

· **Dangerous products of decomposition:** No dangerous decomposition products known.

## 11 Toxicological information

· **Acute toxicity:**
· **LD/LC50 values that are relevant for classification:** LC50 - None available.
· **Primary irritant effect:**
· **on the skin:** No irritating effect.
· **on the eye:** No irritating effect.
· **Sensitization:** No sensitizing effects known.
· **Additional toxicological information:**
When used and handled according to specifications, the product does not have any harmful effects according to our experience and the information provided to us.
The substance is not subject to classification.

## 12 Ecological information

· **General notes:** Generally not hazardous for water

* 

## 13 Disposal considerations

· **Product:**
· **Recommendation:**
Cylinder and unused product should be returned to vendor. Disposable cylinder must be disposed of in accordance with local regulations.

· **Uncleaned packagings:**
· **Recommendation:**
Cylinder and unused product should be returned to vendor. Disposable cylinder must be disposed of in accordance with local regulations.
· **Recommended cleansing agent:** None applicable.

* 

## 14 Transport information

· **TDG and DOT regulations:**

· **Hazard class:** 2
· **Identification number:** UN1013
· **Proper shipping name (technical name):** CARBON DIOXIDE

(Contd. on page 5)

# Material Safety Data Sheet

Printing date 11/02/2006 Version 1 Reviewed on 11/02/2006

**Trade name: Carbon Dioxide**

(Contd. of page 4)

| | |
|---|---|
| · **Label** | 2.2 |

· **Maritime transport IMDG:**

| | |
|---|---|
| · **IMDG Class:** | 2 |
| · **UN Number:** | 1013 |
| · **Label** | 2.2 |
| · **Marine pollutant:** | No |
| · **Propper shipping name:** | CARBON DIOXIDE |

· **Air transport ICAO-TI and IATA-DGR:**

| | |
|---|---|
| · **ICAO/IATA Class:** | 2 |
| · **UN/ID Number:** | 1013 |
| · **Label** | 2.2 |
| · **Propper shipping name:** | CARBON DIOXIDE |

## 15 Regulations

· **Sara**

· **Section 355 (extremely hazardous substances):**

Substance is not listed.

· **Section 313 (Specific toxic chemical listings):**

Substance is not listed.

· **TSCA (Toxic Substances Control Act):**

Substance is listed.

· **Proposition 65**

· **Chemicals known to cause cancer:**

Substance is not listed.

· **Chemicals known to cause reproductive toxicity for females:**

Substance is not listed.

· **Chemicals known to cause reproductive toxicity for males:**

Substance is not listed.

· **Chemicals known to cause developmental toxicity:**

Substance is not listed.

· **Cancerogenity categories**

· **EPA (Environmental Protection Agency)**

Substance is not listed.

(Contd. on page 6)

# Material Safety Data Sheet

Printing date 11/02/2006 Version 1 Reviewed on 11/02/2006

**Trade name: Carbon Dioxide**

(Contd. of page 5)

· **NTP (National Toxicology Program)**
Substance is not listed.

· **TLV (Threshold Limit Value established by ACGIH)**
Substance is not listed.

· **NIOSH-Ca (National Institute for Occupational Safety and Health)**
Substance is not listed.

· **OSHA-Ca (Occupational Safety & Health Administration)**
Substance is not listed.

· **Canadian substance listings:**

· **Canadian Domestic Substances List (DSL)**
Substance is listed.

· **Canadian Ingredient Disclosure list (limit 0.1%)**
Substance is not listed.

· **Canadian Ingredient Disclosure list (limit 1%)**
Substance is listed.

· **Product related hazard informations:**
Observe the general safety regulations when handling chemicals.
The substance is not subject to classification according to the sources of literature known to us.

· **Safety phrases:**
Keep container tightly closed in a cool place.

* 
## 16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· **Department issuing MSDS:** Customer Service Centre: 1-866-385-5349
· **Contact:** Canada Technical Services: 1-866-385-5349

# Material Safety Data Sheet

## Copper sulphate

**Infosafe no.** AJ1WQ **Issue Date** August 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<br>NSW 2147 |
| **Emergency Tel.** | 1800 022 037 (24H) |
| **Tel/Fax** | Tel: (02) 9839 4000 Fax: (02) 9674 6225 |
| **Other Information** | New Zealand: Asia Pacific Specialty Chemicals (NZ) Limited<br>119 Carbine Road<br>Mt Wellington, Auckland 6<br>Emergency Tel: 0800 243 622 (24H)<br>Telephone: (09) 276 4019<br>Fax: (09) 276 7231 |

## IDENTIFICATION

**Product Name** Copper sulphate

**Proper Shipping Name** ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.O.S.

| **Other Names** | **Name** | **Manf. Code** |
|---|---|---|
| | COPPER (II) SULPHATE ANHYDROUS | AR 00000171 |
| | COPPER II SULPHATE | UL 00000772 |
| | COPPER II SULPHATE | TECH 00001008 |
| | COPPER SULPHATE ELECTROPLATING GRADE | 00011316 |
| | COPPER II SULPHATE ANHYDROUS | UL 00001007 |
| | Blue copper | |
| | Blue stone | |
| | Blue vitriol | |
| | Copper(II) sulfate | |
| | Copper sulfate | |
| | Cupric sulfate | |
| | Cupric sulphate | |
| | Sulfate de cuivre | |

**UN Number** 3077

**DG Class** 9

**Packing Group** III

**Hazchem Code** 2X

**Poisons Schedule** S6

**Product Use** Used in agriculture as a soil additive, pesticide, feed additive; germicide; leather and textile mordant; pigment; manufacture of batteries; electroplating and electrorefining of copper; medicine; wood and pulp preservative; engraving and lithography; ore, steel and rubber processing; asphalt treatment.

## Physical Data

| | |
|---|---|
| **Appearance** | Greyish-white to greenish-white hygroscopic crystals or powder. |
| **Melting Point** | 650°C Decomposes |
| **Boiling Point** | Not applicable |
| **Vapour Pressure** | 7.3 mmHg @ 25°C |
| **Specific Gravity** | 3.603 |
| **Flash Point** | Not applicable (does not burn) |
| **Flamm. Limit LEL** | Not applicable |
| **Flamm. Limit UEL** | Not applicable |
| **Solubility in Water** | Very soluble |

## Other Properties

| | |
|---|---|
| **Autoignition Temp.** | Not applicable |
| **Vapour Density** | Not applicable |
| **pH Value** | 4.0 (0.2 M @ 4°C) |
| **Solubility in Organic Solvents** | Soluble in methanol and glycerol; slightly soluble in ethanol. |
| **Molecular Weight** | 159.61 |
| **Other Information** | DEHYDRATION: The pentahydrate loses two water molecules of hydration at 30°C, 2 more at 110°C and becomes anhydrous by 250°C. |

## Ingredients

| **Ingredients** | **Name** | **CAS** | **Proportion** |
|---|---|---|---|
| | Copper sulphate | 7758-98-7 | 97-100 % |

# HEALTH HAZARD INFORMATION

## Health Effects

| | |
|---|---|
| **Acute - Swallowed** | Harmful if swallowed. Copper salts impart a metallic taste in the mouth. Burning sensation in the throat and repeated vomiting are typical effects. More severe poisonings cause diarrhoea and ulceration of the gastrointestinal tract. Can be fatal. |
| **Acute - Eye** | Will cause irritation in contact with the eyes. Dilute copper sulphate solutions have been used as topical antibiotics. Copper sulphate particles in the eye could cause local inflammation, tissue destruction (necrosis), corneal opacity and adhesion of the eyelid to the eye. Traces of sulphuric acid impurity may contribute to these effects. |
| **Acute - Skin** | Will cause irritation in contact with the skin, which will result in redness, itchiness, and possible dermatitis. |
| **Acute - Inhaled** | May cause irritation to the mucous membrane and upper airways. Dusts and mists (copper solutions) may also cause irritation of the nasal passages and throat. Ulceration of the nasal septum is possible, but may be due to traces of sulphuric acid impurities. |
| **Chronic** | HEALTH EFFECTS SKIN: Repeated or prolonged exposure to copper salts can cause irritation, producing itching and redness of the skin. Some individuals may become sensitized to copper sulfate and develop allergic contact dermatitis.<br>INHALATION: Repeated inhalation of copper sulfate mists (e.g. Bordeaux mixture) may induce a condition known as 'vineyard sprayer's lung'. Greenish-tumours occur in the liver and lungs of afflicted individuals. The disease is asymptomatic until later stages. Symptoms include weakness, malaise, loss of appetite and weight, cough and greenish-brown sputum.<br>INGESTION: Chronic occupational exposure to copper sulfate by ingestion is not likely. Symptoms would be like those of Wilson's disease, which include liver, brain, muscle and kidney disfunction. |
| **Other Information** | CARCINOGENICITY Although some individuals afflicted with 'vineyard sprayers' lung' developed lung cancer, there is no indication of an increased incidence of cancer due to copper sulfate exposure, per se.<br>TERATOGENICITY AND EMBRYOTOXICITY There are no reports of teratogenicity or embryotoxicity in humans. Animal studies indicate that a deficiency or embryotoxicity in humans. Animal studies indicate that a deficiency or excess of copper in the body can cause significant harm to developing embryos. The net absorption of copper is limited and embryotoxic levels are unlikely from industrial exposure.<br>TOXICOLOGICAL SYNERGISTIC MATERIALS Information not available<br>MUTAGENICITY No human data available. Negative or inconclusive results in short-term tests.<br>POTENTIAL FOR ACCUMULATION Copper is an essential element and its level in the body is strictly controlled. Under most conditions, excess copper is excreted in the urine and feces (via the bile).<br>HEALTH HAZARD COMMENTS Copper salts may decrease the toxicity of molybdenum. Zinc salts may decrease the toxicity of copper salts. |

## First Aid

| | |
|---|---|
| **Swallowed** | Immediately wash out mouth with water, and then give plenty of water to drink. SEEK IMMEDIATE MEDICAL ATTENTION. |
| **Eye** | If in eye(s) wash with copious amounts of water for approximately 15 minutes holding eyelid(s) open. Take care not to rinse contaminated water into the non-affected eye. SEEK MEDICAL ATTENTION. |
| **Skin** | Remove contaminated clothing, shoes and leather goods (e.g. watchbands, belts). Wash gently and thoroughly with water and non-abrasive soap. Ensure contaminated clothing is washed before re-use or discard. If contact is more than of minor nature, SEEK MEDICAL ATTENTION. |
| **Inhaled** | Remove the source of contamination or move the victim to fresh air. Ensure airways are clear and have a qualified person give oxygen through a face mask if breathing is difficult. SEEK MEDICAL ATTENTION. |
| **First Aid Facilities** | Safety showers, eye wash fountains, and normal wash room facilities. |
| **Other Information** | Consult a doctor and/or the nearest Poison Control Centre for all exposures except minor instances of inhalation or skin contact. All first aid procedures should be periodically reviewed by a doctor familiar with the material and its conditions of use in the workplace. |

## Advice to Doctor

| | |
|---|---|
| **Advice to Doctor** | Treat symptomatically or consult Poison Information Centre. |

## Other Health Hazard Information

## PRECAUTIONS FOR USE

| | |
|---|---|
| **Exposure Limits** | Copper, dusts & mists (as Cu) TWA: 1 mg/m3<br>Copper (fume) TWA: 0.2 mg/m3 |
| **Eng. Controls** | Engineering control methods to reduce hazardous exposures are preferred. Methods include mechanical ventilation (dilution and local exhaust), process or personnel enclosure, control of process conditions, and process modification (e.g., substitution of a less hazardous material). Administrative controls and personal protective equipment may also be required. Use local exhaust ventilation, and process enclosure if necessary, to control airborne dust or mist. Locate dust collectors outside or where permitted by regulation. Supply sufficient replacement air to make up for air removed by exhaust system. |

## Personal Protection

| | |
|---|---|
| **Protective Equip.** | RESPIRATORY PROTECTION: The use of a Class P2 full facepiece respirator with replaceable filter complying with AS/NZS 1715 and AS/NZS 1716 is recommended.<br>EYE PROTECTION: The use of face shields, chemical goggles, or safety glasses with side shield protection is recommended.<br>HAND PROTECTION: The use of Nitrile rubber gloves is recommended.<br>CLOTHING: The use of plastic apron, sleeves, overalls, and rubber boots are recommended. |
| **Work/Hygienic Practices** | Avoid eye contact and repeated or prolonged skin contact. Wear overalls, safety glasses and impervious gloves. If risk of inhalation of spray mists exists, wear combined organic vapour / particulate respirator meeting the requirements of AS/NZS 1715 and AS/NZS 1716. Always wash hands before smoking, eating, drinking or using the toilet. Wash contaminated clothing and other protective equipment before storing or re-using. |

## Flammability

| | |
|---|---|
| **Fire Hazards** | In common with many organic chemicals, may form flammable dust clouds in air. For precautions necessary refer to safety information on dust explosion hazards. Not combustible. |

## SAFE HANDLING INFORMATION

## Storage and Transport

| | |
|---|---|
| **Storage Precautions** | Store in a cool, dry, well-ventilated area, out of direct sunlight. Store in suitable, labelled containers. Keep containers tightly closed when not in use and when empty. Protect from damage. Limit quantity of material in storage. Restrict access to storage area. Post warning signs when appropriate. Keep storage area separate from populated work areas. Inspect periodically for deficiencies such as damage or leaks. |
| **Transport** | Class 9 Miscellaneous dangerous goods shall not be loaded in a vehicle with: - Class 1 Explosives - Class 5. 1 Oxidizing agents (when Class 9 substance capable of igniting and burning - Class 5. 2 Organic peroxides (when Cl. 9 capable of igniting/burnin |
| **Storage Regulations** | This material is a SCHEDULED (S6) POISON and must be stored, handled and maintained according to the appropriate Commonwealth Regulations. |
| **Handling** | Avoid generating dust and mist. Use dust-tight containers. Prevent accumulations of dust. Use smallest possible amounts in designated areas with adequate ventilation. Have emergency equipment (for spills, leaks, etc.) readily available. Label containers. Keep containers closed when not in use. Empty containers may contain residues which are hazardous. |
| **Proper Shipping Name** | ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.O.S. |
| **IERG Number** | 47 |
| **Packaging Method** | #5.9.9 |

## Spills and Disposal

| | |
|---|---|
| **Spills & Disposal** | Increase ventilation. Evacuate all unnecessary personnel. Wear Self-Contained Breathing Apparatus (S.C.B.A) and full protective clothing to minimise skin exposure. Dampen spilled material with water to avoid airborne dust, then transfer material to a suitable container. Use absorbent paper dampened with water to pick up remaining material. Wash surfaces well with soap and water. Seal all wastes in vapour tight plasitic bags for eventual disposal. If large quantities of this material enter the waterways contact the Environmental Protection Authority, or your local Waste Management Authority. |
| **Disposal** | Disposal of this material should be undertaken by a registered chemical disposal company. |

## Fire/Explosion Hazard

| | |
|---|---|
| **Fire/Explos. Hazard** | On burning will emit noxious fumes. |
| **Hazardous Combustion Products** | Combustion products include oxides of carbon and other noxious smoke. |
| **Fire Fighting Procedures** | Wear Self-Contained Breathing Apparutus (S.C.B.A) and full protective clothing to minimse skin exposure. |
| **Extinguishing Media** | Use extinguishing media suitable for surrounding environment. |
| **Hazardous Reaction** | STABILITY Stable under normal conditions<br>INCOMPATIBILITY -MAT'LS TO AVOID ACETYLENE - copper salts may react to form explosive acetylides.<br>HYDROXYLAMINE - anhydrous copper sulfate can<br>cause ignition upon contact with hydroxylamine due to the heat of coordination. |
| **Hazchem Code** | 2X |

## OTHER INFORMATION

| | |
|---|---|
| **Toxicology** | Oral (rat) LD50 : 300 mg/kg<br>Skin (rat) LD50 : > 2 gm/kg |
| **Information on Ecological Effects** | Harmful to aquatic life. |
| **Risk Statement** | R22 Harmful if swallowed.<br>R36/38 Irritating to eyes and skin. |
| **Safety Statement** | S22 Do not breathe dust.<br>S24/25 Avoid contact with skin and eyes.<br>S36/37/39 Wear suitable protective clothing, gloves and eye/face protection. |
| **Hazard Category** | Harmful,Irritant |

## CONTACT POINT

**Contact**

Australia: Business Hours: Mr Paul Verren
Telephone: (02) 9839 4024
After Hours: 1800 022 037
New Zealand: Business Hours: Mr Lloyd Williams
Telephone: (09) 276 4019
Emergency Tel: 0800 243 622
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 Asia Pacific Speciality 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

PETRO-CANADA

# Material Safety Data Sheet

| WHMIS (Pictograms) | WHMIS (Classification) | Protective Clothing | TDG (pictograms) |
|---|---|---|---|
| | **B-3, D-2B** | | |

## *Section 1. Chemical Product and Company Identification*

| | | | |
|---|---|---|---|
| **Product Name** | **DIESEL FUEL** | **Code** | W104, W293; SAP: 120, 121, 122, 287 |
| **Synonym** | Seasonal Diesel, #1 Diesel, #2 Heating Oil, #1 Heating Oil, D50, P50, Arctic Diesel, Farm Diesel, Marine Diesel, Low Sulphur Diesel, LSD, Ultra Low Sulphur Diesel, ULSD, Mining Diesel, Naval Distillate, Dyed Diesel, Marked Diesel, Coloured Diesel | **Validated on** | **2/5/2007.** |
| **Manufacturer** | PETRO-CANADA<br>P.O. Box 2844<br>150 – 6th Avenue South-West<br>Calgary, Alberta<br>T2P 3E3 | **In case of Emergency** | Petro-Canada: 403-296-3000<br>Canutec Transportation: 613-996-6666<br>Poison Control Centre: Consult local telephone directory for emergency number(s). |
| **Material Uses** | Diesel fuels are distillate fuels suitable for use in high and medium speed internal combustion engines of the compression ignition type. Mining Diesel has a higher flash point requirement, for safe use in underground mines. | | |

## *Section 2. Composition and Information on Ingredients*

| | | | *Exposure Limits (ACGIH)* | | |
|---|---|---|---|---|---|
| **Name** | **CAS #** | **% (V/V)** | **TLV-TWA(8 h)** | **STEL** | **CEILING** |
| Distillates (petroleum), hydrodesulfurized middle | 64742-80-9 | 100 | Not established | Not established | Not established |
| Kerosine (petroleum), hydrodesulfurized | 64742-81-0 | | 200 mg/m³ | Not established | Not established |
| Fuels, diesel | 68334-30-5 | | 100 mg/m³ | Not established | Not established |
| Fuel oil no. 2 | 68476-30-2 | | 100 mg/m³ | Not established | Not established |

| | |
|---|---|
| **Manufacturer Recommendation** | Avoid prolonged or repeated skin contact to diesel fuels which can lead to dermal irritation and may be associated with an increased risk of skin cancer. |
| **Other Exposure Limits** | Consult local, state, provincial or territory authorities for acceptable exposure limits. |

## *Section 3. Hazards Identification.*

| | |
|---|---|
| **Potential Health Effects** | Combustible liquid. Exercise caution when handling this material. Contact with this product may cause skin and eye irritation. Prolonged or repeated contact may cause skin irritation, defatting, drying and dermatitis. Inhalation of this product may cause respiratory tract irritation and Central Nervous System (CNS) Depression, symptoms of which may include; weakness, dizziness, slurred speech, drowsiness, unconsciousness and in cases of severe overexposure; coma and death. Ingestion of this product may cause gastro-intestinal irritation. Aspiration of this product may result in severe irritation or burns to the respiratory tract. For more information refer to Section 11 of this MSDS. |

## *Section 4. First Aid Measures*

| | |
|---|---|
| **Eye Contact** | Avoid direct contact. Quickly and gently blot or brush away chemical. Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for 15-20 minutes or until the chemical is removed, while holding the eyelid(s) open. Take care not to rinse contaminated water into the unaffected eye or onto the face. Obtain medical attention immediately. |
| **Skin Contact** | Avoid direct contact. Wear chemical resistant protective clothing if necessary. Quickly and gently, blot or brush away excess chemical. Wash gently and thoroughly with warm water and non-abrasive soap for 15-20 minutes or until chemical is removed. Under running water, remove contaminated clothing, shoes and leather goods (e.g., watch bands, belts, etc.). Obtain medical attention immediately. Completely decontaminate clothing, shoes and leather goods before reuse or discard. |
| **Inhalation** | Take proper precautions to ensure your own safety before attempting rescue (e.g. wear appropriate protective equipment). If breathing has stopped, trained personnel should begin artificial respiration (AR) or, if the heart has stopped, cardiopulmonary resuscitation (CPR) immediately. Immediately transport victim to an emergency care facility. |

*Continued on Next Page*

| | |
|---|---|
| **Ingestion** | NEVER give anything by mouth if victim is rapidly losing consciousness, or is unconscious or convulsing. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. Have victim drink 240 to 300 mL (8 to 10 oz) of water to dilute material in stomach. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. Repeat administration of water. If breathing has stopped, trained personnel should begin artificial respiration (AR) or, if the heart has stopped, cardiopulmonary resuscitation (CPR) immediately. Quickly transport victim to an emergency care facility. |
| **Note to Physician** | Not available. |

## *Section 5. Fire-fighting Measures*

| | | | |
|---|---|---|---|
| **Flammability** | Combustible liquid. | **Flammable Limits** | Lower: 0.7%<br>Upper: 6% |
| **Flash Points** | Diesel Fuel: Closed Cup: ≥45ºC (113ºF)<br>Marine Diesel Fuel: Closed Cup: ≥64ºC (147ºF)<br>Mining Diesel: Closed Cup: ≥52ºC (126ºF) | **Auto-Ignition Temperature** | 225°C (437°F) |
| **Fire Hazards in Presence of Various Substances** | Flammable in presence of open flames, sparks, and heat. Vapours are heavier than air and may travel considerable distance to sources of ignition and flash back. This product can accumulate static charge and ignite. | **Explosion Hazards in Presence of Various Substances** | Containers may explode in heat of fire. Do not cut, weld, heat, drill or pressurize empty container. Runoff to sewer may create fire or explosion hazard. |
| **Products of Combustion** | Carbon oxides (CO, CO2), nitrogen oxides (NOx), sulphur oxides (SOx), sulphur compounds (H2S), smoke and irritating vapours as products of incomplete combustion.<br>See Section 11 (Other Considerations) for information regarding the toxicity of the combustion products. | | |
| **Fire Fighting Media and Instructions** | NAERG2004, GUIDE 128, Flammable liquids (Non-polar/Water-immiscible).<br>CAUTION: This product has a moderate flash point above 40ºC: Use of water spray when fighting fire may be inefficient.<br><br>If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also consider initial evacuation for 800 meters (1/2 mile) in all directions.<br><br>SMALL FIRES: Dry chemical, CO2, water spray or regular foam.<br>LARGE FIRES: Water spray, fog or regular foam. Do not use straight streams. Move containers from fire area if you can do it without risk.<br>Fires Involving Tanks or Car/Trailer Loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.<br><br>Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting devices or any discolouration of tank. ALWAYS stay away from the ends of tanks. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible withdraw from area and let fire burn. Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection. | | |

## *Section 6. Accidental Release Measures*

| | |
|---|---|
| **Material Release or Spill** | Consult current National Emergency Response Guide Book (NAERG) for appropriate spill measures if necessary. IN THE EVENT OF A LARGE SPILL CONSIDER THE FOLLOWING CONTROL MEASURES: Extinguish all ignition sources. Evacuate non-essential personnel. Ventilate area. Stop leak if safe to do so. Dike spilled material. Use appropriate inert absorbent material to absorb spilled product. Collect used absorbent for later disposal. Ground and bond all equipment used to clean up the spilled material, as it may be a static accumulator. Avoid contact with spilled material. Avoid breathing vapours or mists of material. Avoid contaminating sewers, streams, rivers and other water courses with spilled material. Notify appropriate authorities immediately. Ensure clean-up personnel wear appropriate personal protective equipment. |

## *Section 7. Handling and Storage*

| | |
|---|---|
| **Handling** | COMBUSTIBLE MATERIAL. Handle with care. Avoid contact with any sources of ignition, flames, heat, and sparks. Ensure all equipment is grounded/bonded. Avoid skin contact. Avoid eye contact. Avoid inhalation of product vapours or mists. Wear proper personal protective equipment (See Section 8). Avoid confined spaces and areas with poor ventilation. Empty containers may contain product residue. Do not pressurize, cut, heat, or weld empty containers. Do not reuse containers without commercial cleaning and/or reconditioning. Personnel who handle this material should practice good personal hygiene during and after handling to help prevent accidental ingestion of this product. Properly dispose of contaminated leather articles including shoes that cannot be decontaminated. |
| **Storage** | Store away from heat and sources of ignition. Store in dry, cool, well-ventilated area. Store away from incompatible and reactive materials (See section 5 and 10). Ensure the storage containers are grounded/bonded. |

## Section 8. Exposure Controls/Personal Protection

**Engineering Controls** For normal application, special ventilation is not necessary. If user's operations generate vapours or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit. Make-up air should always be supplied to balance air removed by exhaust ventilation. Ensure that eyewash station and safety shower are close to work-station.

**Personal Protection** - ***The selection of personal protective equipment varies, depending upon conditions of use.***

**Eyes** As a minimum, safety glasses with side shields should be worn when handling this material. If product is used in an application where splashing may occur, the use of safety goggles and/or a face shield should be considered.

**Body** If this material may come in contact with the body during handling and use, we recommend wearing appropriate protective clothing to prevent contact with the skin. (Contact your PPE provider for more information.)

**Respiratory** A NIOSH-approved air-purifying respirator with an organic vapour cartridge or canister may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits. Protection provided by air-purifying respirators is limited. Use a positive-pressure, air-supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstances where air-purifying respirators may not provide adequate protection.

**Hands** If this material may come in contact with the hands during handling and use, we recommend wearing gloves of the following material(s): nitrile, neoprene, polyvinyl alcohol (PVA), fluoro-elastomer. Consult your PPE provider for breakthrough times and the specific glove that is best for you based on your use patterns. It should be realized that eventually any material regardless of their imperviousness, will get permeated by chemicals. Therefore, protective gloves should be regularly checked for wear and tear. At the first signs of hardening and cracks, they should be changed.

**Feet** Wear appropriate footwear to prevent product from coming in contact with feet and skin.

## Section 9. Physical and Chemical Properties

| | | | |
|---|---|---|---|
| **Physical State and Appearance** | Bright oily liquid. | **Viscosity** | 1.3 - 4.4 cSt @ 40ºC (104ºF) |
| **Colour** | Clear to yellow / brown (may be dyed for taxation purposes). | **Pour Point** | Not available. |
| **Odour** | Mild petroleum oil like. | **Softening Point** | Not available. |
| **Odour Threshold** | Not available. | **Dropping Point** | Not available. |
| **Boiling Point** | 150 to 371°C (302 to 699.8°F) | **Penetration** | Not available. |
| **Density** | 0.8 to 0.88 kg/L @ 15ºC (59ºF) | **Oil / Water Dist. Coefficient** | Not available. |
| **Vapour Density** | 4.5 [Air = 1] | **Ionicity (in water)** | Not available. |
| **Vapour Pressure** | 1 kPa (7.5 mm Hg) @ 20ºC (68ºF) | **Dispersion Properties** | Not available. |
| **Volatility** | Semivolatile to volatile. | **Solubility** | Insoluble in cold water, soluble in non-polar hydrocarbon solvents. |

## Section 10. Stability and Reactivity

| | | | |
|---|---|---|---|
| **Corrosivity** | Not available. | | |
| **Stability** | The product is stable under normal handling and storage conditions. | **Hazardous Polymerization** | Will not occur under normal working conditions. |
| **Incompatible Substances / Conditions to Avoid** | Reactive with oxidizing agents and acids. | **Decomposition Products** | May release COx, NOx, SOx, H2S, smoke and irritating vapours when heated to decomposition. |

## Section 11. Toxicological Information

**Routes of Entry** Skin contact, eye contact, inhalation and ingestion.

**Acute Lethality** Acute toxicity information is not available for the product as a whole, therefore, data for some of the ingredients is provided below:

**Distillates (petroleum), hydrodesulfurized middle (64742-80-9):**
Acute Inhalation toxicity (LC50): 4600 mg/m³/4h (rat)

**Kerosine (petroleum), hydrosulfurized (64742-81-0):**
Acute Oral toxicity (LD50): >5000 mg/kg (rat)
Acute Dermal toxicity (LD50): >2000 mg/kg (rabbit)
Acute Inhalation toxicity (LC50): >5000 mg/m³/4h (rat)

**Fuels, diesel (68334-30-5):**
Acute Oral toxicity (LD50): 7500 mg/kg (rat)
Acute Dermal toxicity (LD50): 24500 mg/kg (mouse)

| | |
|---|---|
| | **Fuel oil no. 2 (68476-30-2):**<br>Acute Oral toxicity (LD50): 12000 mg/kg (rat) |
| **Chronic or Other Toxic Effects** | |
| Dermal Route: | This product contains a component (at >= 1%) that can cause skin irritation. Therefore, this product is considered to be a skin irritant. Prolonged or repeated contact may defat and dry skin, and cause dermatitis. (See Other Considerations) |
| Inhalation Route: | Inhalation of this product may cause respiratory tract irritation. Inhalation of this product may cause Central Nervous System (CNS) Depression, symptoms of which may include; weakness, dizziness, slurred speech, drowsiness, unconsciousness and in cases of severe overexposure; coma and death. |
| Oral Route: | Ingestion of this product may cause gastro-intestinal irritation. Aspiration of this product may result in severe irritation or burns to the respiratory tract. Ingestion of this product may cause Central Nervous System (CNS) Depression, symptoms of which may include; weakness, dizziness, slurred speech, drowsiness, unconsciousness and in cases of severe overexposure; coma and death. |
| Eye Irritation/Inflammation: | Short-term exposure is expected to cause only slight irritation, if any. |
| Immunotoxicity: | Not available. |
| Skin Sensitization: | Contact with this product is not expected to cause skin sensitization, based upon the available data and the known hazards of the components. |
| Respiratory Tract Sensitization: | Contact with this product is not expected to cause respiratory tract sensitization, based upon the available data and the known hazards of the components. |
| Mutagenic: | This product is not known to contain any components at >= 0.1% that have been shown to cause mutagenicity. Therefore, based upon the available data and the known hazards of the components, this product is not expected to be a mutagen. |
| Reproductive Toxicity: | This product is not known to contain any components at >= 0.1% that have been shown to cause reproductive toxicity. Therefore, based upon the available data and the known hazards of the components, this product is not expected to be a reproductive toxin. |
| Teratogenicity/Embryotoxicity: | This product is not known to contain any components at >= 0.1% that have been shown to cause teratogenicity and/or embryotoxicity. Therefore, based upon the available data and the known hazards of the components, this product is not expected to be a teratogen/embryotoxin. |
| Carcinogenicity (ACGIH): | Considered to be A3 by the ACGIH (Kerosine (petroleum), hydrodesulfurized; Fuels, diesel; Fuel oil no. 2) (See Other Considerations) |
| Carcinogenicity (IARC): | This product is not known to contain any chemicals at reportable quantities that are listed as group 1, 2A or 2B carcinogens by IARC. |
| Carcinogenicity (NTP): | This product is not known to contain any chemicals at reportable quantities that are listed as carcinogens by NTP. |
| Carcinogenicity (IRIS): | This product is not known to contain any chemicals at reportable quantities that are listed as carcinogens by IRIS. |
| Carcinogenicity (OSHA): | This product is not known to contain any chemicals at reportable quantities that are listed as carcinogens by OSHA. |
| **Other Considerations** | Avoid prolonged or repeated skin contact to diesel fuels which can lead to dermal irritation and may be associated with an increased risk of skin cancer.<br>Diesel engine exhaust particulate is probably carcinogenic to humans (IARC Group 2A). |

## *Section 12. Ecological Information*

| | | | |
|---|---|---|---|
| **Environmental Fate** | Not available. | **Persistance/ Bioaccumulation Potential** | Not available. |
| **BOD5 and COD** | Not available. | **Products of Biodegradation** | Not available. |
| **Additional Remarks** | No additional remark. | | |

## Section 13. Disposal Considerations

**Waste Disposal** Spent/ used/ waste product may meet the requirements of a hazardous waste. Consult your local or regional authorities. Ensure that waste management processes are in compliance with government requirements and local disposal regulations.

## Section 14. Transport Information

| | | | |
|---|---|---|---|
| **TDG Classification** | DIESEL FUEL, 3, UN1202, PGIII (CL-TDG) | **Special Provisions for Transport** | See Transportation of Dangerous Goods Regulations. |

## Section 15. Regulatory Information

**Other Regulations** This product is acceptable for use under the provisions of WHMIS-CPR. All components of this formulation are listed on the CEPA-DSL (Domestic Substances List).

All components of this formulation are listed on the US EPA-TSCA Inventory.

All components of this product are on the European Inventory of Existing Commercial Chemical Substances (EINECS).

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

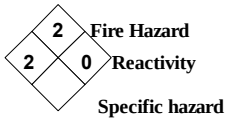
Please contact Product Safety for more information.

| | | | |
|---|---|---|---|
| **DSD/DPD (Europe)** | Not evaluated. | **HCS (U.S.A.)** | CLASS: Irritating substance.<br>CLASS: Target organ effects.<br>CLASS: Combustible liquid having a flash point between 37.8°C (100°F) and 93.3°C (200°F). |
| **ADR (Europe) (Pictograms)** | NOT EVALUATED FOR EUROPEAN TRANSPORT<br>NON ÉVALUÉ POUR LE TRANSPORT EUROPÉEN. | **DOT (U.S.A) (Pictograms)** | Not evaluated for transport<br>Non évalué pour le transport |

**HMIS (U.S.A.)**

| | |
|---|---|
| Health Hazard | 2* |
| Fire Hazard | 2 |
| Reactivity | 0 |
| Personal Protection | H |

**NFPA (U.S.A.)**




**Rating**
0 Insignificant
1 Slight
2 Moderate
3 High
4 Extreme

## Section 16. Other Information

**References** Available upon request.
* Marque de commerce de Petro-Canada - Trademark

**Glossary**

ACGIH - American Conference of Governmental Industrial Hygienists
ADR - Agreement on Dangerous goods by Road (Europe)
ASTM - American Society for Testing and Materials
BOD5 - Biological Oxygen Demand in 5 days
CAS - Chemical Abstract Services
CEPA - Canadian Environmental Protection Act
CERCLA - Comprehensive Environmental Response, Compensation and Liability Act
CFR - Code of Federal Regulations
CHIP - Chemical Hazard Information and Packaging Approved Supply List
COD - Chemical Oxygen Demand
CPR - Controlled Products Regulations
DOT - Department of Transportation (U.S.A.)
DSCL - Dangerous Substances Classification and Labeling (Europe)
DSD/DPD - Dangerous Substance or Dangerous Preparations Directives (Europe)
DSL - Domestic Substance List (Canada)
EEC/EU - European Economic Community/European Union
EINECS - European Inventory of Existing Commercial Chemical Substances
EPCRA - Emergency Planning And Community Right-To-Know Act
FDA - Food and Drug Administration
FIFRA - Federal Insecticide, Fungicide, and Rodenticide Act
HCS - Hazardous Communication System
HMIS - Hazardous Material Information System
IARC - International Agency for Research on Cancer
IRIS - Integrated Risk Information System
LD50/LC50 - Lethal Dose/Concentration kill 50%
LDLo/LCLo - Lowest Published Lethal Dose/Concentration
NFPA - National Fire Prevention Association
NIOSH - National Institute for Occupational Safety & Health
NPRI - National Pollutant Release Inventory
NSNR - New Substances Notification Regulations (Canada)
NTP - National Toxicology Program
OSHA - Occupational Safety & Health Administration
PEL - Permissible Exposure Limit
RCRA - Resource Conservation and Recovery Act
SARA - Superfund Amendments and Reorganization Act
STEL - Short Term Exposure Limit (15 minutes)
TDG - Transportation Dangerous Goods (Canada)
TDLo/TCLo - Lowest Published Toxic Dose/Concentration
TLV-TWA - Threshold Limit Value-Time Weighted Average
TLm - Median Tolerance Limit
TSCA - Toxic Substances Control Act
USEPA - United States Environmental Protection Agency
USP - United States Pharmacopoeia
WHMIS - Workplace Hazardous Material Information System

**For Copy of MSDS**

**Prepared by Product Safety - JDW on 2/5/2007.**

**Internet: www.petro-canada.ca/msds**

**Canada-wide: telephone: 1-800-668-0220; fax: 1-800-837-1228**

**For Product Safety Information: (905) 804-4752**

**Data entry by Product Safety - JDW.**

***To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.***

# Material Safety Data Sheet

**Dyno Nobel Inc.**
2650 Decker Lake Boulevard, Suite 300
Salt Lake City, Utah 84119
Phone: 801-364-4800 Fax: 801-321-6703
E-Mail: dnna.hse@am.dynonobel.com
**FOR 24 HOUR EMERGENCY, CALL CHEMTREC (USA) 800-424-9300**
**CANUTEC (CANADA) 613-996-6666**

**MSDS # 1019**
**Date 01/24/05**

Supercedes
MSDS # 1019 09/09/04

## SECTION I - PRODUCT IDENTIFICATION

**Trade Name(s):**

D-GEL™ 1000
DYNOSPLIT®: D1, D3/4, D 7/8
EXTRA GELATIN: 40%, 75%
GELAPRIME® F
UNIGEL®
UNIMAX®
VIBROGEL®: 1,3
Z POWDER™
DYNOMAX PRO™
Oil Well Explosive 80%
Oil Well Explosive 100%
STONECUTTER™
REDH®A
RED H® B
POWERGEL D
60% Hi-Pressure Gelatin
IRESPLIT® D
IP: 724, 738

**Product Class:** Packaged Dynamites and Blasting Gelatins
**Product Appearance & Odor:** Powdery to gelatinous solid, light tan to dark brown color. Faint, waxy odor.
**DOT Hazard Shipping Description:** Explosive, blasting, type A 1.1D UN0081 II
**NFPA Hazard Classification:** Not Available (See Section IV - Special Fire Fighting Procedures)

## SECTION II - HAZARDOUS INGREDIENTS

| Ingredients: | CAS# | % (Range) | ACGIH TLV-TWA |
|---|---|---|---|
| Nitroglycerin (NG) | 55-63-0 | 1-20 | 0.05 ppm |
| Ethylene Glycol Dinitrate (EGDN) | 628-96-6 | 8-76 | 0.05 ppm |
| Nitrocellulose | 9004-70-0 | 0-6 | No Value Established |
| Ammonium Nitrate | 6484-52-2 | 0-75 | No Value Established |
| Sodium Nitrate[1] | 7631-99-4 | 0-50 | No Value Established |
| Sulfur[2] | 7704-34-9 | 0-4 | No Value Established |

[1] Our source of Sodium Nitrate (Chilean) may contain perchlorate ion, which occurs naturally. Although Dyno Nobel does not analyze for the presence of perchlorate anion, based on published studies, the products listed above may contain between 0 and 1,000 ppm perchlorate.

[2] This ingredient is not found in most of the products listed above.

Ingredients, other than those mentioned above, as used in this product are not hazardous as defined under current Department of Labor regulations, or are present in deminimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).

## SECTION III - PHYSICAL DATA

**Boiling Point:** Not Applicable
**Vapor Density:** Not Applicable
**Vapor Pressure:** Not Applicable
**Density:** 0.8-1.48 g/cc



DYNO
Dyno Nobel
Groundbreaking Performance

**Percent Volatile by Volume:** Not Applicable

**Evaporation Rate (Butyl Acetate = 1):** Not Applicable

**Solubility in Water:** Ammonium and sodium nitrates are completely soluble. NG and EGDN are very slightly soluble.

## SECTION IV - FIRE AND EXPLOSION HAZARD DATA

**Flash Point:** Not Applicable

**Flammable Limits:** Not Applicable

**Extinguishing Media:** (See Special Fire Fighting Procedures section.)

**Special Fire Fighting Procedures:** Do not attempt to fight fires involving explosive materials. Evacuate all personnel to a predetermined safe location, no less than 2,500 feet in all directions.

**Unusual Fire and Explosion Hazards:** Can explode or detonate under fire conditions. Burning material may produce toxic vapors.

## SECTION V - HEALTH HAZARD DATA

### Effects of Overexposure

**Eyes:** May cause irritation, redness and tearing.

**Skin:** Contact may result in headache, nausea and blood vessel dilation.

**Ingestion:** May result in headache, nausea, intestinal upset and blood vessel dilation.

**Inhalation:** May result in headache, nausea and blood vessel dilation.

**Systemic or Other Effects:** *Perchlorate*: Perchlorate can potentially inhibit iodide uptake by the thyroid and result in a decrease in thyroid hormone. The National Academy of Sciences (NAS) has reviewed the toxicity of perchlorate and has concluded that even the most sensitive populations could ingest up to 0.7 microgram perchlorate per kilogram of body weight per day without adversely affecting health. The USEPA must establish a maximum contaminant level (MCL) for perchlorate in drinking water by 2007, and this study by NAS may result in a recommendation of about 20 ppb for the MCL.

### Emergency and First Aid Procedures

**Eyes:** Irrigate with running water for at least fifteen minutes. If irritation persists, seek medical attention.

**Skin:** Remove contaminated clothing. Wash with soap and water.

**Ingestion:** Seek medical attention.

**Inhalation:** Remove to fresh air. If irritation persists, seek medical attention.

**Special Considerations:** None.

## SECTION VI - REACTIVITY DATA

**Stability:** Stable under normal conditions. May explode when subjected to fire, supersonic shock, or high-energy projectile impact, especially when confined or in large quantities.

**Conditions to Avoid:** Keep away from heat, flame, ignition sources and strong shock.

**Materials to Avoid (Incompatibility):** Corrosives (mineral acids, bases, strong acids).

**Hazardous Decomposition Products:** Carbon Monoxide (CO), Hydrogen Sulfide ($H_2S$), Nitrous Oxides ($NO_X$), and Sulfur Oxides ($SO_X$).

**Hazardous Polymerization:** Will not occur.

## SECTION VII - SPILL OR LEAK PROCEDURES

**Steps to be taken in Case Material is Released or Spilled:** Protect from all ignition sources. In case of fire evacuate area not less than 2,500 feet in all directions. Notify authorities in accordance with emergency response procedures. Only personnel trained in emergency response should respond. If no fire danger is present, and product is undamaged

and/or uncontaminated, repackage product in original packaging or other clean DOT approved container. Ensure that a complete account of product has been made and is verified. Follow applicable Federal, State, and local spill reporting requirements. Contact of this product with water may result in a reportable release.

**Waste Disposal Method:** Disposal must comply with Federal, State and local regulations. If product becomes a waste, it is potentially regulated as a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR, part 261. Review disposal requirements with a person knowledgeable with applicable environmental law (RCRA) before disposing of any explosive material.

## SECTION VIII - SPECIAL PROTECTION INFORMATION

**Ventilation:** Forced ventilation may be necessary where natural ventilation is limited. Magazines containing NG and/or EGDN based explosives must be ventilated before entry.
**Respiratory Protection:** None normally required.
**Protective Clothing:** Chemical resistant (nitrile) gloves are suggested.
**Eye Protection:** Safety glasses are recommended.
**Other Precautions Required:** Inhalation and skin contact should be minimized to avoid headaches, nausea, and blood vessel dilation. Protective clothing should be changed daily, more often if contaminated.

## SECTION IX - SPECIAL PRECAUTIONS

**Precautions to be taken in handling and storage:** Store in cool, dry, well-ventilated location. Store in compliance with Federal, State, and local regulations. Keep away from heat, flame, ignition sources, and strong shock.
**Precautions to be taken during use:** Avoid breathing the fumes or gases from detonation of explosives. Use accepted safe industry practices when using explosive materials. Unintended detonation of explosives or explosive devices can cause serious injury or death.
**Other Precautions:** It is recommended that users of explosive materials be familiar with the Institute of Makers of Explosives Safety Library Publications.

## SECTION X - SPECIAL INFORMATION

| Chemical Name | CAS Number | % By Weight |
|---|---|---|
| Nitroglycerin | 55-63-0 | 1-20 |

The reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR 372 may become applicable if the physical state of this product is changed to an aqueous solution. If an aqueous solution of this product is manufactured, processed, or otherwise used, the nitrate compounds category and ammonia listing of the previously referenced regulation should be reviewed.

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# Material Safety Data Sheet

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**CANUTEC (CANADA) 613-996-6666**

**MSDS # 1076**
**Date 01/24/05**

Supercedes
MSDS # 1076 01/22/03

## SECTION I - PRODUCT IDENTIFICATION

**Trade Name(s):** ELECTRIC SUPER™ COAL
ELECTRIC SUPER™ LP
ELECTRIC SUPER™ SP
ELECTRIC SUPER™ SEISMIC
ELECTRIC SUPER™ INSTANT

**Product Class:** Commercial Electric Detonators and Accessory Products

**Product Appearance & Odor:** Metal cylinder with varying length of attached plastic coated wires.

**DOT Hazard Shipping Description:** Detonators, Electric 1.1B UN0030 II
Or
Detonators, Electric 1.4B UN0255 II
Or
Detonators, Electric 1.4S UN0456 II

**NFPA Hazard Classification:** Not Applicable (See Section IV - Special Fire Fighting Procedures)

## SECTION II - HAZARDOUS INGREDIENTS

| | | EXPOSURE LIMITS | |
|---|---|---|---|
| **Ingredients** | **CAS#** | **OSHA PEL-TWA** | **ACGIH TLV-TWA** |
| Tungsten | 7440-33-7 | None[1] | 5 mg/m$^3$ (TWA)<br>10 mg/m$^3$ (STEL) |
| Barium Chromate | 10294-40-3 | 1 mg ($CrO_3$)/10m$^3$ (ceiling)<br>0.5 mg (Ba)/m$^3$ | 0.01 mg (Cr)/m$^3$<br>0.5 mg (Ba)/m$^3$ |
| Lead Compounds | ---------- | 0.5 mg (Pb)/m$^3$ | 0.5 mg (Pb)/m$^3$ |
| Pentaerythritol Tetranitrate (PETN) | 78-11-5 | None[1] | None[2] |
| Boron | 7440-42-8 | No Value Established | No Value Established |
| Potassium Perchlorate[3] | 7778-74-7 | None[1] | None[2] |
| Diazodinitrophenol (DDNP) | 4682-03-5 | No Value Established | No Value Established |
| Nitrocellulose | 9004-70-0 | No Value Established | No Value Established |

[1] Use limit for particulates not otherwise regulated (PNOR): Total dust, 15 mg/m$^3$ ; respirable fraction, 5 mg/m$^3$ .
[2] Use limit for particulates not otherwise classified (PNOC): Inhalable particulate, 10 mg/m$^3$ ; respirable part., 3 mg/m$^3$ .
[3] Not all delay periods contain perchlorate. Those that do contain between from about 4 to a maximum of about 25 mg perchlorate per detonator.



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Ingredients, other than those mentioned above, as used in this product are not hazardous as defined under current Department of Labor regulations, or are present in deminimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).

## SECTION III - PHYSICAL DATA

**Boiling Point:** Not Applicable
**Vapor Pressure:** Not Applicable
**Vapor Density:** Not Applicable
**Density:** Not Applicable
**Percent Volatile by Volume:** Not Applicable
**Solubility in Water:** Not Applicable

## SECTION IV - FIRE AND EXPLOSION HAZARD DATA

**Flash Point:** Not Applicable
**Flammable Limits:** Not Applicable
**Extinguishing Media:** None
**Special Fire Fighting Procedures:** Do not attempt to fight fires involving explosive materials. Evacuate all personnel to a predetermined safe location, no less than 2,500 feet in all directions.
**Unusual Fire and Explosion Hazards:** Can explode or detonate under fire conditions. Burning material may produce toxic vapors.

## SECTION V - HEALTH HAZARD DATA

### Effects of Overexposure

This is a packaged product that will not result in exposure to the explosive material under normal conditions of use. Exposure concerns are primarily with post-detonation reaction products, particularly heavy metal compounds.

**Eyes:** No exposure to chemical hazards anticipated with normal handling procedures. Particulates in the eye may cause irritation, redness and tearing.
**Skin:** No exposure to chemical hazards anticipated with normal handling procedures.
**Ingestion:** No exposure to chemical hazards anticipated with normal handling procedures.
**Inhalation:** Not a likely route of exposure.
**Systemic or Other Effects:** None anticipated with normal handling procedures. Repeated inhalation or ingestion of post-detonation reaction products may lead to systemic effects such as respiratory tract irritation, ringing of the ears, dizziness, elevated blood pressure, blurred vision and tremors. Heavy metal (lead) poisoning can occur.
*Carcinogenicity*: ACGIH classifies Lead as a “Suspected Human Carcinogen” and insoluble Chromium VI as “Confirmed Human Carcinogen”. NTP, OSHA, and IARC consider components contained in this detonator carcinogenic.
*Perchlorate*: Perchlorate can potentially inhibit iodide uptake by the thyroid and result in a decrease in thyroid hormone. The National Academy of Sciences (NAS) has reviewed the toxicity of perchlorate and has concluded that even the most sensitive populations could ingest up to 0.7 microgram perchlorate per kilogram of body weight per day without adversely affecting health. The USEPA must establish a maximum contaminant level (MCL) for perchlorate in drinking water by 2007, and this study by NAS may result in a recommendation of about 20 ppb for the MCL.

### Emergency and First Aid Procedures

**Eyes:** Irrigate with running water for at least fifteen minutes. If irritation persists, seek medical attention.
**Skin:** Wash with soap and water.
**Ingestion:** Seek medical attention.
**Inhalation:** Not applicable.
**Special Considerations:** None

# Material Safety Data Sheet

## SECTION VI - REACTIVITY DATA

**Stability:** Stable under normal conditions, may explode when subjected to fire, supersonic shock or high-energy projectile impact, especially when confined or in large quantities.
**Conditions to Avoid:** Keep away from heat, flame, ignition sources, strong shock and electrical impulse. Do not attempt to disassemble.
**Materials to Avoid (Incompatibility):** Corrosives (acids and bases)
**Hazardous Decomposition Products**: Carbon Monoxide (CO), Nitrous Oxides ($NO_x$), Lead (Pb) and various oxides and complex oxides of metals.
**Hazardous Polymerization:** Will not occur.

## SECTION VII - SPILL OR LEAK PROCEDURES

**Steps to be taken in Case Material is Released or Spilled:** Protect from all ignition sources. In case of fire evacuate area not less than 2,500 feet in all directions. Notify authorities in accordance with emergency response procedures. Only personnel trained in emergency response should respond. If no fire danger is present, and product is undamaged and/or uncontaminated, repackage product in original packaging or other clean DOT approved container. Ensure that a complete account of product has been made and is verified. Follow applicable Federal, State, and local spill reporting requirements.
**Waste Disposal Method:** Disposal must comply with Federal, State and local regulations. If product becomes a waste, it is potentially regulated as a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR, part 261. Review disposal requirements with a person knowledgeable with applicable environmental law (RCRA) before disposing of any explosive material.

## SECTION VIII - SPECIAL PROTECTION INFORMATION

**Ventilation:** Not required for normal handling.
**Respiratory Protection:** None normally required.
**Protective Clothing:** Cotton clothing is suggested.
**Eye Protection:** Safety glasses are recommended.
**Other Precautions Required:** None.

## SECTION IX - SPECIAL PRECAUTIONS

**Precautions to be taken in handling and storage:** Store in cool, dry, well-ventilated location. Store in compliance with Federal, State, and local regulations. Keep away from heat, flame, ignition sources, strong shock, and electrical impulses.
**Precautions to be taken during use:** Avoid breathing the fumes or gases from detonation of explosives. Use accepted safe industry practices when using explosive materials. Unintended detonation of explosives or explosive devices can cause serious injury or death.
**Other Precautions:** It is recommended that users of explosive materials be familiar with the Institute of Makers of Explosives Safety Library Publications.

# Material Safety Data Sheet

## SECTION X - SPECIAL INFORMATION

This product contains the following substances that are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

| Chemical Name | CAS Number (Use Toxic Chemical Category Code) | % By Weight |
|---|---|---|
| Barium Compounds | N040 | 1.2 |
| Lead Compounds | N420 | 0 – 0.59 |
| Chromium Compounds | N090 | 1.2 |

| Amount of Lead in Detonator Product Line * | | | | |
|---|---|---|---|---|
| **Product** | **Pb compounds in detonator [grams]** | **Pb compounds in detonator [Wt.%]** | **Pb in detonator [grams]** | **Pb in detonator [Wt. %]** |
| **Electric Super SP** | **0.0412** | **0.588%** | **0.0357** | **0.5093%** |
| **Electric Super LP** | **0.0412** | **0.588%** | **0.0357** | **0.5093%** |
| **Electric Super Coal** | **0.0412** | **0.588%** | **0.0357** | **0.5093%** |
| **Electric Super Seismic** | **0.0000** | **0.0000%** | **0.0000** | **0.0000%** |
| **Electric Super Instant** | **0.0000** | **0.0000%** | **0.0000** | **0.0000%** |

*****Applies to only the detonator (source of lead). Do not use case weight or weight of any other component.

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**MSDS # 1049**
**Date 02/07/05**

Supercedes
MSDS # 1049 01/24/03

## SECTION I - PRODUCT IDENTIFICATION

**Trade Name(s):** N-36
N-37
N-39
N-40
N-52

**Product Class:** Emulsifier

**Product Appearance & Odor:** Dark, viscous liquid with a slightly pungent hydrocarbon odor.

**DOT Hazard Shipping Description:** Combustible liquid, n.o.s. (Alkanolamine), NA 1993 III
Shipped in drums or bulk tanker.

**NFPA Hazard Classification:** Health (Blue) = 2
Flammability (Red) = 1
Reactivity (Yellow) = 0

## SECTION II - HAZARDOUS INGREDIENTS

| | | | Occupational Exposure Limits | |
|---|---|---|---|---|
| **Ingredients:** | **CAS#** | **% (Range)** | **ACGIH TLV-TWA** | **OSHA PEL-TWA** |
| Alkanolamine | 100-37-8 | 1-6 | 10 mg/m$^3$ | 50 mg/m$^3$ |
| Mineral Oil (Mist) | 64742-35-4 | 5-70 | 5 mg/m$^3$ | None |

Ingredients, other than those mentioned above, as used in this product are not hazardous as defined under current Department of Labor regulations, or are present in deminimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).

## SECTION III - PHYSICAL DATA

**Boiling Point:** >150°C (302°F)
**Vapor Density:** >1
**Percent Volatile by Volume:** <5
**Evaporation Rate (Butyl Acetate = 1):** <1

**Vapor Pressure:** <1 mm Hg at 20°C
**Density:** 0.87-0.92 g/cc
**Solubility in Water:** Insoluble



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## SECTION IV - FIRE AND EXPLOSION HAZARD DATA

**Flash Point:** 79°C (174°F) **Flammable Limits:** Not Determined
**Extinguishing Media:** Use carbon dioxide or dry chemical on small fires. Use foam (alcohol, polymer or ordinary) and water spray for large fires.
**Special Fire Fighting Procedures:** Self contained breathing apparatus and protective clothing should be worn when fighting fires involving chemicals.
**Unusual Fire and Explosion Hazards:** None known.

## SECTION V - HEALTH HAZARD DATA

### Effects of Overexposure

**Eyes:** May cause irritation, redness and tearing.
**Skin:** Prolonged contact may cause irritation.
**Ingestion:** Large amounts may be harmful if swallowed.
**Inhalation:** May cause dizziness, nausea, intestinal upset.
**Systemic or Other Effects:** None known.

### Emergency and First Aid Procedures

**Eyes:** Irrigate with running water for at least fifteen minutes. If irritation persists, seek medical attention.
**Skin:** Remove contaminated clothing. Wash with soap and water.
**Ingestion:** Seek medical attention.
**Inhalation:** Remove to fresh air. If irritation persists, seek medical attention.
**Special Considerations:** None.

## SECTION VI - REACTIVITY DATA

**Stability:** Stable under normal conditions.
**Conditions to Avoid:** See Below
**Materials to Avoid (Incompatibility):** Strong oxidizing material can cause a reaction.
**Hazardous Decomposition Products:** Thermal decomposition or burning may produce Carbon Monoxide (CO) and/or Nitrogen Oxides ($NO_X$).
**Hazardous Polymerization:** Will not occur.

## SECTION VII - SPILL OR LEAK PROCEDURES

**Steps to be taken in Case Material is Released or Spilled:** Use appropriate safety equipment. Use absorbent material to collect and contain for disposal. Contain large spills and pump into a suitable tank. Wash area with suitable detergent and thoroughly rinse. Follow applicable Federal, State and local reporting requirements.
**Waste Disposal Method:** Disposal must comply with Federal, State and local regulations.

## SECTION VIII - SPECIAL PROTECTION INFORMATION

**Ventilation:** Ventilation must be adequate to prevent exposure to high concentrations of vapors. Mechanical ventilation is recommended for enclosed areas and/or when product is at elevated temperatures.

**Respiratory Protection:** Do not breath vapors. A suitable respirator is strongly recommended when ventilation is marginal or the product is being handled at elevated temperatures.
**Protective Clothing:** Body-covering clothing and rubber gloves are recommended. Remove contaminated clothing to prevent prolonged skin contact.
**Eye Protection:** Safety glasses are recommended.
**Other Precautions Required:** None.

## SECTION IX - SPECIAL PRECAUTIONS

**Precautions to be taken in handling and storage:** Store in compliance with all Federal, State, and local regulations.
**Other Precautions:** Store only in well-ventilated areas at temperatures below the flash point. Keep all containers tightly sealed, including empty containers. Do not breathe vapors when opening containers.

## SECTION X - SPECIAL INFORMATION

This product contains the following substances that are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

| Chemical Name | CAS Number | % By Weight |
|---|---|---|
| None | | |

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# Material Safety Data Sheet
## Ethylene glycol

ACC# 09400

## Section 1 - Chemical Product and Company Identification

**MSDS Name:** Ethylene glycol
**Catalog Numbers:** AC146750000, AC146750010, AC146750025, AC146750250, AC295530000, AC295530010, AC295530025, AC295530051, AC410010000, AC410010010, AC410010040, AC410010200, S79007, S80005, S800051, S93233, BP230-1, BP230-4, E177-20, E177-4, E178-1, E178-200, E178-4, E178-500, E178J-4, E184-4, S800052, ZZE1785C15
**Synonyms:** 1,2-Dihydroxyethane; 1,2-Ethanediol; Ethylene alcohol; Glycol.
**Company Identification:**

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

**For information, call:** 201-796-7100
**Emergency Number:** 201-796-7100
**For CHEMTREC assistance, call:** 800-424-9300
**For International CHEMTREC assistance, call:** 703-527-3887

## Section 2 - Composition, Information on Ingredients

| CAS# | Chemical Name | Percent | EINECS/ELINCS |
|---|---|---|---|
| 107-21-1 | Ethylene glycol | >95 | 203-473-3 |

## Section 3 - Hazards Identification

### EMERGENCY OVERVIEW

Appearance: viscous liquid.
**Warning!** Causes eye irritation. May be harmful if swallowed. May cause kidney damage. May cause central nervous system effects. Hygroscopic (absorbs moisture from the air).
**Target Organs:** Kidneys, central nervous system, respiratory system, eyes.

### Potential Health Effects

**Eye:** May cause moderate eye irritation.
**Skin:** Low hazard for usual industrial handling. A single prolonged skin exposure is not likely to result in the material being absorbed in harmful amounts.
**Ingestion:** The lethal dose in adult humans for ethylene glycol is about 100 ml (1/3 cup). Swallowing may cause nausea, vomiting or diarrhea. Excessive exposure may cause CNS effects, cardiopulmonary effects (metabolic acidosis), and kidney failure. Toxicity follows 3-stage progression. (1) involves central nervous system effects including paralysis of eye muscles, convulsions, and coma. Metabolic acidosis and cerebral swelling may also occur. (2) involves cardiopulmonary system with symptoms of hypertension, rapid heart beat, and possible cardiac failure. (3) involves severe kidney abnormalities including possible renal failure.
**Inhalation:** If ethylene glycol is heated or misted in work areas that are poorly ventilated, vapor/mist may accumulate and cause respiratory irritation and symptoms such as headache and

nausea. Material has a very low vapor pressure at room temperature, so inhalation exposures are not expected unless material is heated or misted.
**Chronic:** May cause kidney injury. Repeated excessive exposure to ethylene glycol may cause irritation of the upper respiratory tract. In humans, effects have been reported on the central nervous system, including nystagmus (involuntary, rapid, rhythmic movement of the eyeball).

## Section 4 - First Aid Measures

**Eyes:** In case of contact, immediately flush eyes with plenty of water for a t least 15 minutes. Get medical aid.
**Skin:** In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.
**Ingestion:** If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.
**Inhalation:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
**Notes to Physician:** Treat symptomatically and supportively.

## Section 5 - Fire Fighting Measures

**General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.
**Extinguishing Media:** Use extinguishing media most appropriate for the surrounding fire.
**Flash Point:** 111 deg C ( 231.80 deg F)
**Autoignition Temperature:** 398 deg C ( 748.40 deg F)
**Explosion Limits, Lower:**3.20 vol %
**Upper:** 15.30 vol %
**NFPA Rating:** (estimated) Health: 2; Flammability: 1; Instability: 0

## Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.
**Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container.

## Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Avoid contact with eyes, skin, and clothing. Avoid breathing spray or mist.
**Storage:** Store in a cool, dry, well-ventilated area away from incompatible substances. Store protected from moisture.

## Section 8 - Exposure Controls, Personal Protection

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

**Exposure Limits**

| Chemical Name | ACGIH | NIOSH | OSHA - Final PELs |
|---|---|---|---|
| Ethylene glycol | 100 mg/m3 Ceiling (aerosol only) | none listed | none listed |

**OSHA Vacated PELs:** Ethylene glycol: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear chemical splash goggles.

**Skin:** Glove protection is not normally required.

**Clothing:** Protective garments not normally required.

**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

## Section 9 - Physical and Chemical Properties

**Physical State:** Liquid

**Appearance:** clear, colorless - syrupy - viscous

**Odor:** sweetish odor

**pH:** Not available.

**Vapor Pressure:** 0.05 mm Hg @ 20 deg C

**Vapor Density:** 2.14 (air=1)

**Evaporation Rate:**Not available.

**Viscosity:** 21cP @ 20 deg C

**Boiling Point:** 197 deg C @ 760 mmHg

**Freezing/Melting Point:**-13 deg C

**Decomposition Temperature:**Not available.

**Solubility:** Soluble.

**Specific Gravity/Density:**1.113 g/ml

**Molecular Formula:**C2H6O2

**Molecular Weight:**62.06

## Section 10 - Stability and Reactivity

**Chemical Stability:** Stable at room temperature in closed containers under normal storage and handling conditions. Hygroscopic: absorbs moisture or water from the air.

**Conditions to Avoid:** Moisture, excess heat.

**Incompatibilities with Other Materials:** Strong oxidizing agents, strong acids, isocyanates, aliphatic amines, caustics.

**Hazardous Decomposition Products:** Carbon monoxide, carbon dioxide.

**Hazardous Polymerization:** Will not occur.

## Section 11 - Toxicological Information

**RTECS#:**
**CAS#** 107-21-1: KW2975000
**LD50/LC50:**
CAS# 107-21-1:
Draize test, rabbit, eye: 500 mg/24H Mild;
Draize test, rabbit, eye: 100 mg/1H Mild;
Draize test, rabbit, eye: 0.012 ppm/3D;
Draize test, rabbit, eye: 1440 mg/6H Moderate;
Oral, mouse: LD50 = 5500 mg/kg;
Oral, rat: LD50 = 4700 mg/kg;
Skin, rabbit: LD50 = 9530 uL/kg;
.
Ethylene glycol is more acutely toxic for humans than for laboratory animals by ingestion. The single oral lethal dose for humans has been estimated at 1.4 ml/kg (1.56 g/kg) or about 100 ml (111 g) for an adult.
**Carcinogenicity:**
CAS# 107-21-1: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

**Epidemiology:** No data available.
**Teratogenicity:** An expert panel convened by the NTP's Center for the Evaluation of Risks to Human Reproduction concluded 2/13/03 that developmental and reproductive risks stemming from exposure to the chemicals propylene glycol and ethylene glycol are negligible.
**Reproductive Effects:** No data available.
**Mutagenicity:** No data available.
**Neurotoxicity:** No data available.
**Other Studies:**

## Section 12 - Ecological Information

**Ecotoxicity:** Fish: Rainbow trout: LC50 = 41000 mg/L; 96 Hr.; Unspecified
Fish: Bluegill/Sunfish: LC50 = 27500-41000 mg/L; 96 Hr.; Unspecified
Fish: Goldfish: LC50 = 27500-41000 mg/L; 96 Hr.; Unspecified
Water flea Phytobacterium phosphoreum: LC50 = 46300 mg/L; 48 Hr.; Unspecified

## Section 13 - Disposal Considerations

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

## Section 14 - Transport Information

| | US DOT | Canada TDG |
|---|---|---|
| **Shipping Name:** | Not regulated | Not Regulated |
| **Hazard Class:** | | |
| **UN Number:** | | |
| **Packing Group:** | | |

## Section 15 - Regulatory Information

### US FEDERAL

**TSCA**

CAS# 107-21-1 is listed on the TSCA inventory.

**Health & Safety Reporting List**

None of the chemicals are on the Health & Safety Reporting List.

**Chemical Test Rules**

None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**

None of the chemicals are listed under TSCA Section 12b.

**TSCA Significant New Use Rule**

None of the chemicals in this material have a SNUR under TSCA.

**CERCLA Hazardous Substances and corresponding RQs**

CAS# 107-21-1: 5000 lb final RQ; 2270 kg final RQ

**SARA Section 302 Extremely Hazardous Substances**

None of the chemicals in this product have a TPQ.

**SARA Codes**

CAS # 107-21-1: immediate, delayed.

**Section 313**

This material contains Ethylene glycol (CAS# 107-21-1, >95%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

**Clean Air Act:**

CAS# 107-21-1 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

**Clean Water Act:**

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

**OSHA:**

None of the chemicals in this product are considered highly hazardous by OSHA.

**STATE**

CAS# 107-21-1 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

**California Prop 65**

California No Significant Risk Level: None of the chemicals in this product are listed.

### European / International Regulations

**European Labeling in Accordance with EC Directives**

**Hazard Symbols:**

XN

**Risk Phrases:**

R 22 Harmful if swallowed.

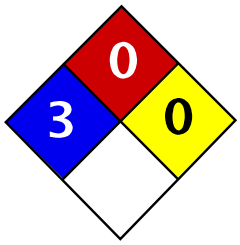
**Safety Phrases:**

**WGK (Water Danger/Protection)**
CAS# 107-21-1: 0
**Canada - DSL/NDSL**
CAS# 107-21-1 is listed on Canada's DSL List.
**Canada - WHMIS**
This product has a WHMIS classification of D2B.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.
**Canadian Ingredient Disclosure List**
CAS# 107-21-1 is listed on the Canadian Ingredient Disclosure List.

## Section 16 - Additional Information

**MSDS Creation Date:** 5/12/1999
**Revision #8 Date:** 7/24/2006

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




| | |
|---|---|
| Health | 3 |
| Fire | 0 |
| Reactivity | 0 |
| Personal Protection | J |

# Material Safety Data Sheet
## Ferric chloride hexahydrate MSDS

## Section 1: Chemical Product and Company Identification

**Product Name:** Ferric chloride hexahydrate

**Catalog Codes:** SLF1390, SLF1903

**CAS#:** 10025-77-1

**RTECS:** NO5425000

**TSCA:** TSCA 8(b) inventory: Ferric chloride hexahydrate

**CI#:** Not available.

**Synonym:** Iron (III) Chloride Hexahydrate

**Chemical Name:** Ferric Chloride Hexahydrate

**Chemical Formula:** FeCl3.6H2O

**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 |
|---|---|---|
| Ferric chloride hexahydrate | 10025-77-1 | 100 |

**Toxicological Data on Ingredients:** Ferric chloride hexahydrate LD50: Not available. LC50: Not available.

## Section 3: Hazards Identification

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

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

The substance may be toxic to kidneys, liver, spleen, cardiovascular system, Urinary system, central nervous system (CNS).
Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure of the eyes to a low level of dust can produce eye irritation. Repeated skin exposure can produce local skin destruction, or dermatitis. Repeated inhalation of dust can produce varying degree of respiratory irritation or lung damage.

## Section 4: First Aid Measures

**Eye Contact:**
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

**Skin Contact:**
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used.Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

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

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

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

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** Non-flammable.

**Auto-Ignition Temperature:** Not applicable.

**Flash Points:** Not applicable.

**Flammable Limits:** Not applicable.

**Products of Combustion:** Not available.

**Fire Hazards in Presence of Various Substances:** 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:** Not available.

**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.

**Large Spill:**
Corrosive solid.
Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. 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.. Keep container dry. Do not ingest. Do not breathe dust. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes.

**Storage:**
Hygroscopic. Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 24°C (75.2°F).

## Section 8: Exposure Controls/Personal Protection

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

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

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

**Exposure Limits:**
TWA: 1 (mg/m3) from ACGIH (TLV) [United States]
TWA: 1 (mg/m3) from NIOSHConsult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Solid. (Solid powder or lumps)

**Odor:** Not available.

**Taste:** Not available.

**Molecular Weight:** 270.3 g/mole

**Color:** Yellow. Brown.

**pH (1% soln/water):** Not available.

**Boiling Point:** Not available.

**Melting Point:** 37°C (98.6°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 1.82 (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.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Incompatible materials, heat

**Incompatibility with various substances:** Not available.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:** Hygroscopic

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Inhalation. Ingestion.

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

**Chronic Effects on Humans:**
MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells.
May cause damage to the following organs: kidneys, liver, spleen, cardiovascular system, Urinary system, central nervous system (CNS).

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

**Special Remarks on Toxicity to Animals:** LDL [Rat] - Route: Oral; Dose: 900 mg/kg

**Special Remarks on Chronic Effects on Humans:** May affect genetic material (mutagen)

**Special Remarks on other Toxic Effects on Humans:**
Acute Potential Health Effects:
Skin: Causes irritation and burns of the skin. This compound has been infrequently associated with skin sensitization in humans.
Eyes: Causes eye irritation and burns. Higher exposures may lead to corneal or conjunctival ulceration.
Ingestion: Harmful if swallowed. Causes irritation of the gastrointestinal (digestive) tract with nausea, vomiting, diarrhea and hemorrage and possible burns. May cause severe and permanent damage to the digestive tract. Delayed effects may include cardiovascular disturbances, liver/kidney damage, cerebral coma and possible death.
Inhalation: Causes irritation of the respiratory tract with possible burns.
Chronic Potential Health Effects:
May affect genetic material
Ingestion: May affect liver/spleen (increased iron levels and damage), urinary system (Kidneys, ureter, bladder), central nervous system, and cardiovascular system.
Eyes: May cause eye discoloration.

## 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:** Class 8: Corrosive material

**Identification:** : Ferric Chloride, Anhydrous UNNA: 1773 PG: III

**Special Provisions for Transport:** Not available.

## Section 15: Other Regulatory Information

**Federal and State Regulations:**
Pennsylvania RTK: Ferric chloride hexahydrate
Minnesota: Ferric chloride hexahydrate
California: Ferric chloride hexahydrate
TSCA 8(b) inventory: Ferric chloride hexahydrate

**Other Regulations:** OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

**Other Classifications:**

**WHMIS (Canada):** CLASS E: Corrosive solid.

**DSCL (EEC):**
R22- Harmful if swallowed.
R34- Causes burns.
S25- Avoid contact with eyes.
S36/37/39- Wear suitable protective clothing, gloves and eye/face protection.
S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

**HMIS (U.S.A.):**

**Health Hazard:** 3

**Fire Hazard:** 0

**Reactivity:** 0

**Personal Protection:** j

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

**Health:** 3

**Flammability:** 0

**Reactivity:** 0

**Specific hazard:**

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

## Section 16: Other Information

**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/09/2005 05:32 PM

**Last Updated:** 10/09/2005 05:32 PM

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MSDS Number: **F1360** * * * * * *Effective Date:* ***08/10/04*** * * * * * *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.

# FERRIC SUBSULFATE SOLUTION

## 1. Product Identification

**Synonyms:** Ferric sulphate, basic, solution; iron hydroxide sulfate; Monsel's solution
**CAS No.:** 1310-45-8
**Molecular Weight:** 737.7
**Chemical Formula:** Fe4(OH)2(SO4)5 (approx.) solution
**Product Codes:**
J.T. Baker: 2041
Mallinckrodt: 5548, 6430

## 2. Composition/Information on Ingredients

| Ingredient | CAS No | Percent | Hazardous |
|---|---|---|---|
| Ferric Subsulfate | 1310-45-8 | 40 - 70% | Yes |
| Water | 7732-18-5 | 30 - 60% | No |

## 3. Hazards Identification

**Emergency Overview**
---
**CAUTION! MAY BE HARMFUL IF SWALLOWED. MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT.**

**J.T. Baker SAF-T-DATA(tm)** Ratings (Provided here for your convenience)
---
Health Rating: 1 - Slight
Flammability Rating: 0 - None
Reactivity Rating: 0 - None
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
Storage Color Code: Orange (General Storage)
---

**Potential Health Effects**
---

Although little information is available in the literature, it is expected that the health hazards for iron compounds reflect those for this material.

**Inhalation:**
May cause irritation to the respiratory tract.
**Ingestion:**
Low toxicity in small quantities but larger dosages may cause nausea, vomiting, diarrhea, and black stool. Pink urine discoloration is a strong indicator of iron poisoning. Liver damage, coma, and death from iron poisoning has been reported.
**Skin Contact:**
No adverse effects expected.
**Eye Contact:**
Splashes may cause irritation.
**Chronic Exposure:**
No information found.
**Aggravation of Pre-existing Conditions:**
Persons with pre-existing skin disorders or eye problems, or impaired liver, kidney or respiratory function may be more susceptible to the effects of the substance.

---

# 4. First Aid Measures

**Inhalation:**
Remove to fresh air. Get medical attention for any breathing difficulty.
**Ingestion:**
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person.
**Skin Contact:**
Wash exposed area with soap and water. Get medical advice if irritation develops.
**Eye Contact:**
Wash thoroughly with running water. Get medical advice if irritation develops.

## 5. Fire Fighting Measures

**Fire:**
Not considered to be a fire hazard.
**Explosion:**
Not considered to be an explosion hazard.
**Fire Extinguishing Media:**
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.

## 6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust.

## 7. Handling and Storage

Store in a tightly closed container. Protect against physical damage, direct sunlight, and freezing. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

## 8. Exposure Controls/Personal Protection

**Airborne Exposure Limits:**
-ACGIH Threshold Limit Value (TLV):
1 mg/m3 (TWA) soluble iron salt as Fe
**Ventilation System:**
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
**Personal Respirators (NIOSH Approved):**
If the exposure limit is exceeded and engineering controls are not feasible, a half facepiece particulate respirator (NIOSH type N95 or better filters) may be worn for up to ten times the

exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest.. A full-face piece particulate respirator (NIOSH type N100 filters) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. 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-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

**Skin Protection:**
Wear protective gloves and clean body-covering clothing.

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

---

# 9. Physical and Chemical Properties

**Appearance:**
Reddish-brown liquid.

**Odor:**
Nearly odorless.

**Solubility:**
Miscible in water.

**Specific Gravity:**
ca. 1.54

**pH:**
Acidic to litmus.

**% Volatiles by volume @ 21C (70F):**
No information found.

**Boiling Point:**
Decomposes.

**Melting Point:**
No information found.

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

**Vapor Pressure (mm Hg):**
No information found.

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

---

# 10. Stability and Reactivity

**Stability:**
Freezes at cool temperatures. Light sensitive.

**Hazardous Decomposition Products:**
Oxides of sulfur and the contained metal.

**Hazardous Polymerization:**
Will not occur.
**Incompatibilities:**
No incompatibility data found.
**Conditions to Avoid:**
Light and low temperatures.

---

# 11. Toxicological Information

No LD50/LC50 information found relating to normal routes of occupational exposure.

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

| Ingredient | ---NTP Carcinogen--- Known | Anticipated | IARC Category |
|---|---|---|---|
| Ferric Subsulfate (1310-45-8) | No | No | None |
| Water (7732-18-5) | No | No | None |

---

# 12. Ecological Information

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

---

# 13. Disposal Considerations

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

---

# 14. Transport Information

Not regulated.

---

# 15. Regulatory Information

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

| Ingredient | TSCA | EC | Japan | Australia |
|---|---|---|---|---|
| Ferric Subsulfate (1310-45-8) | Yes | Yes | No | Yes |
| Water (7732-18-5) | Yes | Yes | Yes | Yes |

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

| Ingredient | Korea | --Canada-- DSL | NDSL | Phil. |
|---|---|---|---|---|
| Ferric Subsulfate (1310-45-8) | Yes | Yes | No | No |
| Water (7732-18-5) | Yes | Yes | No | Yes |

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

| Ingredient | -SARA 302- RQ | TPQ | ------SARA 313------ List | Chemical Catg. |
|---|---|---|---|---|
| Ferric Subsulfate (1310-45-8) | No | No | No | No |
| Water (7732-18-5) | No | No | No | No |

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

| Ingredient | CERCLA | -RCRA- 261.33 | -TSCA- 8(d) |
|---|---|---|---|
| Ferric Subsulfate (1310-45-8) | No | No | No |
| Water (7732-18-5) | No | No | No |

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

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

---

# 16. Other Information

**NFPA Ratings:** Health: **1** Flammability: **0** Reactivity: **0**
**Label Hazard Warning:**
CAUTION! MAY BE HARMFUL IF SWALLOWED. MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT.
**Label Precautions:**
Avoid contact with eyes, skin and clothing.

Keep container closed.
Use with adequate ventilation.
Wash thoroughly after handling.
INTENDED FOR FDA APPROVED USE ONLY.
NOT ON THE TSCA INVENTORY.

**Label First Aid:**

If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. 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.

**Product Use:**

For Food and Drug or Research and Development use

**Revision Information:**

No Changes.

**Disclaimer:**

**********

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**********

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

# MATERIAL SAFETY DATA SHEET

# Hydrochloric Acid

## Section 01 - Chemical And Product And Company Information

**Product Identifier** ..... Hydrochloric acid, inhibited hydrochloric acid

**Product Use** ..... Acidizing (activation) of petroleum wells, scale removal, ore reduction, metal cleaning, pH adjustment, industrial acidizing, generation of chlorine dioxide, regeneration of ion exchange resins.

**Supplier Name**..... ClearTech Industries Inc.
2302 Hanselman Avenue
Saskatoon, SK. Canada
S7L 5Z3

**Prepared By**..... ClearTech Industries Inc. Technical Department
Phone: (306)664-2522

**Preparation Date**..... May 31, 2005

**24-Hour Emergency Phone**..... 306-664-2522

## Section 02 - Composition / Information on Ingredients

| | | |
|---|---|---|
| **Hazardous Ingredients**..... | Hydrochloric Acid | 15-36.5% |
| **CAS Number**..... | Hydrochloric Acid | 7647-01-0 |
| **Synonym (s)**..... | Aqueous hydrogen chloride, muriatic acid | |

## Section 03 - Hazard Identification

**Inhalation**..... Vapour or mist can cause irritation to nose, throat, and upper respiratory tract. Symptoms include: coughing, choking, and bleeding of the nose and gums. Severe exposure can result in pulmonary edema and corrosion of tissues in the nose and throat.

**Skin Contact / Absorption**..... Contact may produce severe irritation or corrosive skin damage, depending upon length of contact and amount of acid. Effects range from dermititis, photo sensitization, redness, swelling, pain, permanent scarring, to death.

**Eye Contact**..... Low concentrations of vapour or mist can be irritating, causing redness. Concentrated vapour, mist or splashed liquid can cause severe irritation, burns and permanent blindness.

**Ingestion**..... Causes severe burns of the mouth, esophagus, and stomach, with consequent pain, nausea, vomiting, diarrhea, circulatory collapse, and possibly death.

**Exposure Limits**..... ACGIH/PEL-C= 5ppm (hydrochloric acid)

## Section 04 - First Aid Measures

**Inhalation**..... Remove victim to fresh air. Give artificial respiration only if breathing has stopped. If breathing is difficult, give oxygen. Seek immediate medical attention.

**Skin Contact / Absorption**..... Remove contaminated clothing. Wash affected area with soap and water. Seek medical attention if irritation occurs or persists

**Eye Contact**..... Flush immediately with water for at least 20 minutes. Forcibly hold eyelids apart to ensure complete irrigation of eye tissue. Seek immediate medical attention

**Ingestion**..... Do not induce vomiting. If vomiting occurs, lean victim forward to prevent breathing in vomitus. Rinse mouth out with water. If the victim can swallow, give 1 cup of water or milk to dilute. If vomiting occurs, rinse the mouth out and give another cup of water. Do not give anything by mouth to an unconscious or convulsing person. Seek immediate medical attention.

**Additional Information**..... Not available

## Section 05 - Fire Fighting

**Conditions of Flammability**……..... Non-flammable

**Means of Extinction**.....……..... Product does not burn. Where fire is involved, use any fire fighting agent appropriate for surrounding material; use water spray to cool fire-exposed surfaces.

**Flash Point**...…….. Not applicable

**Auto-ignition Temperature**……. Not applicable

**Upper Flammable Limit** …….. Not applicable

**Lower Flammable Limit**...……... Not applicable

**Hazardous Combustible Products**... Hydrogen and chlorine gas formed at temperatures over 1500°C.

**Special Fire Fighting Procedures**..... Wear NIOSH-approved self-contained breathing apparatus and protective clothing.

**Explosion Hazards**……..... Normally none, but when in contact with metals explosive hydrogen gas may be evolved.

## Section 06 - Accidental Release Measures

**Leak / Spill**.....……... Wear appropriate personal protective equipment. Ventilate area. Only enter area with PPE. Stop or reduce leak if safe to do so. Prevent material from entering sewers.

**Deactivating Materials**...……... Soda ash, lime, limestone

## Section 07 - Handling and Storage

**Handling Procedures**.....……... Use proper equipment for lifting and transporting all containers. Use sensible industrial hygiene and housekeeping practices. Wash thoroughly after handling. Avoid all situations that could lead to harmful exposure.

**Storage Requirements**.....…….…. Store in a cool, dry, well-ventilated place. Keep container tightly closed, and away from incompatible materials. Store away from incompatible materials such as oxidizing materials, reducing materials, strong bases.

## Section 08 - Personal Protection and Exposure Controls

### Protective Equipment

**Eyes**..... Chemical goggles, full-face shield, or a full-face respirator is to be worn at all times when product is handled. Contact lenses should not be worn; they may contribute to severe eye injury.

**Respiratory**..... At concentrations up to 50 ppm, chemical charge respirator or air-purifying respirator is recommended. Above this level, a self-contained breathing apparatus is required.

**Gloves**..... Impervious gloves of chemically resistant material (rubber or PVC) should be worn at all times. Wash contaminated clothing with soap and water, dry thoroughly before reuse.

**Clothing**..... Body suits, aprons, and/or coveralls of chemical resistant material should be worn at all times. Wash contaminated clothing with soap and water, dry thoroughly before reuse.

**Footwear**..... Impervious boots of chemically resistant material should be worn at all times

### Engineering Controls

**Ventilation Requirements**..... Mechanical ventilation (dilution or local exhaust), process or personnel enclosure, and control of process conditions. Supply sufficient replacement air to make up for air removed by exhaust systems.

**Other**..... Emergency shower and eyewash should be in close proximity.

## Section 09 - Physical and Chemical Properties

**Physical State**..... Liquid

**Odor and Appearance**..... Colourless or slightly yellow, fuming liquid with a pungent odour.

**Odor Threshold**..... Detectable at 1-5ppm

**Specific Gravity (Water=1)**..... 1.16-1.19 (30-35%); 1.08 (15%)

**Vapor Pressure (mm Hg, 20C)**..... 100mm Hg at 20°C (35%)

**Vapor Density (Air=1)**..... 1.268

**Evaporation Rate**..... < 1

**Boiling Point**..... 90.5°C (30%)

**Freeze/Melting Point**..... -51°C (30%)

**pH**..... < 1

**Water/Oil Distribution Coefficient**.... < 1

**Bulk Density**..... Not available

**% Volatiles by Volume**..... 100%

**Solubility in Water**..... Completely miscible

**Molecular Formula**..... HCl

**Molecular Weight**..... 36.46

## Section 10 - Stability and Reactivity

**Stability**..... Stable, heat and contamination could cause decomposition.

**Incompatibility**..... Incompatible with strong bases, metals, phosphines, acetylides, borides, carbides, silicides, vinyl acetate, formaldehyde, hypochlorites, cyanides, sulphides.

**Hazardous Products of Decomposition**.. Contact with hypochlorites liberates chlorine gas. May react violently with incompatible substances. May release toxic and/or flammable gases such as hydrogen and phosphine gas. Considerable amounts of heat may be evolved.

**Polymerization**..... Will not occur.

## Section 11 - Toxicological Information

**Irritancy**..... Severe irritant, corrosive to eyes and skin.

**Sensitization**..... Not available

**Chronic/Acute Effects**..... Prolonged exposure can cause erosion and discolouration of teeth and chronic imflammation of nose, throat, and airways. Repeated or prolonged contact to dilute solutions can cause dermatitis.

**Synergistic Materials**..... Not available

**Animal Toxicity Data**..... $LC_{50}$(inhalation,mouse,4 hour)= 757ppm
$LD_{50}$(oral,rabbit)= 900mg/kg

**Carcinogenicity**..... Not considered to be carcinogenic by IARC and ACGIH.

**Reproductive Toxicity**..... Not available

**Teratogenicity**..... Not available

**Mutagenicity**..... Not available

## Section 12 - Ecological Information

**Fish Toxicity**..... Not available

**Biodegradability**..... When released into the soil, this material is not expected to biodegrade.

**Environmental Effects**..... Extremely toxic to aquatic life by lowering the pH below 5.5. When released into the soil, this material may leach into groundwater.

## Section 13 - Disposal Consideration

**Waste Disposal**.....Dispose in accordance with all federal, provincial, and/or local regulations including the Canadian Environmental Protection Act.

## Section 14 - Transportation Information

**TDG Classification**

**Class**..... 8

**Group**..... II

**PIN Number**..... UN1789

**Other**..... Secure containers (full and/or empty) with suitable hold down devises during shipment.

## Section 15 - Regulatory Information

**WHMIS Classification**.....E, D1

**NOTE: THE PRODUCT LISTED ON THIS MSDS HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE CANADIAN CONTROLLED PRODUCTS REGULATIONS. THIS MSDS CONTAINS ALL INFORMATION REQUIRED BY THOSE REGULATIONS**

## Section 16 - Other Information

**Note: The responsibility to provide a safe workplace remains with the user. The user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment. The information contained herein is, to the best of our knowledge and belief, accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material. It is the responsibility of the user to comply with all applicable laws and regulations.**

## ClearTech Industries Inc. - Locations

**Corporate Head Office: 2302 Hanselman Avenue, Saskatoon, SK, S7L 5Z3**
**Phone: 306-664-2522**
**Fax: 306-665-6216**

**www.ClearTech.ca**

| Location | Address | Postal Code | Phone Number | Fax Number |
|---|---|---|---|---|
| Richmond BC | 12431 Horseshoe way | V7A 4X6 | 604-272-4000 | 604-272-4596 |
| Calgary AB | 5516E - 40th St. S.E. | T2C 2A1 | 403-279-1096 | 403-236-0989 |
| Edmonton AB | 11750 - 180th Street | T5S 1N7 | 780-452-6000 | 780-452-4600 |
| Saskatoon SK | 2302 Hanselman Avenue | S7L 5Z3 | 306-933-0177 | 306-933-3282 |
| Regina SK | 555 Henderson Drive | S42 5X2 | 306-721-7737 | 306-721-8611 |
| Winnipeg MB | 340 Saulteaux Crescent | R3J 3T2 | 204-987-9777 | 204-987-9770 |
| Mississauga ON | 7480 Bath Road | L4T 1L2 | 905-612-0566 | 905-612-0575 |

# 24 Hour Emergency Number - All Locations - 306-664-2522

# Material Safety Data Sheet
# HYDROFLUORIC ACID

Print Date: March 2007

## SECTION 1 – Chemical Product and Company Identification

**MSDS Name:** HYDROFLUORIC ACID MSDS Preparation Date: 02-2007, Supersedes 02-2004, 02-2001 & 02-98

**Synonyms or Generic ID:** Fluohydric acid, fluoric acid, hydrofluoric acid solution
**Seastar Product Codes:** IQ-05-0500, IQ-05-4000, IQ-05-200L, BA-05-0250, BA-05-0500, BA-05-1000, BA-05-2000, OF-05-4000, PDV-05-REFILL
**Canadian TDG Classification**: 8 6.1 PKG Gr II **Formula:** HF
**PIN (UN# / NA#):** UN1790 **Molecular Wt:** 20.01
**Canadian WHMIS Class:** Class E; Class D Div 1 Sub A; Class D Div 2 Sub A

**Supplier:** Seastar Chemicals Inc, 10005 McDonald Park Road, Sidney, BC V8L 5Y2 CANADA
**Tel:** (250) 655-5880, **Fax:** (250) 655-5888

**CANUTEC (CAN): (613)-996-6666**

## SECTION 2 – Composition/Information on Ingredients

| CAS # | Chemical Name | Percent | EINECS/ELINCS | TLV | Hazard |
|---|---|---|---|---|---|
| 7732-18-5 | Water | Balance | 231-791-2 | N/av | None |
| 7664-39-3 | Hydrofluoric acid | 47-51% | 231-634-8 | ACFIH – as F: 2.5 mg/m$^3$ TWA (listed under FLUORIDES); NIOSH – as F: 3 ppm TWA; 2.5 mg/m$^3$ TWA; C 6 ppm (15 min); c 5 mg/m$^3$ (15 min); OSHA – 3 ppm TWA | Corrosive |

Hazard Symbols: T+ C Risk Phrases: 26/27/28 35

## SECTION 3 – Hazards Identification

### EMERGENCY OVERVIEW

Colourless liquid with a pungent, irritating, penetrating odour. Concentrations above 40% fume in air. Will not burn. Cylinders or tanks may rupture and explode if heated. Highly reactive. Contact with metals, such as iron or steel, slowly releases flammable and potentially explosive hydrogen gas. VERY TOXIC. May be fatal if inhaled, absorbed through the skin or swallowed. CORROSIVE to the nose, throat and respiratory tract. Causes lung injury-effects may be delayed. CORROSIVE to the eyes and skin. Causes severe burns. May cause blindness and permanent scarring. Absorbed fluoride can cause metabolic imbalances with irregular heartbeat, nausea, dizziness, vomiting and seizures. Long-term exposure may cause skeletal fluorosis (weakened bone structure).
Target Organs: Lungs, teeth, eyes, skin, bone, mucous membranes.

### Potential Health Effects

**Primary Route(s) of Entry**: Inhalation and ingestion. Skin contact. Eye contact. Skin absorption.
**Effects of Acute Exposure**: May be fatal by ingestion, inhalation or skin absorption. Corrosive. Acute effects may be delayed.
**LD50/LC50**: CAS# 7732-18-3: Oral, rat: LD50 = >90 mL/kg. CAS# 7664-39-3: Inhalation, mouse: LC50 = 342 ppm/1H. Inhalation, rate: LC50 = 1276 ppm/1H.
**Eyes**: Contact with liquid or vapor can cause irritation or severe burns or conjunctivitis, and possible irreversible eye damage. Solutions as dilute as 2% or lower may cause burns.
**Skin**: Both liquid and vapour can cause severe burns, which may not be immediately painful or visible. May be fatal if absorbed through the skin. Causes severe burns with delayed tissue destruction. Substance is rapidly absorbed through the skin. Penetration may continue for several days. Causes severe tissue necrosis and bone destruction. May cause hypocalcemia and death. Solutions as dilute as 2% or lower may cause burns. LD50: skin-mouse 500 mg/kg.
**Ingestion**: Causes severe digestive tract burns with abdominal pain, vomiting, and possible death. May cause systemic toxic effects on the heart, liver, and kidneys. Depletes calcium levels in the body which, if left untreated, can lead to hypocalcemia and death.
**Inhalation**: May cause severe irritation of the upper respiratory tract with pain, burns, and inflammation. May cause pulmonary edema and severe respiratory disturbances. Depletes calcium levels in the body which can led to hypocalcemia and death.

**Effects of Chronic Exposure**: Acute exposure above 5 ppm may irritate eyes and respiratory tract. Also causes severe eye and skin burns. Repeated inhalation may cause osteofluorosis and permanent respiratory damage. Prolonged or repeated exposure may cause permanent bone structure abnormalities. To the best of our knowledge, the chronic toxicity of this substance has not been fully investigated.

## SECTION 4 – First Aid Measures

**Eyes**: Immediately flush eyes with large amounts of water for at least 15 minutes, holding the lids apart to ensure flushing of the entire surface. Get competent medical aid immediately. If a physician is not immediately available, apply one or two drops of 0.5 tetracine hydrochloride solution followed by a second irrigation for at least 15 minutes or until a physician is available.
**Skin**: Get medical aid immediately. Rinse area with copious quantities of water for at least 15 minutes. Remove contaminated clothing and shoes.
FIRST AID: (SKIN ONLY) IF AVAILABLE, AFTER THOROUGH WASHING (PREFERRED METHOD), A 2.5% CALCIUM GLUCONATE GEL SHOULD BE APPLIED TO THE BURNED AREA, [OR] THE BURNED AREA SHOULD BE IMMERSED IN A SOLUTION OF 0.2% ICED AQUEOUS BENZETHONIUM CHLORIDE, OR 0.13% ICED AQUEOUS BENZALKONIUM CHLORIDE. IF IMMERSION IS NOT PRACTICAL, TOWELS SHOULD BE SOAKED WITH ONE OF THE ABOVE SOLUTIONS AND USED AS COMPRESSES FOR THE BURNED AREA. IDEALLY, COMPRESSES SHOULD BE CHANGED EVERY TWO MINUTES. IT IS SUGGESTED THAT A CERTAIN QUANTITY OF EITHER PREPARED SOLUTION OR THE CALCIUM GLUCONATE GEL BE KEPT ON HAND AT ALL TIMES. SOLUTIONS SHOULD BE REPLACED ANNUALLY IF NOT PREVIOUSLY USED.
**Ingestion**: Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Get medical aid immediately. Never give anything by mouth to an unconscious person.
**Inhalation**: Remove patient from exposure to fresh air immediately. Administer approved oxygen supply if breathing is difficult. Administer artificial respiration or CPR if breathing has ceased. Call a physician. Keep patient lying down, quiet and warm.
**Notes to Physician**: Due to delayed and persistent symptoms, observe patient closely for 48 hours. Prompt action is essential in all cases of contact.
**Antidote:** Always have calcium gluconate gel on hand. The use of infilitration therapy and intraarterial therapy for hydrofluoric acid burns resulting from concentrations greater than 20% should be made by qualified medical personnel. Calcium gluconate may be administered intravenously slowly to bind to the fluoride ion. This administration needs to be monitored under the supervision of a physician.

## SECTION 5 – Fire Fighting Measures

**General Information**: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water Reactive. Material will react with water and may release a flammable and/or toxic gas. Wear appropriate protective clothing to prevent contact with skin and eyes. Wear a self-contained breathing apparatus (SCBA) to prevent contact with thermal decomposition products. Reacts with most metals to form highly flammable hydrogen gas, which can form explosive mixtures with air.
**Extinguishing Media**: Use water spray to cool fire-exposed containers. Substance is non-flammable; use agent most appropriate to extinguish surrounding fire.
**Auto-ignition Temperature**: Not available.
**Flash Point**: Not available.
**NFPA Rating**: NFPA Hazard Rating: Health – 4; Flammability – 0; Reactivity – 1.
**Explosion Limits**: Lower: Not available. Upper: Not available.

## SECTION 6 – Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section 8.
**Spills/Leaks**: Avoid runoff into storm sewers and ditches, which lead to waterways. Wear a self-contained breathing apparatus and appropriate personal protection (see Exposure Controls, Personal Protection section 8). Neutralize spill with sodium bicarbonate. Use water spray to disperse the gas/vapor. Remove all sources of ignition.
**Steps to be taken in case material is released or spilled:** Wear full protective equipment. Contain spills and cautiously dilute with large excess of water. Neutralize carefully with soda ash or lime. Material will fume during neutralization; approach from upwind. Provide good ventilation. Flush residue in accordance with applicable disposal regulations.
**Waste disposal method:** According to all applicable regulations. Avoid runoff.

## SECTION 7 – Handling and Storage

**Handling**: Wash thoroughly after handling. Remove contaminated clothing and wash before re-use. Use with adequate ventilation. Do not get on skin or in eyes. Do not ingest or inhale.

**Storage**: Store in a cool, dry, well-ventilated area away from incompatible substances. Do not store in metal or glass containers. Do not store in direct sunlight. Keep tightly closed. Empty container may contain hazardous residue. Do not add any other material to the container. Do not wash down the drain. Do not get in eyes, on skin, or on clothing. Wash well after use. In accordance with good storage and handling practices. Do not allow smoking or food consumption while handling. Store in approved containers only. Do not add water to acids. Instead, dilute by adding acid to water cautiously and with agitation.
**Storage Code**: White.

## SECTION 8 – Exposure Control/Personal Protection

**Engineering Controls**: Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.
**Exposure Limits**:

| *Chemical Name* | *ACGH* | *NIOSH* | *OSHA* |
|---|---|---|---|
| Water | None listed. | None listed. | None listed. |
| Hydrofluoric acid | As F: 2.5 mg/m$^3$ TWA (listed under FLUORIDES) | As F: 3 ppm TWA; 2.5 mg/m$^3$ TWA; C 6 ppm (15 min); C 5 mg/m$^3$ (15 min) | 3 ppm TWA |

**OSHA Vacated PELs** Hydrofluoric acid: as F: 3 ppm TWA

Personal Protective Equipment
**Eyes**: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133. Wear face shield.
**Skin**: Wear appropriate protective neoprene gloves to prevent skin exposure. Wear acid-resistant jacket, trousers and boots sufficient to protect skin.
**Clothing**: Wear appropriate protective clothing to prevent skin exposure.
**Respiratory Protection**: Wear appropriate OSHA/MSHA approved chemical cartridge respirator regulations found in 29CFR 1910.134. If more than TLV, do not breathe vapour. Wear self-contained breathing apparatus. Always use an NIOSH-approved respirator when necessary.
**Ventilation**: Use only in a chemical fume hood. Adequate ventilation to maintain vapour/dust below TLV.
**Other Protective Equipment**: Make eye bath and emergency shower available.

## SECTION 9 – Physical and Chemical Properties

**Physical State:** Liquid
**Appearance:** clear, colourless
**Odour:** strong odour
**pH:** Weak acid
**Vapour Pressure:** Varies with concentration; 50% (w/w): 1.64 kPa (12.3 mm Hg) at 20 $^0$C (calculated).
**Vapour Density:** 1.86 at 25 $^0$C (air = 1) (HF gas)
**Evaporation Rate:** Varies with concentration
**Viscosity:** No information available.
**Boiling Point:** Varies with concentration; 48% (w/w): 108 $^0$C (226.4 $^0$F); 38.2% (w/w): 112.2 $^0$C (234 $^0$F)
**Freezing/Melting Point:** Varies with concentration; 48% (w/w): -37 $^0$C (-34.6 $^0$F)
**Decomposition Temperature:** No information available.
**Solubility:** Soluble in water in all proportions. Soluble in ethanol; slightly soluble in diethyl ether, benzene, toluene, xylene and tetralin.
**Specific Gravity/Density:** 50% (w/w): 1.18 at 20 $^0$C (water = 1).
**Molecular Formula:** HF
**Molecular Weight:** 20.0054

## SECTION 10 – Stability and Reactivity

**Chemical Stability**: Normally stable.
**Conditions to Avoid**: Incompatible materials, metals.
**Incompatibilities with Other Materials**: Substance is incompatible with over 35 specific chemicals. Please refer to the NFPA Fire Protection Guide for specifics. Heat. Glass, concrete and other silicon-bearing materials will yield silicon tetrafluoride. Pressure build-up from this process has been known to blow up glass containers. Carbonates, sulphides, and cyanides will yield toxic gases such as carbon dioxide, hydrogen sulphide and hydrogen cyanide. Alkalis, some oxides, fluorine and other water-reactive materials will cause strong exothermic reactions that can be violent. Reacts with most common metals to produce hydrogen. Is corrosive to many materials, including leather, rubber and many organics.
**Hazardous Decomposition Products**: Fluoride fumes.
**Hazardous Polymerization**: Has not been reported.

## SECTION 11 – Toxicological Information

**RTECS**: CAS# 7732-18-5: ZC0110000. CAS# 7664-39-3: MW7875000.
**LD50/LC50**: CAS# 7732-18-3: Oral, rat: LD50 = >90 mL/kg. CAS# 7664-39-3: Inhalation, mouse: LC50 = 342 ppm/1H. Inhalation, rate: LC50 = 1276 ppm/1H.
**Carcinogenicity**: CAS# 7732-18-5: Not listed as a carcinogen by ACGIH, IARC, NIOSH, NTP, OSHA, or CA Prop 65. CAS# 7664-39-3: ACGIH: Not listed. California: Not listed. NIOSH: Not listed. NTP: Not listed. OSHA: Not listed. IARC: [present] (when used in drinking water) (listed as 'FLUORIDES, INORGANIC').
**Epidemiology**: No information available.
**Teratogenicity**: Embryo or fetus: death, ihl-rat TCLo=4980 ug/$m^3$/4H (1-22 D preg).
**Reproductive**: Fertility: post-implantation mortality and pre-implantation mortality, ihl-rat TCLo=470 uf/$m^3$/4H.
**Mutagenicity**: DNA Damage: D. melanogaster-ihl 1300 ppb/6W Sex Chromosome Loss/Non-disjunction: D. melanogaster-ihl 2900 ppb.
**Neurotoxicity**: No information available.

## SECTION 12 – Ecological Information

**Ecotoxicity**: No information available. Fish (fresh water) 60 ppm lethal (time period not specified).
**Environmental**: No information reported. **Physical**: No information available **Other**: None.

## SECTION 13 – Disposal Considerations

**Dispose of in a manner consistent with federal, provincial/state/territorial, and local regulations.**
RCRA D-Maximum Concentration of Contaminants: None of the components are on this list.
RCRA D Series – Chronic Toxicity Reference Levels: None of the components are on this list.
RCRA F Series Wastes: None of the components are on this list.
RCRA P Series Wastes: None of the components are on this list.
RCRA U Series Wastes: CAS# 7664-39-3: waste number U134 (Corrosive waste, Toxic waste).
RCRA Substances Banned from Land Disposal: CAS# 7664-39-3 is banned from land disposal according to RCRA.

## SECTION 14 – Transport Information

**Proper Shipping Name:** HYDROFLUORIC ACID, solution, with not more than 60 percent hydrofluoric acid
**Hazard Class:** 8 (6.1) **UN Number:** UN1790 **Packing Group:** II

## SECTION 15 – Regulatory Information

### US Federal

**TSCA:** CAS# 7732-18-5 is listed on the TSCA Inventory. CAS# 7664-39-3 is listed on the TSCA Inventory.
**Health and Safety Reporting List:** None of the components are on this list.
**Chemical Test Rules:** None of the components are on this list.
**TSCA Section 12b:** None of the components are on this list.
**TSCA Significant New Use Rule (SNUR):** None of the components are on this list.
**CERCLA Reportable Quantities (RQ):** CAS# 7664-39-3: final RQ = 100 pounds (45.4 kg).
**SARA Threshold Planning Quantities (TPQ):** CAS# 7664-39-3: TPQ = 100 pounds.
**SARA Hazard Categories:** CAS# 7664-39-3: acute, chronic.
**SARA Section 313:** This material contains Hydrofluoric acid (CAS# 7664-39-3, 48-50%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
**Clean Air Act – Hazardous Air Pollutants (HAPs):** CAS# 7664-39-3 is listed as a hazardous air pollutant (HAP).
**Clean Air Act – Class 1 Ozone Depletors:** None of the components are on this list.
**Clean Air Act – Class 2 Ozone Depletors:** None of the components are on this list.
**Clean Water Act – Hazardous Substances:** CAS# 7664-39-3 is listed as a Hazardous Substance under the CWA.
**Clean Water Act – Priority Pollutants:** None of the components are on this list.
**Clean Water Act – Toxic Pollutants:** None of the components are on this list.
**OSHA – Highly Hazardous:** CAS #7664-39-3 is considered highly hazardous by OSHA.

### US State

**State Right to Know:** Hydrofluoric acid can be found on the following state Right-to-Know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
**California Prop 65:** No information available.
**California No Significant Risk Level:** No information available.

### European/International Regulations

European Labelling in Accordance with EC Directives:
Hazard Symbols: T+ C
Risk Phrases: R 35 Causes severe burns.
R 35 Causes severe burns.
Safety Phrases: S 7/9 Keep container tightly closed and in a well-ventilated place.
S 25 In case of contact with eyes, rinse imediately with plenty of water and seek medical advice.
S 36/37 Wear suitable protective clothing and gloves.

WGKK (Water Danger/Protection): No information available.
Canadian DSL/NDSL: CAS# 7732-18-5 is listed on Canada's DSL/NDSL List.
CAS# 7664-39-3 is listed on Canada's DSL/NDSL List.
Canadian WHMIS Classification: This product has a WHMIS classification of D1A, E.
Canada Ingredient Disclosure List: CAS# 7732-18-5 is not listed on Canada's Ingredient Disclosure List.
CAS# 7664-39-3 is listed on Canada's Ingredient Disclosure List.
Exposure Limits: OES-United Kingdom: TWA (listed as FLUORIDES): as F: 2.5 mg/m$^3$ TWA. OES-United Kingdom: STEL as F: 3 ppm STEL; 2.5 mg/m$^3$ STEL.

## SECTION 16 – Other Information

The statements contained herein are offered for informational purposes only and are based upon technical data. Seastar Chemicals Inc believes them to be accurate but does not purport to be all-inclusive. The above-stated product is intended for use only by persons having the necessary technical skills and facilities for handling the product at their discretion and risk. Since conditions and manner of use are outside our control, we (Seastar Chemicals Inc) make no warranty of merchantability or any such warranty, express or implied with respect to information and we assume no liability resulting from the above product or its use. Users should make their own investigations to determine suitability of information and product for their particular purposes.

The MSDS format adheres to the standards and regulatory requirements of the United States and may not meet regulatory requirements in other countries.



# HYDROGEN PEROXIDE (70%)

8250CR Revised 12-OCT-1996

## CHEMICAL PRODUCT/COMPANY IDENTIFICATION

### Material Identification

"ALBONE", "TYSUL" are registered trademarks of DuPont.

Corporate MSDS Number : DU000113
Formula : H2O2
Molecular Weight : 34.02

### Tradenames and Synonyms

"ALBONE"
"TYSUL"
"ALBONE" SG

### Company Identification

MANUFACTURER/DISTRIBUTOR
DuPont Chemical Solutions Enterprise
1007 Market Street
Wilmington, DE 19898

PHONE NUMBERS
Product Information : 1-800-441-7515 (outside the U.S. 302-774-1000)
Transport Emergency : CHEMTREC 1-800-424-9300(outside U.S. 703-527-3887)
Medical Emergency : 1-800-441-3637 (outside the U.S. 302-774-1000)

## COMPOSITION/INFORMATION ON INGREDIENTS

### Components

| Material | CAS Number | % |
|---|---|---|
| HYDROGEN PEROXIDE | 7722-84-1 | 70 |
| WATER | 7732-18-5 | 30 |

### Components (Remarks)

Strength is expressed in weight percent (WT%).

## HAZARDS IDENTIFICATION

### Potential Health Effects

Hydrogen peroxide may cause severe irritation or burns of the skin, eyes and mucous membranes. Splashes in the eye can cause severe eye damage with ulceration of the cornea, and may cause irreversible eye damage, including blindness. Skin exposure can result in bleaching of the skin and hair.

Inhalation of concentrated vapors can cause irritation of the nose and throat with chest discomfort, cough, difficulty in breathing and shortness of breath.

Ingestion can cause irritation of the upper gastrointestinal tract with pain and distention of the stomach and esophagus due to liberation of oxygen.

Gross overexposure by ingestion may be fatal.

HUMAN HEALTH EFFECTS:

Skin contact with aqueous solutions of less than 50% may cause irritation with discomfort or rash. Higher or prolonged exposure may result in skin burns or ulceration. Evidence suggests that skin permeation can occur in amounts capable of producing systemic toxicity. Effects of eye contact with aqueous solutions of less than 5% may include eye irritation with discomfort, tearing, or blurring of vision. Higher or prolonged exposure may result in eye corrosion with corneal or conjunctival ulceration. Contact with aqueous concentrations of greater than 10% may result in eye corrosion with corneal or conjunctival ulceration with possible irreversible eye damage, including blindness.

Overexposure by inhalation may cause irritation of the upper respiratory passages or nonspecific discomfort such as nausea, headache, or weakness. Higher inhalation exposure may lead to temporary lung irritation effects with cough, discomfort, difficulty breathing, or shortness of breath; or fatality from gross overexposure. Ingestion may cause irritation of the gastrointestinal tract with upper abdominal pain, "heartburn", nausea, vomiting, and diarrhea. "Coffee grounds" vomitus and black tarry stools may occur as a result of gastrointestinal tract bleeding. Additional effects from overexposure include red blood cell destruction or gas embolism. When used as colonic lavage, hydrogen peroxide has caused gas embolism and gangrene of the intestine at concentrations down to 0.75%. Gross overexposure by ingestion may be fatal.

Individuals with preexisting diseases of the skin, eyes, or lungs may have increased susceptibility to the toxicity of excessive exposures.

(HAZARDS IDENTIFICATION - Continued)

Carcinogenicity Information

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

## FIRST AID MEASURES

First Aid

**INHALATION**
If inhaled, immediately remove to fresh air . If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

**SKIN CONTACT**
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Wash contaminated clothing and shoes promptly and thoroughly.

**EYE CONTACT**
In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

**INGESTION**
If swallowed, do not induce vomiting. Give large quantities of water. Never give anything by mouth to an unconscious person. Call a physician.

Notes to Physicians

If swallowed, large amounts of oxygen may be released quickly. The distention of the stomach or esophagus may be injurious. Insertion of a gastric tube may be advisable.

## FIRE FIGHTING MEASURES

Flammable Properties

Will not burn, but decomposition, which may be caused by heat or contamination, will release oxygen which will increase the explosive limit range and burning rate of flammable vapors.

(FIRE FIGHTING MEASURES - Continued)

Fire and Explosion Hazards:

Powerful oxidizer. Contact with clothing or combustibles will frequently cause fire. Contact with organic liquids or vapors may cause immediate fire or explosion, especially if heated. Under certain circumstances, detonation may be delayed. Oxygen release from hydrogen peroxide may force organic or hydrogen vapors into an explosive range. Follow appropriate National Fire Protection Association (NFPA) codes.

Extinguishing Media

Use only water.

Fire Fighting Instructions

Flood with water. Cool tank/container with water spray.

Wear full protective clothing (rubber suit and boots) including chemical splash goggles or hood and self-contained breathing apparatus.

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## ACCIDENTAL RELEASE MEASURES

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Safeguards (Personnel)

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Accidental Release Measures

Comply with Federal, State, and local regulations on reporting releases of wastes. Flood area with water and drain to an approved chemical sewer or wastewater treatment system, including municipal sewers if approved. May be destroyed with sodium metabisulfite or sodium sulfite (1.9 lbs. SO2 equivalent per lb. of peroxide) after diluting to 5-10% peroxide.

The Extremely Hazardous Substance List Reportable Quantity is 1 lb. for 70% hydrogen peroxide.

If HYDROGEN PEROXIDE (70%) is spilled and not recovered, or is recovered as a waste for treatment or disposal, the CERCLA Reportable Quantity is 100 lbs. (release of an unlisted Hazardous Waste characteristic of ignitibility).

## HANDLING AND STORAGE

### Handling (Personnel)

Use extreme care when attempting any reactions because of fire and explosion potential (immediate or delayed). Conduct all initial experiments on a small scale and protect personnel with adequate shielding as the reactions are unpredictable, and may be delayed, and may be affected by impurities, contaminants, temperature, etc. Do not get in eyes. Avoid contact with skin and clothing. Wash thoroughly after handling. Avoid contact with flammable or combustible materials. Avoid contamination from any source including metals, dust, and organic materials. In the event of an accident where large volumes of hydrogen peroxide might come into contact with external fires or with incompatible chemicals, a one-half mile area from the incident should be evacuated.

### Storage

Store in a properly vented container or in approved bulk storage facilities. Do not block vent. Do not store on wooden pallets. Do not store where contact with incompatible materials could occur, even with a spill (see "Hazardous Reactivity"). Have water source available for diluting. Do not add any other product to container. Never return used or unused peroxide to container, instead dilute with plenty of water and discard. Rinse empty containers thoroughly with clean water before discarding. (See "Waste Disposal".)

## EXPOSURE CONTROLS/PERSONAL PROTECTION

### Engineering Controls

Use sufficient ventilation to keep employee exposure below recommended exposure limits.

### Personal Protective Equipment

**EYE/FACE PROTECTION**

Wear coverall chemical splash goggles. In addition, where the possibility exists for eye or face contact due to splashing or spraying of material, wear chemical splash goggles/full-length face shield combination.

**RESPIRATORS**

Where there is potential for airborne exposure in excess of applicable limits, wear NIOSH approved respiratory protection.

(EXPOSURE CONTROLS/PERSONAL PROTECTION - Continued)

PROTECTIVE CLOTHING

Where there is potential for skin contact, have available and wear as appropriate: impervious gloves, apron, pants, jacket, hood, and boots; or totally encapsulating chemical suit with breathing air supply. Permeation data supplied by vendors indicate that impervious materials such as natural rubber, natural rubber plus neoprene, nitrile, or polyvinylchloride afford adequate protection.

Do not wear leather gloves or leather shoes (uppers or soles) because they can ignite following contact with peroxide. Cotton clothing can also ignite. This effect may be within minutes, or delayed. Clothing fires and skin damage occur less quickly with 50% or lower hydrogen peroxide than with 70% material, but adequate personal protection is essential for all industrial concentrations. Protective skin creams offer no protection from hydrogen peroxide and should not be used.

# Exposure Guidelines

Applicable Exposure Limits

HYDROGEN PEROXIDE

| | | |
|---|---|---|
| PEL | (OSHA) | : 1 ppm, 1.4 mg/m3 (90%) - 8 Hr TWA |
| TLV | (ACGIH) | : 1 ppm, 1.4 mg/m3, 8 Hr. TWA, A3 |
| AEL * | (DuPont) | : None Established |

* AEL is DuPont’s Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

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## PHYSICAL AND CHEMICAL PROPERTIES

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Physical Data

| | |
|---|---|
| Boiling Point | : 126 C (259 F) @ 760 mm Hg |
| Vapor Pressure | : 8 mm Hg @ 25 C (77 F)<br>20 mm Hg @ 40 C (104 F) |
| Vapor Density | : 1.02 Calculated |
| Melting Point | : -40 C (-40 F) |
| Evaporation Rate | : 1 |
| Solubility in Water | : 100 WT% |
| pH | : Apparent pH = 0.5 |
| Form | : Clear liquid |
| Color | : Colorless |
| Specific Gravity | : 1.3 @ 25 C (77 F) |
| Odor | : Pungent (slight), Irritating. |

## STABILITY AND REACTIVITY

### Chemical Stability

Unstable with heat or contamination; liberation of oxygen gas may result in dangerous pressures. (See "Decomposition", below.)

### Incompatibility with Other Materials

Incompatible with most flammables/combustibles (see "Fire and Explosion Hazards") as well as cyanides, nitric acid, potassium permanganate, and many other oxidizing and reducing agents. Mixtures with both organics and some acids may be especially reactive.

### Decomposition

Contamination or heat may cause self-accelerating exothermic decomposition with oxygen gas and steam release that can cause dangerous pressures. May react dangerously with rust, dust, dirt, iron, copper, heavy metals or their salts (such as mercuric oxide or chloride), alkalis, and with organic materials (especially vinyl monomers).

### Polymerization

Polymerization will not occur.

## TOXICOLOGICAL INFORMATION

### Animal Data

| | | |
|---|---|---|
| Inhalation 8-hour LC50 | : | >2,000 ppm in rats (90% $H_2O_2$) |
| Skin absorption LD50 | : | 9,200 mg/kg (70% $H_2O_2$) in rabbits |
| Oral LD50 | : | 805 mg/kg (70% $H_2O_2$) in rats |

At aqueous concentrations of less than 50% hydrogen peroxide skin irritation occurs, but at greater concentrations hydrogen peroxide is corrosive to the skin. Concentrations less than 5% in aqueous solutions are eye irritants; solutions between 5% and 10% range from severe eye irritants to being corrosive; concentrations greater than 10% are corrosive to the eye. The compound is not a skin sensitizer in animals.

Repeated inhalation exposures produced nasal discharge, bleached hair, and respiratory tract congestion with some deaths occurring in rats and mice exposed to concentrations greater than 67 ppm. Dogs exposed by inhalation to 7 ppm for 6 months had lung and skin irritation.

The effects from single high oral doses include convulsions. Repeated administration of the compound in the diet of

(TOXICOLOGICAL INFORMATION - Continued)

animals resulted in growth inhibition, reduced weight gain, abnormal liver function, ulcers, and discoloration of the stomach lining with swelling. Long-term administration to mice in the drinking water resulted in gastric erosions and duodenal hyperplasia.

One study by skin application suggested no carcinogenic activity. Results of an ingestion study with mice suggested that hydrogen peroxide might be carcinogenic. However, the FDA and other organizations have reviewed this study and concluded there is insufficient evidence that hydrogen peroxide is carcinogenic. An unpublished, long-term study with rats revealed no evidence of carcinogenicity. Female rats treated with 10% hydrogen peroxide produced offspring of lower body weight and some structural abnormalities, but these changes were attributed to maternal toxicity. Hydrogen peroxide produced genetic damage to bacterial and mammalian cells in culture, but one study in animals indicated it did not produce genetic damage. Limited tests in animals demonstrate no reproductive toxicity.

## ECOLOGICAL INFORMATION

### Ecotoxicological Information

Aquatic Toxicity

96-hour LC50, catfish: 37.4 mg/L

## DISPOSAL CONSIDERATIONS

### Waste Disposal

Comply with Federal, State, and local regulations. If approved, may be diluted and drained to a municipal sewer or waste treatment plant. May be diluted and drained through a scrap metal pit (iron, copper, etc.) to reduce peroxide concentration. Hydrogen peroxide may be an RCRA regulated hazardous waste upon disposal due to the oxidizing characteristic under the ignitibility category.

## TRANSPORTATION INFORMATION

### Shipping Information

DOT/IMO

| | |
|---|---|
| Proper Shipping Name | : HYDROGEN PEROXIDE AQUEOUS SOLUTIONS, STABILIZED |
| Hazard Class | : 5.1 |
| UN No. | : 2015 |
| DOT/IMO Label | : OXIDIZER, CORROSIVE |

(TRANSPORTATION INFORMATION - Continued)

Subsidiary Hazard Class : 8
Packing Group : I

Shipping Containers

Tank Cars.
Tank Trucks.

ISO (Sea) Tanks
Bottles

## REGULATORY INFORMATION

U.S. Federal Regulations

TSCA Inventory Status : Reported/Included.

TITLE III HAZARD CLASSIFICATIONS SECTIONS 311, 312

Acute : Yes
Chronic : No
Fire : No
Reactivity : Yes
Pressure : Yes

LISTS:

| | |
|---|---|
| SARA Extremely Hazardous Substance | -Yes |
| CERCLA Hazardous Material | -(*) |
| SARA Toxic Chemicals | -No |

*See Disposal Information.

CANADIAN WHMIS CLASSIFICATIONS:

C; E; F

HYDROGEN PEROXIDE (70%) is listed by OSHA as a Highly Hazardous Chemical in Appendix A to 29 CFR 1910.119. Use of this product may require compliance with 29 CFR 1910.119, Process Safety Management of Highly Hazardous Chemicals.

## OTHER INFORMATION

NFPA, NPCA-HMIS

NFPA Rating
Health : 2
Flammability : 0
Reactivity : 3

Oxidizer.

(Continued)

NPCA-HMIS Rating
Health : 3
Flammability : 0
Reactivity : 3

Personal Protection rating to be supplied by user depending on use conditions.

Additional Information

For further information, see DuPont HYDROGEN PEROXIDE Storage and Handling Bulletin.

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The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

Responsible for MSDS : MSDS Coordinator
> : DuPont Chemical Solutions Enterprise
Address : Wilmington, DE 19898
Telephone : (800) 441-7515

# Indicates updated section.

This information is based upon technical information believed to be reliable. It is subject to revision as additional knowledge and experience is gained.

End of MSDS

PETRO-CANADA

# Material Safety Data Sheet

| WHMIS (Pictograms) | WHMIS (Classification) | Protective Clothing | TDG (pictograms) |
|---|---|---|---|
| | **B-2, D-2A, D-2B** | | |

## *Section 1. Chemical Product and Company Identification*

| | | | |
|---|---|---|---|
| **Product Name** | **JET B AVIATION TURBINE FUEL** | **Code** | W219<br>SAP: 150, 151, 152 |
| **Synonym** | Jet B; Jet B DI; JP-4; Jet F-40; NATO F-40; Turbine Fuel, Aviation, Wide Cut Type (CAN/CGSB-3.22). | **Validated on** | **2/8/2005.** |
| **Manufacturer** | PETRO-CANADA<br>P.O. Box 2844<br>Calgary, Alberta<br>T2P 3E3 | **In case of Emergency** | Petro-Canada:<br>403-296-3000<br>Canutec Transportation:<br>613-996-6666<br>Poison Control Centre: Consult local telephone directory for emergency number(s). |
| **Material Uses** | Used as aviation turbine fuel. May contain a fuel system icing inhibitor. | | |

## *Section 2. Composition and Information on Ingredients*

| | | | *Exposure Limits (ACGIH)* | | |
|---|---|---|---|---|---|
| **Name** | **CAS #** | **% (W/W)** | **TLV-TWA(8 h)** | **STEL** | **CEILING** |
| Complex mixture of petroleum hydrocarbons (C6-C14). | 64741-41-9 | >99 | Not established | Not established | Not established |
| Benzene | 71-43-2 | <0.5 | 0.5 ppm | 2.5 ppm | Not established |
| Fuel System Icing Inhibitor (FSII) (if added*):<br>Diethylene Glycol Monomethyl Ether | 111-77-3 | ≤0.15 | Not established | Not established | Not established |
| Anti-static, antioxidant, corrosion inhibitor and metal deactivator additives.<br>* Please note that Jet B DI, JP-4, Jet F-40 and NATO F-40 all contain Fuel System Icing Inhibitor (FSII).corrosion inhibitor | Not applicable | <0.1 | Not applicable | Not applicable | Not applicable |

| | |
|---|---|
| **Manufacturer Recommendation** | Not applicable |
| **Other Exposure Limits** | Consult local, state, provincial or territory authorities for acceptable exposure limits. |

## *Section 3. Hazards Identification.*

| | |
|---|---|
| **Potential Health Effects** | Flammable liquid. Exercise caution when handling this material. Skin and eye contact can cause irritation. Inhalation of vapours can cause irritation of the respiratory tract and CNS depression with symptoms of nausea, headaches, vomiting, dizziness, fatigue, light-headedness, reduced coordination, unconciousness and possibly death. Aspiration into the lungs may produce potentially fatal chemical pneumonitis (fluid in the lungs), severe lung damage, or respiratory failure. May cause cancer. May cause teratogenicity/embryotoxicity. For more information refer to Section 11 of this MSDS. |

## *Section 4. First Aid Measures*

| | |
|---|---|
| **Eye Contact** | Quickly and gently blot or brush away chemical. Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for 20 minutes or until the chemical is removed, while holding the eyelid(s) open. Take care not to rinse contaminated water into the unaffected eye or onto the face. Obtain medical attention immediately. |
| **Skin Contact** | Quickly and gently, blot or brush away excess chemical. Wash gently and thoroughly with warm water and non-abrasive soap for 5 minutes or until chemical is removed. |
| **Inhalation** | Take proper precautions to ensure your own safety before attempting rescue (e.g. wear appropriate protective equipment). Remove source of contamination or move victim to fresh air. If breathing is difficult, oxygen may be beneficial if administered by trained personnel, preferably on a doctor's advice.<br>DO NOT allow victim to move about unnecessarily. Immediately transport victim to an emergency care facility. |

*Continued on Next Page*

| | |
|---|---|
| **Ingestion** | NEVER give anything by mouth if victim is rapidly losing consciousness, or is unconscious or convulsing. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. Have victim drink 240 to 300 mL (8 to 10 oz) of water to dilute material in stomach. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. Repeat administration of water. |
| **Note to Physician** | Not available |

## *Section 5. Fire-fighting Measures*

| | | | |
|---|---|---|---|
| **Flammability** | Flammable liquid (NFPA). | **Flammable Limits** | LOWER: 1.3% UPPER: 8% (NFPA) |
| **Flash Points** | CLOSED CUP: -31ºC (-24°F) (NFPA) | **Auto-Ignition Temperature** | 240°C (464°F) (NFPA) |
| **Fire Hazards in Presence of Various Substances** | Flammable in presence of open flames, sparks, and heat. Vapours are heavier than air and may travel considerable distance to sources of ignition and flash back. This product can accumulate static charge and ignite. May accumulate in confined spaces. | **Explosion Hazards in Presence of Various Substances** | Do not cut, weld, heat, drill or pressurize empty container. Containers may explode in heat of fire. |
| **Products of Combustion** | Carbon oxides (CO, CO2), nitrogen oxides (NOx), sulphur oxides (SOx), aldehydes, ketones, smoke and irritating vapours as products of incomplete combustion. | | |
| **Fire Fighting Media and Instructions** | NAERG96, GUIDE 128, Flammable liquids (Non-polar/Water-immiscible).<br>CAUTION: This product has a very low flash point: Use of water spray when fighting fire may be inefficient.<br><br>If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also consider initial evacuation for 800 meters (1/2 mile) in all directions.<br><br>SMALL FIRES: Dry chemical, CO2, water spray or regular foam.<br>LARGE FIRES: Water spray, fog or regular foam. Do not use straight streams. Move containers from fire area if you can do it without risk.<br>Fires Involving Tanks or Car/Trailer Loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.<br><br>Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting devices or any discolouration of tank. ALWAYS stay away from the ends of tanks. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible withdraw from area and let fire burn. Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection. | | |

## *Section 6. Accidental Release Measures*

| | |
|---|---|
| **Material Release or Spill** | IN THE EVENT OF A LARGE SPILL CONSIDER THE FOLLOWING CONTROL MEASURES: Consult current National Emergency Response Guide Book (NAERG) for appropriate spill measures if necessary. Evacuate non-essential personnel. Extinguish all ignition sources. Ventilate area. Stop leak if safe to do so. Avoid contact with spilled material. Do not allow spilled material to enter sewer systems as vapours may accumulate and may cause an explosion/fire hazard. If spilled in a confined space, ensure appropriate confined space entry protocols are followed. Ensure clean-up personnel wear appropriate personal protective equipment. Use appropriate inert absorbent material to absorb spilled product. Do not use paper or other flammable materials to absorb product. Collect used absorbent for later disposal. Avoid breathing vapours or mists of material. Notify appropriate authorities immediately. |

## *Section 7. Handling and Storage*

| | |
|---|---|
| **Handling** | FLAMMABLE MATERIAL. Handle with care. Avoid contact with any sources of ignition, flames, heat, and sparks. Wear proper personal protective equipment (See Section 8). Ensure all equipment is grounded/bonded. Avoid confined spaces and areas with poor ventilation. Avoid inhalation of product vapours or mists. Empty containers may contain product residue. Do not pressurize, cut, heat, or weld empty containers. Do not reuse containers without commercial cleaning and/or reconditioning. Personnel who handle this material should practice good personal hygiene during and after handling to help prevent accidental ingestion of this product. |
| **Storage** | Store away from heat and sources of ignition. Store away from incompatible and reactive materials (See section 5 and 10). Ensure the storage containers are grounded/bonded. Keep container tightly closed. Store in dry, cool, well-ventilated area. |

## Section 8. Exposure Controls/Personal Protection

| | |
|---|---|
| **Engineering Controls** | For normal application, special ventilation is not necessary. If user's operations generate vapours or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit. Make-up air should always be supplied to balance air removed by exhaust ventilation. Ensure that eyewash station and safety shower are close to work-station. |
| **Personal Protection** - ***The selection of personal protective equipment varies, depending upon conditions of use.*** | |
| **Eyes** | As a minimum, safety glasses with side shields should be worn when handling this material. |
| **Body** | If this material may come into contact with the body during handling and use, we recommend wearing appropriate protective clothing to prevent contact with the skin. (Contact your PPE provider for more information). |
| **Respiratory** | A NIOSH-approved air-purifying respirator with an organic vapour cartridge or canister with a dust, fume of mist filter (R, or P series) may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits. Protection provided by air-purifying respirators is limited. Use a positive-pressure, air-supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstances where air-purifying respirators may not provide adequate protection. |
| **Hands** | If this material may come in contact with the hands during handling and use, we recommend wearing gloves of the following material(s): neoprene, polyvinyl alcohol (PVA), and fluoro-elastomer. Consult your PPE provider for breakthrough times and the specific glove that is best for you based on your use patterns. |
| **Feet** | Wear appropriate footwear to prevent product from coming in contact with feet and skin. |

## Section 9. Physical and Chemical Properties

| | | | |
|---|---|---|---|
| **Physical State and Appearance** | Clear liquid. | **Viscosity** | Not available (similar to gasoline) |
| **Colour** | Clear and colourless. | **Pour Point** | Freezing Point: <-51ºC (<-60ºF) for Jet B/Jet B DI; <-58ºC (<-72ºF) for Jet Fuel F-40. |
| **Odour** | Gasoline like. | **Softening Point** | Not applicable. |
| **Odour Threshold** | Not available | **Dropping Point** | Not applicable. |
| **Boiling Point** | 50 to 270°C (122 to 518°F) | **Penetration** | Not applicable. |
| **Density** | 0.75 to 0.80 kg/L @ 15ºC (59ºF). | **Oil / Water Dist. Coefficient** | Not available |
| **Vapour Density** | 3.5 (Air = 1) | **Ionicity (in water)** | Not available |
| **Vapour Pressure** | 21 kPa (158 mmHg) @ 37.8ºC (100ºF). | **Dispersion Properties** | Not available |
| **Volatility** | Volatile. | **Solubility** | Insoluble in water. Partially miscible in some alcohols. Miscible in other petroleum solvents. |

## Section 10. Stability and Reactivity

| | | | |
|---|---|---|---|
| **Corrosivity** | Not available | | |
| **Stability** | The product is stable under normal handling and storage conditions. | **Hazardous Polymerization** | Will not occur under normal working conditions. |
| **Incompatible Substances / Conditions to Avoid** | Can react with strong oxidizing agents, uranium hexafluoride, diborane. Incompatible with halogens and halogen compounds. | **Decomposition Products** | May release COx, NOx, SOx, aldehydes, ketones, smoke and irritating vapours when heated to decomposition. |

## Section 11. Toxicological Information

| | |
|---|---|
| **Routes of Entry** | Skin contact, eye contact, inhalation and ingestion. |
| **Acute Lethality** | Acute toxicity information is not available for the product as a whole, therefore, data for some of the ingredients is provided below: |

**Based on toxicity of similar product.**
Acute oral toxicity (LD50): >5000 mg/kg (rat).
Acute dermal toxicity (LD50): >5000 mg/kg (rabbit).
Acute inhalation toxicity (LC50): >5000 mg/m³/4h (rat).

**Benzene**
Acute oral toxicity (LD50): 930 mg/kg (rat).
Acute dermal toxicity (LD50): >9400 mg/kg (rabbit).
Acute inhalation toxicity (LC50): 13200 ppm/4h (rat).

**Diethylene Glycol Monomethyl Ether**
Acute oral toxicity (LD50): 4140-5180 mg/kg (rat).
Acute dermal toxicity (LD50): >2000 mg/kg (rabbit).
Acute inhalation toxicity (LC50): >50000 mg/m³/4h (rat).

**Chronic or Other Toxic Effects**

| | |
|---|---|
| Dermal Route: | Skin contact can cause irritation. Prolonged or repeated contact may defat and dry skin, and cause dermatitis. |
| Inhalation Route: | Ingestion of this product may cause Central Nervous System (CNS) Depression, symptoms of which may include; weakness, dizziness, slurred speech, drowsiness, unconsciousness and in cases of severe overexposure; coma and death. |
| Oral Route: | Ingestion of this product may lead to aspiration of the liquid, especially if vomiting occurs. This may result in chemical pneumonitis (inflammation of the lungs) and/or pulmonary edema (an accumulation of fluid in the lungs). |
| Eye Irritation/Inflammation: | Short-term exposure is expected to cause only slight irritation, if any. |
| Immunotoxicity: | Not available |
| Skin Sensitization: | Contact with this product is not expected to cause skin sensitization, based upon the available data and the known hazards of the components. |
| Respiratory Tract Sensitization: | Contact with this product is not expected to cause respiratory tract sensitization, based upon the available data and the known hazards of the components. |
| Mutagenic: | Benzene is tumorigenic by RTECS criteria. |
| Reproductive Toxicity: | This product is not known to contain any components at >= 0.1% that have been shown to cause reproductive toxicity. Therefore, based upon the available data and the known hazards of the components, this product is not expected to be a reproductive toxin. |
| Teratogenicity/Embryotoxicity: | This product contains a component(s) at >= 0.1% that has been shown to cause teratogenicity and/or embryotoxicity in laboratory tests. Therefore, this product is considered to be a teratogen/embryotoxin [Diethylene Glycol Monomethyl Ether]. |
| Carcinogenicity (ACGIH): | ACGIH A1: confirmed human carcinogen. [Benzene] |
| Carcinogenicity (IARC): | IARC Group 1: carcinogenic to Humans. [Benzene] |
| Carcinogenicity (NTP): | NTP Group 1: known to be a carcinogen. [Benzene] |
| Carcinogenicity (IRIS): | EPA/IRIS Class A: human carcinogen. |
| Carcinogenicity (OSHA): | Benzene is an OSHA known carcinogen. |
| **Other Considerations** | No additional remark. |

## *Section 12. Ecological Information*

| | | | |
|---|---|---|---|
| **Environmental Fate** | Not available | **Persistance/ Bioaccumulation Potential** | Not available |
| **BOD5 and COD** | Not available | **Products of Biodegradation** | Not available |
| **Additional Remarks** | No additional remark. | | |

## *Section 13. Disposal Considerations*

| | |
|---|---|
| **Waste Disposal** | Spent/ used/ waste product may meet the requirements of a hazardous waste. Consult your local or regional authorities. Ensure that waste management processes are in compliance with government requirements and local disposal regulations. |

## *Section 14. Transport Information*

| | | | |
|---|---|---|---|
| **TDG Classification** | FUEL, AVIATION, TURBINE ENGINE, 3, UN1863, PGII (CL-TDG) | **Special Provisions for Transport** | See Transportation of Dangerous Goods Regulations. |

## *Section 15. Regulatory Information*

**Other Regulations**

This product is acceptable for use under the provisions of WHMIS-CPR. All components of this formulation are listed on the CEPA-DSL (Domestic Substances List).

All components of this formulation are listed on the US EPA-TSCA Inventory.

All components of this product are on the European Inventory of Existing Commercial Chemical Substances (EINECS).

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

Please contact Product Safety for more information.

**DSD/DPD (Europe)** Not evaluated.

**HCS (U.S.A.)**

CLASS: Contains material which may cause cancer.
CLASS: Flammable liquid having a flash point lower than 37.8°C (100°F).
CLASS: Toxic.
CLASS: Irritating substance.
CLASS: Target organ effects.

**ADR (Europe) (Pictograms)**

**NOT EVALUATED FOR EUROPEAN TRANSPORT**

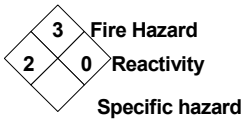
**NON ÉVALUÉ POUR LE TRANSPORT EUROPÉEN.**

**DOT (U.S.A) (Pictograms)**

**HMIS (U.S.A.)**

| | |
|---|---|
| **Health Hazard** | 2* |
| **Fire Hazard** | 3 |
| **Reactivity** | 0 |
| **Personal Protection** | H |

**NFPA (U.S.A.)**




**Rating**

0 Insignificant
1 Slight
2 Moderate
3 High
4 Extreme

## *Section 16. Other Information*

**References** Available upon request.
* Marque de commerce de Petro-Canada - Trademark

**Glossary**

ACGIH - American Conference of Governmental Industrial Hygienists
ADR - Agreement on Dangerous goods by Road (Europe)
ASTM - American Society for Testing and Materials
BOD5 - Biological Oxygen Demand in 5 days
CAN/CGA B149.2 Propane Installation Code
CAS - Chemical Abstract Services
CEPA - Canadian Environmental Protection Act
CERCLA - Comprehensive Environmental Response, Compensation and Liability Act
CFR - Code of Federal Regulations
CHIP - Chemicals Hazard Information and Packaging Approved Supply List
CNS - Central Nervous System
COD5 - Chemical Oxygen Demand in 5 days
CPR - Controlled Products Regulations
DOT - Department of Transport
DSCL - Dangerous Substances Classification and Labeling (Europe)
DSD/DPD - Dangerous Substances or Dangerous Preparations Directives (Europe)
DSL - Domestic Substance List
EEC/EU - European Economic Community/European Union
EINECS - European Inventory of Existing Commercial Chemical Substances
EPA - Environmental Protection Agency
EPCRA - Emergency Planning and Community Right to Know Act
FDA - Food and Drug Administration
FIFRA - Federal Insecticide, Fungicide and Rodenticide Act
HCS - Hazard Communication Standard
HMIS - Hazardous Material Information System
IARC - International Agency for Research on Cancer
IRIS - Integrated Risk Information System
LD50/LC50 - Lethal Dose/Concentration kill 50%
LDLo/LCLo - Lowest Published Lethal Dose/Concentration
NAERG'96 - North American Emergency Response Guide Book (1996)
NFPA - National Fire Prevention Association
NIOSH - National Institute for Occupational Safety & Health
NPRI - National Pollutant Release Inventory
NSNR - New Substances Notification Regulations (Canada)
NTP - National Toxicology Program
OSHA - Occupational Safety & Health Administration
PEL - Permissible Exposure Limit
RCRA - Resource Conservation and Recovery Act
RTECS - Registry of Toxic Effects of Chemical Substances
SARA - Superfund Amendments and Reorganization Act
SD - Single Dose
STEL - Short Term Exposure Limit (15 minutes)
TDG - Transportation Dangerous Goods (Canada)
TDLo/TCLo - Lowest Published Toxic Dose/Concentration
TLm - Median Tolerance Limit
TLV-TWA - Threshold Limit Value-Time Weighted Average
TSCA - Toxic Substances Control Act
USEPA - United States Environmental Protection Agency
USP - United States Pharmacopoeia
WHMIS - Workplace Hazardous Material Information System

**For Copy of MSDS**

**Prepared by Product Safety - JDW on 2/8/2005.**

| | |
|---|---|
| **Internet: www.petro-canada.ca/msds**<br><br>**Fuels & Solvents:**<br>**Western Canada, Ontario & Central Canada, telephone: 1-800-668-0220; fax: 1-800-837-1228**<br>**Quebec & Eastern Canada, telephone: 514-640-8308; fax: 514-640-8385**<br><br>**For Product Safety Information: (905) 804-4752** | **Data entry by Product Safety - JDW.** |

***To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.***

Panasonic®

**BATTERY SALES GROUP**

# MATERIAL SAFETY DATA SHEET

## LC SEALED LEAD ACID BATTERY SERIES

## Section I: Chemical Product and Company Identification

**Product Identity:** Sealed Lead Acid Battery

**Trade Name:** Panasonic LC Valve Regulated Lead Acid Battery Series

**Distributor:**
Panasonic Industrial Company - Battery Sales Group
Two Panasonic Way/7A-1, Secaucus, New Jersey 07094

**Manufacturer:**
Matsushita Battery Industrial
Osaka, 570, Japan

***For Chemical Emergency***
***Spill, Leak, Fire, Exposure or Accident***
***Call CHEMTREC – Day or Night - 24 hours***
***1-800-424-9300***
***Outside the USA: 1-703-527-3887 (collect)***

Telephone Number for General Information
Toll Free 1-800-793-3772
Internet: www.panasonic.com/batteries

## Section II: Hazardous Ingredients / Identity Information

| Component | Common Name | Chemical Name | Approximate % by wt. or vol. | OSHA PEL | ACGIH TLV | CAS# |
|---|---|---|---|---|---|---|
| Lead | (Negative Electrode and Grid) | Pb | 48~53 wt% | 0.05 mg/m$^3$ | 0.15 mg/m$^3$ | 7439-92-1 |
| Lead Oxide | (Positive Electrode) | $PbO_2$ | 23~26% | 0.05 mg/m$^3$ | 0.15 mg/m$^3$ | 1309-60-0 |
| Lead Sulfate | (Positive and Negative Electrode) | $PbSO_4$ | < 1. wt% | 0.05 mg/m$^3$ | 0.15 mg/m$^3$ | 7446-14-2 |
| Sulfuric Acid | (Electrolyte) | $H_2SO_4$ | 7~10 wt% | 1.0 mg/m$^3$ | 1.0 mg/m$^3$ | 7664-93-9 |

Percentages of components are dependant both on the model of the battery and state of charge/discharge of the battery. Sulfuric Acid is reportable under Sections 302, 311, 312 and 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA). Reportable Quantity: 500 lbs for sulfuric acid and 10,000 lbs for lead. See Section XII, Page 3 for more information.

Overall Chemical Reaction: $PbO2 + Pb + 2H_2SO_4 \rightleftharpoons 2PbSO_4 + 2H_2O$

**Note: Panasonic Sealed Lead Acid batteries are a sealed, non-spillable design. Under normal use and handling the customer has no contact with the internal components of the battery or the chemical hazards. Under normal use and handling these batteries do not emit regulated or hazardous substances. Warning: Battery terminals/posts and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Wash hands thoroughly after working with batteries and before eating, drinking or smoking.**

## Section III: Physical / Chemical Characteristics

| | |
|---|---|
| **Boiling Point:** | Electrolyte 110°C - 112°C |
| **Vapor Pressure:** | Electrolyte 11.7 mm Hg. at 20°C |
| **Vapor Density (AIR = 1):** | Electrolyte 3.4 |
| **Solubility in Water:** | Lead, Lead Oxide and Lead Sulfate are insoluble in water. Sulfuric Acid is 100% soluble in water. |
| **Appearance and Odor:** | The entire battery is a solid article consisting of an opaque plastic case with two protruding lead terminals. The battery is odorless. Sulfuric Acid is a liquid. |
| **Specific Gravity (H2O = 1)** | Electrolyte 1.300 |

**Health Hazard Information (Acute and Chronic) - Sulfuric Acid only.**

The International Agency for Research on Cancer (IARC) has classified "strong inorganic acid mist containing sulfuric acid" as a Category I carcinogen, a substance that is carcinogenic to humans. This classification does not apply to liquid forms of sulfuric acid or sulfuric acid solutions contained within the battery. Inorganic acid mist (sulfuric acid mist) is not generated under normal use of this product. Misuse of the product, such as overcharging, may however result in the generation of sulfuric acid mist.

| | |
|---|---|
| **Routes of Entry:** | By inhalation (mist), skin and eyes, ingestion. |
| **Acute:** | Tissue destruction on contact. May cause 2nd and 3rd degree burns or blindness. Ingestion will cause corrosive burns on contact. May be fatal if swallowed. |
| **Chronic:** | Inhalation of mists may cause upper respiratory irritation. |
| **Signs and Symptoms:** | Irritation and burning of exposed tissues. |
| **Medical Conditions:** | Respiratory disorders may be aggravated by prolonged inhalation of mists. |

## Section IV: Emergency and First Aid Procedures

Battery Electrolyte

| | |
|---|---|
| **Inhalation:** | Remove to fresh air. Give oxygen or artificial respiration if needed. **Get immediate medical attention.** |
| **Eye Contact:** | Flush with plenty of water for at least 15 minutes. **Get immediate medical attention.** |
| **Skin Contact:** | Remove contaminated clothing and flush affected areas with plenty of water for at least 15 minutes. |
| **Ingestion:** | Do not induce vomiting. Dilute by giving large quantities of water. If available give several glasses of milk. Do not give anything by mouth to an unconscious person. **Give CPR if breathing has stopped. Get immediate medical attention.** |

## Section V: Fire and Explosion Hazard Data

| | |
|---|---|
| **Flash Point:** | Not Applicable |
| **Flammable Limits:** | Lower 4.10% (Hydrogen gas) Upper 74.20% |
| **Extinguishing Media:** | Dry chemical, foam, halon or $CO_2$. |

**Special Fire Fighting Procedures:**
If batteries are on charge, turn off power. Use positive pressure, self-contained breathing apparatus in fighting fire. Water applied to electrolyte generates heat and causes it to splatter. Wear acid resistant clothing. Ventilate area well.
**Unusual Fire and Explosion Hazards:**
Hydrogen and oxygen gases are generated in cells during normal battery operation or when on charge. (Hydrogen is flammable and oxygen supports combustion). These gases enter the air through the vent caps during battery overcharging. To avoid risk of fire or explosion, keep sparks and other sources of ignition away from the battery. Do not allow metal objects to simultaneously contact both positive and negative terminal of batteries. Ventilate area well.

## Section VI: Reactivity Data

| | |
|---|---|
| **Stability:** | Stable under normal conditions. |
| **Conditions to Avoid:** | Sparks and other sources of ignition. Prolonged overcharge. Fire or explosion hazard due to possible hydrogen gas generation. |

**Incompatibility:**
Combination of sulfuric acid with combustibles and organic materials may cause fire and explosion. Avoid strong reducing agents, most metals, carbides, chlorates, nitrates, picrate.
**Hazardous Decomposition Products:** Hydrogen gas may be generated in an overcharged condition, in fire or at very high temperatures. CO, $CO_2$ and sulfur oxides may emit in fire.
Hazardous polymerization will not occur.

## Section VII: Precautions for Safe Handling and Use

**Steps to be Taken in Case of Broken Battery Case or Electrolyte Leakage:**
Neutralize any electrolyte or exposed internal battery parts with soda ash (sodium bicarbonate) until fizzing stops. Keep untrained personnel away from electrolyte and broken battery. Place broken battery and clean-up materials in a plastic bag or non-metallic container. Dispose of clean-up materials as a hazardous waste. Ventilate area as hydrogen gas may be given off during neutralization.
**Waste Disposal Method:**
**Federal and State laws prohibit the improper disposal of all lead acid batteries. The battery end users (owners) are responsible for their batteries from the date of purchase through their ultimate disposal. The only legally acceptable method of disposal of lead acid batteries is to recycle them at a Resource Conservation and Recovery Act (RCRA) approved secondary lead smelter.** The Panasonic SAV-LEAD Recycling Program allows for the recycling of lead-acid batteries in an environmentally sound manner. For more information on the SAV-LEAD Recycling Program call toll-free, 1-800-SAV-LEAD (1800-728-5323). These batteries are chemically identical to common automotive starter batteries and can be recycled with automotive lead-acid batteries.
HAZARDOUS WASTE CODES: D002, D008.
**Precautions to be Taken in Handling, Storing and Transportation:**
Store in cool, dry area away from combustible materials. Do not store in sealed, unventilated areas. Avoid overheating and overcharging.
**Other Precautions:**
Do not charge in unventilated areas. Do not use organic solvents or other than recommended chemical cleaners on battery.

## Section VIII: Control Measures / Personal Protection

**General:**

Normal room ventilation is sufficient during normal use and handling. Recommend 2 to 3 room air changes per hour to prevent buildup of hydrogen gas.

**Personal Protective Equipment (In the Event of Battery Case Breakage):**

Always wear safety glasses with side shields or full face shield.
Use rubber or neoprene gloves.
Wear acid resistant boots, apron or clothing.

**Work/Hygienic Practices:**

Remove jewelry, rings, watches and any other metallic objects while working on batteries. All tools should be adequately insulated to avoid the possibility of shorting connections. DO NOT lay tools on top of battery. Be sure to discharge static electricity from tools and individual person by touching a grounded surface in the vicinity of the batteries, but away from cells. Batteries are heavy. Serious injury can result from improper lifting or installation. DO NOT lift, carry, install or remove cells by lifting or pulling the terminal posts for safety reasons and because terminal posts and post seals may be damaged. DO NOT wear nylon clothes or overalls as they can create static electricity. DO KEEP a fire extinguisher and emergency communications device in the work area.

**IMPORTANT:**

**Wash hands thoroughly after working with batteries and before eating, drinking or smoking.**

## Section IX: Regulatory Information

**NFPA Hazard Rating for Sulfuric Acid:**

Flammability (Red) = 0 Health (Blue) = 3 Reactivity (Yellow) = 2

## Section X: Transportation Information

**Identification and Proper Shipping Name:**

Batteries – Wet, Non-Spillable, Electric Storage, UN 2800.

**DOT - Unregulated, meets the requirements of 49 CFR 173, 159 (d).**

**IATA/ICAO - Unregulated, meets the requirements of Special Provision A67.**

**IMO - Unregulated.**

***For all modes of transportation, each battery and outer package must be labeled: "Non-Spillable" or "Non-Spillable Battery." This label must be visible during transportation. * Batteries must be securely packed to prevent short-circuiting.**

## Section XI: California Proposition 65 Information

The State of California has determined that certain battery terminals contain lead and lead compounds, *and handling this product may also expose you to sulfuric acid mist*, chemicals known to the State of California to cause cancer and reproductive harm. IMPORTANT: WASH HANDS THOROUGHLY AFTER WORKING WITH BATTERIES AND BEFORE EATING, DRINKING OR SMOKING.

## Section XII: Other Information - Notice to Readers

**General Product Description – LC VRLA Batteries**

Panasonic LC Batteries are **sealed** (valve regulated) non-spillable lead-acid batteries with pasted lead-calcium plates. The electrolyte is held captive in an Absorbed Glass Mat (AGM) separator between plates that immobilize the electrolyte in the cell. AGM separator material is a highly porous, absorbent micro fiberglass mat mixed with polymer fibers. There is no "free" electrolyte to leak out if the cell is tipped over (cell case and cover are sealed together) or if the cell is punctured. The AGM separator material immobilizes the electrolyte and creates a situation where the spill of electrolyte is highly unlikely. Typical accidents where a battery case is punctured results in a slight drip or a slow ooze of material out of the cell that cannot be characterized as a spill.

Panasonic LC VRLA batteries are also different from conventional **unsealed** (wet/flooded) cells because they contain only a minimum amount of electrolyte. VRLA battery electrolyte is a dilute mixture of sulfuric acid in water, which typically has a specific gravity between 1.270 and 1.3. Specific Gravity is a measure of the density of a liquid as compared to that of water, which has a specific gravity of 1.000. Pure sulfuric acid has a specific gravity of 1.835.

**NOTE**: Panasonic LC batteries do not contain a gel electrolyte.

**General Product Description - LC VRLA Batteries (continued)**

During normal battery installation, operation and maintenance, the user has NO contact with the internal components of the battery or its internal hazardous chemicals.

Panasonic LC batteries are UL recognized under the file number: Matsushita Electric Industrial Co. Ltd., Matsushita Electric Corp. of America, File #MH13723, 1 Panasonic Way, Secaucus, NJ 07094.

**NOTICE TO READERS: DISCLAIMER**

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**Preparer: Charles P. Monahan** **Director, Regulatory Compliance** **201-392-6464**
**Printed in the U.S.A.**

# Supplemental Information on Panasonic Valve-Regulated Lead Acid Batteries

## Transportation

All Panasonic valve-regulated lead acid batteries are considered "non-spillable" for purposes of transportation by the U.S. Department of Transportation (DOT), International Civil Aviation Administration (ICAO), the International Air Transport Association (IATA) and the International Maritime Dangerous Goods regulations (IMDG). They are considered "non-spillable" by DOT by passing the Vibration Test and Pressure Differential Test as required in 49 CFR 173.159(d). They are also considered to be "non-spillable" by both ICAO and IATA by exceeding the requirements of Special Provisions "A67" as defined in their 1998 Handbooks.

Our batteries are authorized for transportation on deck or under deck storage on either a passenger or cargo vessel by passing the Vibration and Pressure Differential Tests as described in the International Maritime Dangerous Goods Regulations (IMDG).

To transport these batteries as "non-spillable" they must be shipped in a condition that would protect them from short-circuits and be securely packaged so as to withstand conditions normal to transportation. For transportation by a consumer, in or out of a device, they are unregulated thus requiring no additional special handling or packaging.

All of our lead acid batteries and their outside packaging, manufactured after September 30, 1995 are labeled "NON-SPILLABLE" per 49 CFR 173.159(d). If you repackage our batteries either as batteries or as a component of another product you must label the outer package "NON-SPILLABLE" per 49 CFR 173.159(d).

## Assure Proper Recycling!

Valve-Regulated Lead Acid batteries destined for recycling can be managed under the federal *Universal Waste Rule* codified at 40 CFR Part 273.

In the event of disposal, dispose only in accordance with federal, state and local regulation. Batteries generated as a waste are subject to the Resource Conservation and Recovery Act (RCRA) as a D008 (lead) hazardous waste.

## Panasonic VRLA Recycling Program

The Panasonic 1-800-SAV-LEAD Recycling Program for the collection and recycling of valve-regulated lead acid batteries (VRLA) covers all Panasonic Valve-Regulated Lead Acid Batteries. The proper disposal of spent VRLA batteries is becoming more of a critical issue, both from the viewpoint of environmental stewardship and from compliance with federal and state environmental regulations. Panasonic recognizes the burdens and responsibilities that have been placed on our customers to properly dispose of spent VRLA batteries and is proud to offer this voluntary nationwide battery recycling program.

## Federal and State Requirements for Proper Disposal

Federal and State laws prohibit the improper disposal of all lead acid batteries. The battery end users (owners) are responsible for their batteries from the date of purchase through their ultimate disposal. The only legally acceptable method of disposal of lead acid batteries is to recycle them at Resource Conservation and Recovery Act (RCRA) approved secondary lead smelter. This Panasonic 1-800-SAV-LEAD Recycling Program will allow for you to arrange for the recycling of your VRLA batteries from anywhere in the United States. The Program will accept Panasonic and other VRLA batteries regardless of manufacturer. Panasonic will handle all VRLA batteries returned in an environmentally sound manner designed to comply with all applicable Federal and State laws and regulations. Panasonic will send batteries only to fully-permitted secondary lead smelters that we believe meet the highest environmental standards. Once the VRLA batteries are received by Panasonic, the cost to transport the batteries to the secondary lead smelter and the actual recycling costs will be borne by Panasonic.

See the next page for How the 1-800-SAV-LEAD Recycling Program Works

## Supplemental Information on Panasonic Valve-Regulated Lead Acid Batteries (Cont.)

**How the 1-800-SAV-LEAD Recycling Program Works**

1) We encourage all of our customers to serve as VRLA collection centers for your customers, thereby establishing a reverse distribution network between the end user and the secondary lead recycling facility.
2) All shipments to our national consolidation facility must be prepaid. No freight collect shipments will be accepted. All freight collect and non-VRLA batteries will be returned to the shipper.
3) Panasonic will maintain on file all necessary documentation for EPA reference. A copy will be provided upon request.
4) All batteries must be shipped, prepaid to Ebco Battery Company that serves as our national consolidation facility. (See *exception* below).

SHIPPING ADDRESS:
Ebco Battery Company
4017 Warm Springs Road
Columbus, Georgia 31909

5) Only VRLA batteries that meet the U.S. Department of Transportation (DOT) "NON-SPILLABLE" (49 CFR 173.159d) requirements will be accepted by this program.
6) Panasonic reserves the right to alter or discontinue this program at any time.

**Packaging Requirements**

1) All VRLA batteries must be fully discharged and packaged in a manner as to insure safe handling and conform to all applicable DOT regulations. (49 CFR 173.159d). A dab of silicon caulking or non-conductive tape on each terminal will ensure that no direct shorts occur during shipment.
2) VRLA battery shipments should be made in pallet quantities whenever possible.
3) Palletized shipments should be secured with metal bands or poly-wrapped with stack height limited to four (4) feet.
4) VRLA batteries shipped on pallets should be of uniform size or be stacked with the larger batteries on the bottom.
5) VRLA batteries should be stacked upright in a head-to-base arrangement. Each layer should be separated by cardboard to prevent accidental shorting.
6) Smaller quantities of VRLA batteries may be shipped via standard UPS. Be sure that each box does not exceed the UPS weight limit of 70 lbs. A dab of silicon caulking or non-conductive tape on each terminal will ensure that no shorts occur during shipment.
7) The outside of every pallet and individual box must be labeled "NON-SPILLABLE" as required by DOT regulations. This label must be visible during transportation.

### *Exception:*

Full-Truck-Loads – All full-truck-load shipments of VRLA batteries must be scheduled 48 hours in advance. To schedule shipments to our consolidation site, please be sure to fax a scheduling request (including contact name and phone number) to Ebco Battery Company at fax: (706) 569-6774.

**Consumer Users of Panasonic VRLA Batteries**

All Panasonic VRLA batteries are chemically identical to common automotive starter batteries and can be returned to any site that accepts automotive lead acid batteries for recycling. Examples include retailers of automotive batteries, automotive service centers, scrap metal dealers, etc...

For additional information on this program or information on how to recycle other Panasonic batteries please call your local Panasonic Battery Sales Group sales office.

**Panasonic Batteries**
Panasonic Industrial Company
A Division of Panasonic Corporation of North America
Two Panasonic Way
Secaucus, NJ 07094
Toll Free: 877-726-2228
Fax: 847-468-5750
e-mail: oembatteries@us.panasonic.com
Internet: www.panasonic.com/batteries

CANADA COLORS & CHEMICALS LTD
80 SCARSDALE ROAD
DON MILLS, ONTARIO, CANADA M3B 2R7
(416)-449-7750

# PRODUCT : MAGNAFLOC 10 CODE: 557050

## SECTION 01: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER/SUPPLIER.....CIBA SPECIALTY CHEMICALS
900 ROUTE 9 NORTH
WOODBRIDGE, NJ
USA ; 07095-1015
PREPARED BY.....ENVIRONMENTAL & REGULATORY AFFAIRS DEPARTMENT
PREPARATION DATE.....APR 30/2003
PRODUCT NAME.....MAGNAFLOC 10
PRODUCT CODE.....557050
CHEMICAL FORMULA.....N.AV.
CHEMICAL FAMILY.....ANIONIC POLYCRYLAMIDE
MATERIAL USE.....FLOCCULANT

## SECTION 02: COMPOSITION/INFORMATION ON INGREDIENTS

| HAZARDOUS INGREDIENTS/COMPOSITION | EXPOSURE LEVELS | LD/50, ROUTE, SPECIES | LC/50, ROUTE, SPECIES |
|---|---|---|---|
| NO KNOWN HAZARDOUS INGREDIENTS. | | | |

## SECTION 03: HAZARDS IDENTIFICATION

ROUTE OF ENTRY:
SKIN CONTACT.....REPEATED OR PROLONGED EXPOSURE MAY CAUSE SLIGHT SKIN IRRITATION.
SKIN ABSORPTION.....N.AV.
EYE CONTACT.....EYE CONTACT MAY CAUSE SLIGHT IRRITATION AND/OR REDNESS.
INHALATION.....INHALED DUST MAY CAUSE RESPIRATORY IRRITATION.
INGESTION.....N.AV.
EFFECTS OF ACUTE EXPOSURE.....REFER TO ROUTE OF ENTRY. ROUTE OF ENTRY: INHALATION.
MEDICAL CONDITIONS AGGRAVATED....EXISTING RESPIRATORY CONDITIONS.
BY OVEREXPOSURE

## SECTION 04: FIRST AID MEASURES

INSTRUCTIONS:.....EYE CONTACT: FLUSH EYES WITH WATER FOR AT LEAST 15 MINUTES. GET MEDICAL ATTENTION. SKIN CONTACT: WASH AFFECTED AREA WITH PLENTY OF WATER AND SOAP, IF AVAILABLE, FOR SEVERAL MINUTES. GET MEDICAL ATTENTION IF IRRITATON OCCURS. CONTAMINATED CLOTHING SHOULD BE WASHED BEFORE RE-USE. INHALATION: REMOVE TO FRESH AIR. GET MEDICAL ATTENTION IF RESPIRATORY IRRITATION DEVELOPS OR IF BREATHING BECOMES DIFFICULT. INGESTION: IF CONSCIOUS, GIVE 2 TO 4 GLASSES OF WATER TO DRINK, BUT DO NOT INDUCE VOMITING. GET MEDICAL ATTENTION. DO NOT GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS

# PRODUCT : MAGNAFLOC 10 CODE: 557050

## SECTION 04: FIRST AID MEASURES

INSTRUCTIONS:.....OR CONVULSING PERSON.

## SECTION 05: FIRE FIGHTING MEASURES

FLAMMABILITY/COMBUSTIBILITY.....SEE FLASH POINT
FLAMMABILITY
IF YES, UNDER WHICH.....N.AV.
CONDITIONS?
EXTINGUISHING MEDIA.....CARBON DIOXIDE, DRY CHEMICAL, FOAM, IN PREFERENCE TO A WATER SPRAY.
SPECIAL PROCEDURES.....WATER MAY CREATE A SLIP HAZARD. USE SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE EQUIPMENT.
FLASH POINT (C), METHOD.....N.AP.
AUTO IGNITION TEMPERATURE.....N.AV.
UPPER FLAMMABLE LIMIT (% BY.....N.AV.
VOL.)
LOWER FLAMMABLE LIMIT (% BY.....N.AV.
VOL.)
EXPLOSION DATA
- EXPLOSIVE POWER.....DANGER! EXPLOSION RISK!. THIS PRODUCT CAN FORM AN EXPLOSIVE DUST/AIR MIXTURE. AVOID DUST FORMATION AND CONTROL IGNITION SOURCES. EMPLOY GROUNDING, VENTING AND EXPLOSION RELIEF PROVISIONS IN ACCORD WITH ACCEPTED ENGINEERING PRACTICES IN PROCESS OPERATIONS CAPABLE OF GENERATING DUST/OR STATIC ELECTRICITY.
- RATE OF BURNING.....N.AV.

SENSITIVITY TO STATIC.....SEE ABOVE
DISCHARGE
- SENSITIVITY TO IMPACT.....NONE

HAZARDOUS COMBUSTION PRODUCTS...OXIDES OF CARBON AND NITROGEN, VARIOUS HYDROCARBONS, AND/OR AMMONIA WHICH MAY BE IRRITATING OR HARMFUL.

## SECTION 06: ACCIDENTAL RELEASE MEASURES

LEAK/SPILL.....PRODUCT BECOMES SLIPPERY AND DIFFICULT TO HANDLE WHEN WET; SPILLS ARE BEST HANDLED WHILE STILL DRY. SWEEP UP AND COLLECT DRY PRODUCT. ABSORB WET PRODUCT WITH VERMICULITE OR OTHER INERT MATERIAL AND PLACE IN CLOSABLE CONTAINER FOR DISPOSAL. SCRUB AREA WITH DRY ABSORBENT AND THEN FLUSH RESIDUE WITH WATER TO ELIMINATE SLIP HAZARD. DISPOSE IN ACCORDANCE WITH LOCAL, PROVINCIAL AND FEDERAL REGULATIONS.

## SECTION 07: HANDLING AND STORAGE

# PRODUCT : MAGNAFLOC 10 CODE: 557050

## SECTION 07: HANDLING AND STORAGE

| | |
|---|---|
| HANDLING PROCEDURES AND EQUIPMENT | WARNING!. DUST GENERATED IN HANDLING OF THIS PRODUCT CAN BE EXPLOSIVE IF SUFFICIENT QUANTITIES ARE MIXED IN AIR, IN WHICH CASE IGNITION SOURCES SHOULD BE AVOIDED. EMPLOY GROUNDING, VENTING AND EXPLOSION RELIEF PROVISIONS IN ACCORD WITH ACCEPTED ENGINEERING PRACTICES IN PROCESS OPERATIONS CAPABLE OF GENERATING DUST/OR STATIC ELECTRICITY. HANDLE IN ACCORDANCE WITH GOOD INDUSTRIAL PRACTICE, HANDLE WITH CARE AND AVOID UNNECESSARY PERSONAL CONTACT. AVOID CONTACT WITH EYES AND PROLONGED OR REPEATED SKIN CONTACT. AVOID CONTINUOUS OR REPETITIVE BREATHING OF DUST. USE ONLY WITH ADEQUATE VENTILATION. REMOVE CONTAMINATED CLOTHING; LAUNDER OR DRY-CLEAN BEFORE REUSE. WASH THOROUGHLY WITH SOAP AND WATER AFTER USING. FOR INDUSTRIAL USE ONLY. SLIP HAZARD WHEN WET. |
| STORAGE NEEDS | MATERIAL IS SLIPPERY WHEN WET. STORE IN THE ORIGINAL CONTAINER, SECURELY CLOSED, IN A COOL AND DRY LOCATION. AVOID EXTREMES OF TEMPERATURE AND IGNITION SOURCES. |

## SECTION 08: EXPOSURE CONTROLS/PERSONAL PROTECTION

| | |
|---|---|
| GLOVES/ TYPE | WEAR IMPERVIOUS GLOVES AS A STANDARD PROCEDURE. |
| RESPIRATORY/TYPE | USE NIOSH APPROVED DUST RESPIRATOR. |
| EYE/TYPE | USE CHEMICAL GOGGLES WHICH MEET CSA STANDARDS TO PROTECT AGAINST DUST PARTICLES. |
| FOOTWEAR/TYPE | WEAR CHEMICAL RESISTANT FOOTWEAR. |
| CLOTHING/TYPE | WEAR GAUNTLETS AND APRON, ESPECIALLY FOR TRANSFER OF BULK QUANTITIES OF CONCENTRATED PRODUCT. |
| OTHER/TYPE | EYE BATH AND SAFETY SHOWER. |
| ENGINEERING CONTROLS | WORK IN WELL VENTILATED AREAS. PROVIDE MECHANICAL VENTILATION TO PREVENT DUST CONCENTRATIONS. |

## SECTION 09: PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|---|
| PHYSICAL STATE | SOLID/WHITE GRANULAR POWDER |
| ODOUR | NO SIGNIFICANT ODOUR |
| ODOUR THRESHOLD | N.AP. |
| VAPOUR PRESSURE (MMHG) | N.AP. |
| VAPOUR DENSITY (AIR=1) | N.AP. |
| BY VOLUME | |
| BY WEIGHT | |
| EVAPORATION RATE | N.AP. |
| BOILING POINT | ~100 C |
| MELTING POINT (C) | N.AV. |
| PH | ~6 (1% SOLUTION) |
| SPECIFIC GRAVITY (WATER=1) | ~0.75 |
| SOLUBILITY IN WATER (% W/W) | SOLUBLE, SOLUBILITY LIMITED BY VISCOSITY |
| COEFFICIENT OF WATER/OIL DIST | N.AV. |

# PRODUCT : MAGNAFLOC 10 CODE: 557050

## SECTION 10: STABILITY AND REACTIVITY

CHEMICAL STABILITY:
YES.....STABLE
NO, WHICH CONDITIONS?.....AVOID WET, DAMP OR UMID CONDITIONS, EXTREMES OF TEMPERATURE, AND IGNITION SOURCES.
COMPATABILITY WITH OTHER SUBSTANCES:
YES
NO, WHICH ONES?.....AVOID CONTACT WITH STRONG OXIDANTS SUCH AS LIQUID CHLORINE, ENRICHED GASEOUS OR LIQUID OXYGEN, AND SODIUM OR CALCIUM HYPOCHLORITE.
REACTIVITY CONDITIONS?.....SEE ABOVE
HAZARDOUS PRODUCTS OF.....SEE HAZARDOUS COMBUSTION PRODUCTS

## SECTION 11: TOXICOLOGICAL INFORMATION

EXPOSURE LIMIT OF MATERIAL.....N.AV.
LC 50 OF MATERIAL, SPECIES &.....N.AV.
ROUTE
LD 50 OF MATERIAL, SPECIES &.....ACUTE ORAL (RAT) IS EXPECTED TO BE >2,000 MG/KG (BY ANALOGY
ROUTE TO SIMILAR MATERIALS). DERMAL - N.AV.
CARCINOGENICITY OF MATERIAL.....NOT A KNOWN CARCINOGEN
REPRODUCTIVE EFFECTS.....NONE KNOWN
MUTAGENICITY.....NOT A KNOWN MUTAGEN
TERATOGENICITY.....NOT A KNOWN TERATOGEN
IRRITANCY OF MATERIAL.....ACUTE EYE (RABBIT): NOT AN IRRITANT (BY ANALOGY TO SIMILAR MATERIALS). ACUTE DERMAL (RABBIT): NOT AN IRRITANT (BY ANALOGY TO SIMILAR MATERIALS). SEE SECTION 03
SENSITIZING CAPABILITY OF.....NOT A KNOWN SENSITIZER
MATERIAL
SYNERGISTIC MATERIALS.....N.AV.

## SECTION 12: ECOLOGICAL CONSIDERATIONS

ECOLOGICAL INFORMATION.....FROM TESTS ON A PRODUCT RANGE, THE FOLLOWING RESULTS ARE EXPECTED:. ACUTE FISH TOXICITY: LC50, 96-HR, ZEBRA FISH (BRACHYDANIO RERIO): 357 MG/L. ACUTE INVERTEBRATE TOXICITY: EC50, 48-HR, DAPHNIA MAGNA: 212 MG/L. ACUTE ALGAE TOXICITY: EC50, 72-HR, ALGAE (CHLORELLA VULGARIS): >1000 MG/L. ACUTE BACTERIA TOXICITY: EC50, 24-HR, BACTERIA (PSEUDOMONAS PUTIDA): 892 MG/L

## SECTION 13: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL.....ALL DISPOSAL METHODS MUST BE. IN ACCORDANCE WITH MUNICIPAL, PROVINCIAL AND FEDERAL REGULATIONS.

# PRODUCT : MAGNAFLOC 10 CODE: 557050

## SECTION 14: TRANSPORT INFORMATION

TDG CLASSIFICATION.....NOT REGULATED
SPECIAL SHIPPING INSTRUCTIONS....N.AP.

## SECTION 15: REGULATORY INFORMATION

CPR COMPLIANCE.....THIS IS NOT A REGULATED PRODUCT. THIS PRODUCT HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE CPR AND THE MSDS CONTAINS ALL THE INFORMATION REQUIRED BY THE CPR.

## SECTION 16: OTHER INFORMATION

N.AP.=NOT APPLICABLE
N.AV.=NOT AVAILABLE

# Material Safety Data Sheet

PETRO-CANADA SUPREME 5W-30, 10W-30, 10W-40, 20W-50 MOTOR OIL

## 1 . Product and company identification

**Common name** : PETRO-CANADA SUPREME 5W-30, 10W-30, 10W-40, 20W-50 MOTOR OIL

**Code** : 410-344, MOSP53; 410-341, MOSP13; 410-342, MOSP14; 410-343, MOSP25

**Material uses** : Supreme is designed for the lubrication of all gasoline, propane and CNG engines where the manufacturer recommends the use of API SM quality oils. SAE 5W-30 and 10W-30 grades also meet the requirements of ILSAC GF-4.

**Manufacturer** : PETRO-CANADA
P.O. Box 2844
Calgary, Alberta
T2P 3E3

**In case of emergency** : **Petro-Canada: 403-296-3000**
**Canutec Transportation:**
**613-996-6666**
**Poison Control Centre: Consult local telephone directory for emergency number(s).**

## 2 . Hazards identification

**Odour** : Mild petroleum oil like.

**OSHA/HCS status** : While this material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200), this MSDS contains valuable information critical to the safe handling and proper use of the product. This MSDS should be retained and available for employees and other users of this product.

**Emergency overview** : No specific hazard.

**Routes of entry** : Dermal contact. Eye contact. Inhalation. Ingestion.

**Potential acute health effects**

**Eyes** : Slightly irritating to the eyes.

**Skin** : Slightly irritating to the skin.

**Inhalation** : No known significant effects or critical hazards.

**Ingestion** : No known significant effects or critical hazards.

**Medical conditions aggravated by over-exposure** : Repeated skin exposure can produce local skin destruction or dermatitis. Repeated or prolonged contact with spray or mist may produce chronic eye irritation and severe skin irritation.

**See toxicological information (section 11)**

## 3 . Composition/information on ingredients

| Name | CAS number | % |
|---|---|---|
| Mixture of severely hydrotreated and hydrocracked base oil (petroleum). | Mixture | - |

The base oil may be a mixture of the following CAS#s: 8042-47-5, 64742-46-7, 64742-52-5, 64742-54-7, 72623-84-8, 72623-85-9, 72623-86-0, 72623-87-1, 178603-64-0, 178603-65-1, 178603-66-2, 445411-73-4

## 4 . First-aid measures

**Eye contact** : In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

**Skin contact** : Wash skin thoroughly with soap and water or use recognised skin cleanser. Get medical attention if irritation occurs. Remove contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse.

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

**Ingestion** : Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If potentially dangerous quantities of this material have been swallowed, call a physician immediately.

**Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training.

# 5 . Fire-fighting measures

**Flammability of the product** : May be combustible at high temperature.

**Products of combustion** : Carbon oxides (CO, CO2), nitrogen oxides (NOx), sulphur oxides (SOx), phosphorus oxides (POx), calcium oxides (CaOx), zinc oxides (ZnOx), molybdenum oxides (MoOx), boron oxides, smoke and irritating vapours as products of incomplete combustion.

**Extinguishing media**

**Suitable** : Use an extinguishing agent suitable for the surrounding fire.

**Not suitable** : None known.

**Special exposure hazards** : No specific hazard.

**Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

**Special remarks on fire hazards** : Low fire hazard. This material must be heated before ignition will occur.

**Special remarks on explosion hazards** : Do not pressurise, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.

# 6 . Accidental release measures

**Personal precautions** : Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment.

**Environmental precautions** : Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

**Methods for cleaning up** : If emergency personnel are unavailable, contain spilt material. For small spills, add absorbent (soil may be used in the absence of other suitable materials), scoop up material and place in a sealable, liquid-proof container for disposal. For large spills, dyke spilt material or otherwise contain material to ensure runoff does not reach a waterway. Place spilt material in an appropriate container for disposal.

# 7 . Handling and storage

**Handling** : Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk. Evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/vapour/spray. Wear suitable protective clothing. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidising agents, acids.

**Storage** : Keep container tightly closed. Store away from incompatible materials (see section 10). Keep container in a cool, well-ventilated area.

# 8 . Exposure controls/personal protection

| Product name | Exposure limits |
|---|---|
| Mixture of severely hydrotreated and hydrocracked base oil (petroleum). | **ACGIH TLV (United States). Notes: (oil mist)**<br>TWA: 5 mg/m$^3$ 8 hour/hours.<br>STEL: 10 mg/m$^3$ 15 minute/minutes. |

**Consult local authorities for acceptable exposure limits.**

**Engineering measures** : No special ventilation requirements. Good general ventilation should be sufficient to control airborne levels. If this product contains ingredients with exposure limits, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure below any recommended or statutory limits.

**Personal protection**

**Eyes** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts.

**Skin** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

## 8 . Exposure controls/personal protection

**Respiratory** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
Recommended: organic vapour filter

**Hands** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
Recommended: neoprene, nitrile, polyvinyl alcohol (PVA), Viton.

**Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

## 9 . Physical and chemical properties

**Physical state** : Viscous liquid.

**Flash point** : Open cup:≥227°C (440.6°F) (Cleveland.).

**Auto-ignition temperature** : Not available.

**Flammable limits** : Not available.

**Colour** : Light amber.

**Odour** : Mild petroleum oil like.

**pH** : Not applicable.

**Boiling/condensation point** : Not available.

**Pour Point** : **5W-30**: -45ºC (-49ºF) **10W-30**: -36ºC (-33ºF) **10W-40**: -36ºC (-33ºF) **20W-50**: -24ºC (-11ºF)

**Melting/freezing point** : Not available.

**Relative density** : 0.856 to 0.8784 kg/L @ 15ºC (59ºF)

**Vapour pressure** : Not available.

**Vapour density** : Not available.

**Volatility** : Not available

**Odour threshold** : Not available.

**Evaporation rate** : Not available.

**Viscosity** : **5W-30**: 61.8 cSt @ 40°C (104ºF), 10.4 cSt @ 100ºC (212ºF), VI=159; **10W-30**: 66.0 cSt @ 40°C (104ºF), 10.2 cSt @ 100ºC (212ºF), VI=141; **10W-40**: 94.9 cSt @ 40°C (104ºF), 13.9 cSt @ 100ºC (212ºF), VI=149; **20W-50**: 170.8 cSt @ 40°C (104ºF), 18.9 cSt @ 100ºC (212ºF), VI=125

**Solubility** : Insoluble in water.

**Log$K_{ow}$** : Not available.

**Softening Point** : Not available.

**Dropping Point** : Not available.

**Penetration** : Not available.

**Physical/chemical properties comments** : Not available.

## 10 . Stability and reactivity

**Stability and reactivity** : The product is stable.

**Conditions of instability** : Not available.

**Incompatibility with various substances** : Reactive with oxidising agents and acids.

**Hazardous decomposition products** : May release COx, H2S, alkyl mercaptans, methacrylate monomers, smoke and irritating vapours when heated to decomposition.

**Hazardous polymerisation** : Will not occur.

# 11 . Toxicological information

**Toxicity data**

| Product/ingredient name | Test | Result | Route | Species |
|---|---|---|---|---|
| Mixture of severely hydrotreated and hydrocracked base oil (petroleum). | LD50<br>LD50<br>LC50 | >5000 mg/kg<br>>2000 mg/kg<br>>2500 mg/m$^3$ (4 hour/hours) | Oral<br>Dermal<br>Inhalation | Rat<br>Rabbit<br>Rat |

**Specific effects**

**Carcinogenic effects** : Not listed as carcinogenic by OSHA, NTP or IARC.

**Mutagenic effects** : No known significant effects or critical hazards.

**Teratogenicity / Reproductive toxicity** : No known significant effects or critical hazards.

**Sensitisation**

**Ingestion** : No known significant effects or critical hazards.

**Inhalation** : No known significant effects or critical hazards.

**Eyes** : Slightly irritating to the eyes.

**Skin** : Slightly irritating to the skin.

**Synergistic products** : Not available.

# 12 . Ecological information

**Ecotoxicity data**

| Product/ingredient name | Species | Period | Result |
|---|---|---|---|

**Environmental precautions** : No known significant effects or critical hazards.

**Bioconcentration factor** Not available.

**BOD and COD** Not available.

**Biodegradable/OECD** Not available.

**Mobility** Not available.

**Special remarks on the products of biodegradation** Not available.

# 13 . Disposal considerations

**Disposal 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 information presented below only applies to the material as supplied. The identification based on characteristic(s) or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations.**

**Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.**

**Waste disposal** : The generation of waste should be avoided or minimised wherever possible. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.

# 14 . Transport information

| Regulatory information | UN number | Proper shipping name | Class | PG* | Label | Additional information |
|---|---|---|---|---|---|---|
| TDG Classification | Not regulated. | - | - | - | | - |
| DOT Classification | Not available. | Not available. | Not available. | - | | - |

PG* : Packing group

# 15 . Regulatory information

**United States**

**HCS Classification** : Not regulated.

**U.S. Federal regulations** : Not available.

**Canada**

**WHMIS (Canada)** : Not controlled under WHMIS (Canada).

**This product has been classified according to the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.**

**EU regulations**

**Risk phrases** : This product is not classified according to EU legislation.

**International regulations**

**International lists**

**CANADA INVENTORY (DSL)** : Not determined.

**EC INVENTORY (EINECS/ELINCS)** : Listed

**TSCA 8(b) inventory** : Listed

# 16 . Other information

**Hazardous Material Information System (U.S.A.)** :

| | |
|---|---|
| Health | 1 |
| Fire hazard | 1 |
| Reactivity | 0 |
| Personal protection | B |

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

**References** : Available upon request.
* Marque de commerce de Petro-Canada - Trademark

**Date of printing** : **7/28/2006.**

**Date of issue** : **7/24/2006.**

**Date of previous issue** : **No previous validation.**

**Responsible name** : **Product Safety - JDW**

**Version** : **1**

**For Copy of (M)SDS** : The Canadian Controlled Products Regulations (CPR) (Under the Hazardous Products Act, part of the WHMIS legislation) only apply to WHMIS Controlled (i.e., hazardous) products. Therefore, the CPR and the 3-year update rule specified therein do not apply to WHMIS Non-Controlled products. Although this is true, customarily Petro-Canada reviews and updates Non-Controlled product MSDS if a customer requests such an update. These Non-Controlled product updates are given a lower priority than Controlled products but are handled as soon as practicable. If you would like to verify if the MSDS you have is the most current, or you require any further information, please contact:

# 16 . Other information

Internet: www.petro-canada.ca/msds

Lubricants:
Western Canada, telephone: 1-800-661-1199; fax: (780) 464-9564
Ontario & Central Canada, telephone: 1-800-268-5850 and (905) 822-4222; fax: 1-800-201-6285
Quebec & Eastern Canada, telephone: 1-800-576-1686; fax: 1-800-201-6285

For Product Safety Information: (905) 804-4752

**Notice to reader**

**To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.**
**Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.**

# Material Safety Data Sheet

## NITRIC ACID

**Infosafe no.** AJ12Z **Issue Date** February 2002 **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<br>NSW 2147 |
| **Emergency Tel.** | 1800 022 037 (24H) |
| **Tel/Fax** | Tel: (02) 9839 4000 Fax: (02) 9674 6225 |
| **Other Information** | New Zealand: Asia Pacific Specialty Chemicals (NZ) Limited<br>119 Carbine Road<br>Mt Wellington, Auckland 6<br>Emergency Tel: 0800 243 622 (24H)<br>Telephone: (09) 276 4019<br>Fax: (09) 276 7231 |

## IDENTIFICATION

**Product Code** TECH 00000625

**Product Name** NITRIC ACID

**Proper Shipping Name** NITRIC ACID

| **Other Names** | **Name** | **Manf. Code** |
|---|---|---|
| | NITRIC ACID (NOT GREATER THAN 70%) | |
| | NITRIC ACID 57% | TECH 00001128 |
| | NITRIC ACID 70% | AR 00000341 |
| | NITRIC ACID 70% | CP 00001650 |
| | NITRIC ACID 70% W/W | TECH 00001380 |
| | NITRIC ACID MIN 65% PICOPUR | RDEH 06030015 |
| | NITRIC ACID 70% | CP 00004990 |
| | Aqua fortis | |
| | Hydrogen nitrate | |
| | Nitric acid other than red fuming, all concentrations | |

**UN Number** 2031

**DG Class** 8

**Packing Group** II

**Hazchem Code** 2PE

**Poisons Schedule** S6

## Physical Data

**Appearance** Colourless to pale yellow liquid with sharp, irritating fumes. Soluble in water.

**Boiling Point** 122 deg C, 68% strength, constant boiling

**Vapour Pressure** No Data

**Specific Gravity** 1.3 - 1.42 at 15 deg C

**Flash Point** No Data

**Flamm. Limit LEL** No Data

## Other Properties

| | |
|---|---|
| **pH Value** | Acid |
| **Formula** | HNO3 |
| **Molecular Weight** | 63.01 |

## Ingredients

| Ingredients | Name | CAS | Proportion |
|---|---|---|---|
| | Nitric acid | 7697-37-2 | 0-70 % |

# HEALTH HAZARD INFORMATION

## Health Effects

| | |
|---|---|
| **Acute - Swallowed** | Damage to oesophagus and stomach may result in onset of fever and can be fatal. |
| **Acute - Eye** | Contamination of eyes can result in permanent injury. |
| **Acute - Skin** | Causes severe burns. |
| **Chronic** | Chronic exposure to mists or fumes may result in erosion of the teeth, bronchial irritation with chronic cough and attacks of bronchial pneumonia. |
| **Other Information** | Considered to be harmful by all exposure routes. Vapour is severe irritant to the eyes, mucous membranes and respiratory tract. Exposure to high concentrations of acid in the form of liquid, vapour, mist or the decomposition product nitrogen dioxide, may lead to pulmonary oedema. Symptoms and effects from overexposure may be delayed several hours. |

## First Aid

| | |
|---|---|
| **Eye** | Urgently seek medical assistance. Transport to hospital or medical centre. |
| **Skin** | Wash affected areas with copious quantities of water immediately. Remove contaminated clothing and wash skin thoroughly.<br>Seek medical attention if swelling, redness, blistering or irritation occurs |

## Advice to Doctor

| | |
|---|---|
| **Advice to Doctor** | Consult Poisons Information Centre. If exposure has been severe and/or symptoms marked, observation in hospital<br>for 48 hours should be considered because of the possibility of delayed pneumonitis and pulmonary oedema. |

## Other Health Hazard Information

## PRECAUTIONS FOR USE

| Exposure Limits | Name | STEL (mgm3) | STEL (ppm) | TWA (mgm3) | TWA (ppm) | FootNote |
|---|---|---|---|---|---|---|
| | Nitric acid | 10 | 4 | 5.2 | 2 | |

**Other Exposure Info.**

(TLV-TWA) 2 ppm, 5 mg/m3 STEL 4 ppm, 10 mg/m3, Worksafe Aust.
SAMPLING & ANALYSIS Use appropriate instrumentation and sampling strategy (location, timing, duration, frequency, and number of samples). Interpretation of the sampling results is related to these variables and the analytical method.
EXPOSURE CONTROL Note: Exposure to this material can be controlled in many ways. The measures appropriate for a particular worksite depend on how this material is used and on the extent of exposure. Use this general information to help develop specific control measures. Ensure that control systems are properly designed and maintained. Comply with occupational, environmental, fire and other applicable regulations.

**Eng. Controls**

Maintain concentration below recommended exposure limit. ENGINEERING CONTROLS Engineering control methods to reduce hazardous exposures are preferred. Methods include mechanical (local exhaust) ventilation, process or personnel enclosure, control of process conditions, and process modification (e.g., substitution of a less hazardous material). Administrative controls and personal protective equipment may also be required. Local exhaust ventilation is necessary when this material is heated or a mist created. Use a corrosion-resistant ventilation system separate from other exhaust ventilation systems. Exhaust directly to the outside. Supply sufficient replacement air to make up for air removed by exhaust systems.

## Personal Protection

| | |
|---|---|
| **Protective Equip.** | RESPIRATORY PROTECTION If engineering controls and work practices are not effective in controlling exposure to this material, then wear suitable personal protective equipment including approved respiratory protection. Have appropriate equipment available for use in emergencies such as spills or fire. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection. PERSONAL PROTECTION RECOMMENDATIONS: Use good occupational work practice. Avoid all contact. Use with adequate ventilation. If inhalation risk exists wear respirator or air-wash hood. EMERGENCY OR PLANNED ENTRY IN UNKNOWN CONCENTRATION OR IDLH CONDITIONS: A SCBA with a full facepiece and operated in a pressure-demand or other positive-pressure mode, or a supplied-air respirator with a full facepiece and operated in pressure-demand or other positive-pressure mode in combination with an auxiliary SCBA operated in pressure-demand or other positive-pressure mode. IDLH value: 100 ppm. ESCAPE: An air purifying full facepiece respirator EYE/FACE PROTECTION Chemical safety goggles. A face shield may also be necessary. SKIN PROTECTION Impervious gloves, coveralls, boots, and/or other resistant protective clothing. Have a safety shower/eye-wash fountain readily available in the immediate work area. An impervious full-body encapsulating suit and respiratory protection may be required in some operations. PERSONAL PROTECTION COMMENTS Remove contaminated clothing promptly. Immediately immerse in water and keep thoroughly wet until discarded or laundered. Inform laundry personnel of contaminant's hazards. Do not eat, drink or smoke in work areas. Wash hands thoroughly after handling this material. Maintain good housekeeping. |

## Flammability

| | |
|---|---|
| **Fire Hazards** | Non flammable. |
| **Other Precautions** | Never pour water into this substance when dissolving or diluting. Always add it slowly to the water to avoid boiling and splattering. |

# SAFE HANDLING INFORMATION

## Storage and Transport

| | |
|---|---|
| **Storage Precautions** | Class 8 products are not to be loaded with class 1, 4.3, 5, 6 (when class 6 is a cyanide and class 8 is an acid), 7 or foodstuffs or foodstuff empties. Store in a well ventilated area and out of direct sunlight. Keep containers closed at all times. Store away from oxidisable, caustic and combustible materials. |
| **Other Storage Info.** | Vapours heavier than air, prevent concentration in sumps and hollows. DO NOT enter confined spaces where vapour may have collected. Use good occupational work practice.<br>Strong oxidising agent, can lead to fire or explosion with organic and/or combustible materials. |
| **Proper Shipping Name** | NITRIC ACID |
| **EPG Number** | 8D1 |
| **IERG Number** | 40 |
| **Packaging Method** | 5.9.8RT5,RT8 |

## Spills and Disposal

| | |
|---|---|
| **Spills & Disposal** | Carefully dilute with water or neutralise with soda ash or slaked lime. After dilution or neutralisation, approved liquid waste land fill site should be suitable.<br>Full protective clothing should be worn, including impervious footwear and breathing apparatus. |

## Fire/Explosion Hazard

| | |
|---|---|
| **Fire/Explos. Hazard** | Fire fighters to wear self-contained breathing apparatus if risk of exposure to products of decomposition. Non flammable. However, if involved in a fire, highly toxic fumes of NOx will be given off. Keep containers cool with water spray. |
| **Hazardous Reaction** | Powerful oxidising agent. Highly corrosive to most metals. Will react explosively with organic materials. Highly toxic fumes evolved during reaction. Hygroscopic. Darkens on exposure to light due to nitrogen dioxide formation.<br>INCOMPATIBILITY: Bases, reducing agents, alcohols, alkali metals, brass, copper, copper alloys, galvanised iron, aluminium, corrodes steel, organic materials, and amines. |
| **Hazchem Code** | 2PE |

## OTHER INFORMATION

| | |
|---|---|
| **Toxicology** | LDLo (man): unreported route, 110 mg/kg. Human fatal dose approx. 1 ml<br>More detailed information about the effects of chemicals on health can be obtained from Worksafe Australia. |
| **Information on Ecological Effects** | Harmful to aquatic life. |
| **Risk Statement** | R35 Causes severe burns. |
| **Safety Statement** | S2 Keep out of reach of children.<br>S23 Do not breathe gas/fumes/vapour/spray<br>S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.<br>S27 Take off immediately all contaminated clothing.<br>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. |
| **Hazard Category** | Very Corrosive |
| **Manufacturers Advice** | Catalogue numbers 06038270 and 06038274 are S5 poisons (Fed). |
| **Empirical Formula & Structural Formula** | HNO3 |

## CONTACT POINT

| | |
|---|---|
| **Contact** | Australia: Business Hours: Mr Paul Verren<br>Telephone: (02) 9839 4024<br>After Hours: 1800 022 037<br>New Zealand: Business Hours: Mr Lloyd Williams<br>Telephone: (09) 276 4019<br>Emergency Tel: 0800 243 622<br>IMPORTANT ADVICE:<br>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 Asia Pacific Speciality 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

# Material Safety Data Sheet

**Dyno Nobel Inc.**
2650 Decker Lake Boulevard, Suite 300
Salt Lake City, Utah 84119
Phone: 801-364-4800 Fax: 801-321-6703
E-Mail: dnna.hse@am.dynonobel.com
**FOR 24 HOUR EMERGENCY, CALL CHEMTREC (USA) 800-424-9300**
**CANUTEC (CANADA) 613-996-6666**

**MSDS # 1030**
**Date 03/31/06**

Supercedes
MSDS # 1030 01/24/05

## SECTION I - PRODUCT IDENTIFICATION

**Trade Name(s):** DYNO® AP, DYNO® AP PLUS, DYNO® AP PLUS LD
DYNO® MC, DYNO® MC PLUS
DYNO® SL, DYNO® SL PLUS
DYNO® XTRA
IRECOAL® E-5 / DYNO® E5
IREMITE® TX / DYNO® TX
POWERMITE®
POWERMITE® AP, POWERMITE® SL, POWERMITE® PLUS
POWERMITE® SL PLUS
POWERMITE® LD, POWERMITE® LD PLUS
POWERMITE® Canadian
POWERMITE® RAISE BOMB™
DX 1004
DYNOSPLIT® AP

**Product Class:** Packaged Emulsion Explosives

**Product Appearance & Odor:** White or pink opaque semi-solid, which will appear gray if product contains aluminum. Little or no odor. Typically paper or plastic chub packaging.

**DOT Hazard Shipping Description:** Explosive, Blasting, Type E 1.1D UN0241 II

**NFPA Hazard Classification:** Not Available (See Section IV - Special Fire Fighting Procedures)

## SECTION II - HAZARDOUS INGREDIENTS

| Ingredients | CAS# | % (Range) | ACGIH TLV-TWA |
|---|---|---|---|
| Ammonium Nitrate | 6484-52-2 | 60-80 | No Value Established |
| Sodium Nitrate[1] | 7631-99-4 | 10-18 | No Value Established |
| Aluminum | 7429-90-5 | 0-10 | 10 mg/m$^3$ |
| Mineral Oil (mist) | 64742-35-4 | 0-3 | 5 mg/m$^3$ |

[1] Our source of Sodium Nitrate (Chilean) may contain perchlorate ion, which occurs naturally. Although Dyno Nobel does not analyze for the presence of perchlorate anion, based on published studies, the products listed above may contain between 50 and 350 ppm perchlorate.

Ingredients, other than those mentioned above, as used in this product are not hazardous as defined under current Department of Labor regulations, or are present in deminimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).



DYNO
Dyno Nobel
Groundbreaking Performance

# Material Safety Data Sheet

## SECTION III - PHYSICAL DATA

**Boiling Point:** Not Applicable

**Vapor Pressure:** Not Applicable

**Vapor Density:** (Air = 1) Not Applicable

**Density:** 0.95-1.25 g/cc

**Percent Volatile by Volume:** <20 (water)

**Solubility in Water:** Product partially dissolves very slowly in water.

**Evaporation Rate (Butyl Acetate = 1):** <1

## SECTION IV - FIRE AND EXPLOSION HAZARD DATA

**Flash Point:** >100°C **Flammable Limits:** Not Applicable
**Extinguishing Media:** (See Special Fire Fighting Procedures section.)
**Special Fire Fighting Procedures:** Do not attempt to fight fires involving explosive materials. Evacuate all personnel to a predetermined safe location, no less than 2,500 feet in all directions.
**Unusual Fire and Explosion Hazards:** Can explode or detonate under fire conditions. Burning material may produce toxic vapors.

## SECTION V - HEALTH HAZARD DATA

### Effects of Overexposure

**Eyes:** May cause irritation, redness and tearing.
**Skin:** Prolonged contact may cause irritation.
**Ingestion:** Large amounts may be harmful if swallowed.
**Inhalation:** Not a likely route of exposure.
**Systemic or Other Effects:** *Perchlorate*: Perchlorate can potentially inhibit iodide uptake by the thyroid and result in a decrease in thyroid hormone. The National Academy of Sciences (NAS) has reviewed the toxicity of perchlorate and has concluded that even the most sensitive populations could ingest up to 0.7 microgram perchlorate per kilogram of body weight per day without adversely affecting health. The USEPA must establish a maximum contaminant level (MCL) for perchlorate in drinking water by 2007, and this study by NAS may result in a recommendation of about 20 ppb for the MCL.

### Emergency and First Aid Procedures

**Eyes:** Irrigate with running water for at least fifteen minutes. If irritation persists seek medical attention.
**Skin:** Remove contaminated clothing. Wash with soap and water.
**Ingestion:** Seek medical attention.
**Inhalation:** If irritation occurs, remove to fresh air.
**Special Considerations:** None.

## SECTION VI - REACTIVITY DATA

**Stability:** Stable under normal conditions, may explode when subjected to fire, supersonic shock or high-energy projectile impact, especially when confined or in large quantity.
**Conditions to Avoid:** Keep away from heat, flame, ignition sources and strong shock.
**Materials to Avoid (Incompatibility):** Corrosives (strong acids and strong bases or alkalis).
**Hazardous Decomposition Products:** Nitrogen Oxides ($NO_X$), Carbon Monoxide (CO)
**Hazardous Polymerization:** Will not occur.

# Material Safety Data Sheet

## SECTION VII - SPILL OR LEAK PROCEDURES

**Steps to be taken in Case Material is Released or Spilled:** Protect from all ignition sources. In case of fire evacuate area not less than 2,500 feet in all directions. Notify authorities in accordance with emergency response procedures. Only personnel trained in emergency response should respond. If no fire danger is present, and product is undamaged and/or uncontaminated, repackage product in original packaging or other clean DOT approved container. Ensure that a complete account of product has been made and is verified. Follow applicable Federal, State, and local spill reporting requirements.
**Waste Disposal Method:** Disposal must comply with Federal, State and local regulations. If product becomes a waste, it is potentially regulated as a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR, part 261. Review disposal requirements with a person knowledgeable with applicable environmental law (RCRA) before disposing of any explosive material.

## SECTION VIII - SPECIAL PROTECTION INFORMATION

**Ventilation:** Not required for normal handling.
**Respiratory Protection:** None normally required.
**Protective Clothing:** Gloves and work clothing that reduce skin contact are suggested.
**Eye Protection:** Safety glasses are recommended.
**Other Precautions Required:** None.

## SECTION IX - SPECIAL PRECAUTIONS

**Precautions to be taken in handling and storage:** Store in cool, dry, well-ventilated location. Store in compliance with Federal, State and local regulations. Keep away from heat, flame, ignition sources and strong shock.
**Precautions to be taken during use:** Avoid breathing the fumes or gases from detonation of explosives. Use accepted safe industry practices when using explosive materials. Unintended detonation of explosives or explosive devices can cause serious injury or death.
**Other Precautions:** It is recommended that users of explosive materials be familiar with the Institute of Makers of Explosives Safety Library Publications.

## SECTION X - SPECIAL INFORMATION

The reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR 372 may become applicable if the physical state of this product is changed to an aqueous solution. If an aqueous solution of this product is manufactured, processed, or otherwise used, the nitrate compounds category and ammonia listing of the previously referenced regulation should be reviewed.

### Disclaimer

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LAFARGE NORTH AMERICA

# MSDS

Revised February 15, 2005

*Material Safety Data Sheet*

## PRODUCT NAME: PORTLAND CEMENT

### 1. CHEMICAL PRODUCT & COMPANY IDENTIFICATION

**Supplier**

Name: Lafarge North America Inc.
Address: 12950 Worldgate Drive, Suite 500
Herndon, VA 20170
Telephone: 703-480-3600

**Product Identifier**

Hydraulic Cement, Oil Well Cement, White Cement, Portland Cement Type I, IA, II, IIA, II L.A., III, IIIA, IV, IVA, V, VA, 10, 20, 30, 40, 50, OWH, OWG Cement, OW Class G HSR

Note: This MSDS covers many products. Individual composition of hazardous constituents will vary.

WHMIS Classification: D2A, E

**Emergency Telephone Numbers**

Health & Transportation: CHEMTREC 1-800-424-9300 or 703-527-3887

### 2. INFORMATION ON COMPONENTS

| Component Name | % | CAS No. |
|---|---|---|
| Tri-Calcium Silicate | 20 - 70 | 12168-85-3 |
| Di-Calcium Silicate | 10 - 60 | 10034-77-2 |
| Tetra-Calcium- Alumino-Ferrite | 5 - 15 | 12068-35-8 |
| Calcium Sulfate | 2 - 10 | Various |
| Tri-Calcium Aluminate | 1 - 15 | 12042-78-3 |
| Calcium Carbonate | 0 - 5 | 1317-65-3 |
| Magnesium Oxide | 0 - 4 | 1309-48-4 |
| Calcium Oxide | 0 - 0.2 | 1305-78-8 |
| Crystalline Silica | 0 - 0.2 | 14808-60-7 |
| Chromates | 0 - 0.005 | Various |

| Component Name | EXPOSURE LIMITS OSHA PEL TWA | ACGIH TLV TWA |
|---|---|---|
| Portland Cement (CAS 65997-15-1)* | | |
| (Respirable Dust) | 5 mg/m$^3$ | |
| (Total Dust) | 15 mg/m$^3$ | 10 mg/m$^3$ |
| Calcium Sulfate | | |
| (Respirable Dust) | 5 mg/m$^3$ | |
| (Total Dust) | 15 mg/m$^3$ | 10 mg/m$^3$ |
| Calcium Carbonate | | |
| (Respirable dust) | 5 mg/ m$^3$ | |
| (Total Dust) | 15 mg/m$^3$ | 10 mg/m$^3$ |
| Magnesium Oxide | 15 mg/m$^3$ | 10 mg/m$^3$ |
| Calcium Oxide | 5 mg/m$^3$ | 2 mg/m$^3$ |
| Crystalline Silica Quartz | | 0.05 mg/m$^3$ |
| Quartz (Respirable) | 10 mg/ m$^3$/ (%$SiO_2$+2) | |
| Quartz (Total Dust) | 30 mg/ m$^3$/ (%$SiO_2$+2) | |
| Chromates | 0.1 mg($CrO_3$)/ m$^3$ | 0.05 mg(Cr)/m$^3$ |
| Nuisance Dust | | |
| (Respirable) | 5 mg/m$^3$ | 3 mg/m$^3$ |
| (Total / Inhalable) | 15 mg/m$^3$ | 10 mg/m$^3$ |

*This value is for particulate matter containing no asbestos and < 1% crystalline silica.

### 3. HAZARD IDENTIFICATION

**Emergency Overview**

Solid; grey powder; odorless.

**Potential Health Effects**

INHALATION (acute): Breathing dust may cause nose, throat or lung irritation and choking. The described effect depends on the degree of exposure.

INHALATION (chronic): Prolonged or repeated exposure may cause lung injury including silicosis. This product may contain crystalline silica. Crystalline silica has been classified by IARC as a known human carcinogen. Some human studies indicate potential for lung cancer from crystalline silica exposure. Risk of injury depends on duration and level of exposure. Long term exposures which result in silicosis may result in additional health effects.

EYE CONTACT (acute/chronic): May cause eye irritation, severe burns and damage to cornea.

SKIN CONTACT (acute/chronic): May cause dry skin, redness, discomfort, irritation or severe burns. May produce allergic reaction potentially associated with hexavalent chromium. Thickening of the skin (scleroderma) may be associated with exposure to high levels of crystalline silica.

INGESTION (acute/chronic): Ingestion of large amounts may cause intestinal distress.

### 4. FIRST AID MEASURES

INHALATION: Move person to fresh air. Seek medical attention for discomfort.

EYE CONTACT: Rinse thoroughly with water. Seek medical attention for abrasions.

SKIN CONTACT: Wash with soap and water. Use moisturizing creams for irritated skin. Seek medical attention for burns.

INGESTION: Do not induce vomiting, but drink plenty of water. Seek medical attention for discomfort.

### 5. FIREFIGHTING MEASURES

**Flashpoint and Method:** None.
**Flammable Limits:** Not combustible.
**Autoignition Temperature:** None.
**General Hazard:** Avoid breathing dust.
**Firefighting Instructions:** Treat adjacent material.
**Firefighting Equipment:** This product is not a fire hazard. Self contained breathing apparatus is recommended to limit exposures to smoke from any combustion source.
**Hazardous Combustion Products:** None.

### 6. ACCIDENTAL RELEASE MEASURES

**General:** Wind blown dust may cause the hazards identified in Section 3. Remove spilled material to limit potential harm.
**Land Spill** Clean up spilled material.
**Water Spill:** Clean up spilled material.

## 7. HANDLING AND STORAGE

**General:** Avoid accidental release. Store dry and away from water.
**Storage Temperature:** Unlimited.
**Storage Pressure:** Unlimited.
**Empty Containers:** Dispose of containers in an approved landfill or incinerator.

## 8. EXPOSURE CONTROL & PERSONAL PROTECTION

**Engineering Controls**
Use exhaust ventilation to maintain dust levels below exposure limits in workplaces with poor ventilation and dusty conditions.
**Personal Protection**
RESPIRATORY PROTECTION: Under ordinary conditions no respiratory protection is required. Wear a NIOSH approved respirator when exposed to dust above exposure limits.
EYE PROTECTION: Wear glasses or safety goggles to prevent contact with eyes. Wearing contact lenses when using this product under dusty conditions is not recommended.
SKIN PROTECITON: Wear impervious gloves, shoes and protective clothing to prevent skin contact.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|---|
| Vapor Pressure: | Not measurable |
| Vapor Density: | Not measurable |
| Specific Gravity: | 3.2 |
| Solubility in Water: | Slight (0.1 - 1.0%) |
| Evaporation Rate: | Not measurable |
| pH (in water): | 12 - 13 |
| Boiling Point: | >1000$^{o}$ C |
| Freezing Point: | None, solid |
| Viscosity: | None, solid |

## 10. STABILITY AND REACTIVITY

**General:** Product is stable but must be kept dry. Reacts with water forming polymerized silicates and calcium oxide.
**Incompatible Materials and Conditions to Avoid:** Must be kept dry. Dissolves in hydrofluoric acid producing corrosive silicon tetrafluoride gas. Silicates react with powerful oxidizers such as fluorine, chlorine trifluoride and oxygen difluoride.
**Hazardous Decomposition:** None, powdered solid.

## 11. MSDS PREPARATION AND TOXICOLOGICAL INFORMATION

For detailed toxicological information contact:
Environment, Health & Safety and Public Affairs
Lafarge North America
12950 Worldgate Drive, Suite 500
Herndon, VA 20170
(703) 480-3600

## 12. ECOLOGICAL INFORMATION

For detailed ecological information: See Section 11 above.

## 13. DISPOSAL CONSIDERATIONS

Dispose in landfill in accordance with all applicable regulations. Any disposal practice must be in compliance with local, provincial, state and federal laws and regulations. Contact local environmental agency for specific rules.

## 14. REQUIRED TRANSPORT INFORMATION

Not a hazardous material for DOT or TDG shipping.

## 15. REGULATORY INFORMATION

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

**OSHA Hazard Communication Rule, 29 CFR 1910.1200:**
This product is considered by OSHA to be a hazardous chemical and should be included in the employer's hazard communication program.

**CERCLA/SUPERFUND, 40 CFR 117,302:** Not listed.

**SARA TITLE III, Sections 311-312 Hazard Category:**
This product has been reviewed according to the EPA Hazard Categories promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 and is considered a hazardous chemical and a delayed health hazard.

**SARA Section 313 Information:**
This product contains NONE of the substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

**Toxic Substance Control Act (TSCA):**
Some constituents identified in this product are listed on the TSCA Inventory.

**California Proposition 65:**
CHRYSTALLINE SILICA (CAS - 14808-60-7) is considered to be a carcinogen by the state of California.

**WHMIS Information**
This product contains substances considered to be hazardous by Health Canada and is a controlled product. Consult local authorities for acceptable exposure limits. WHMIS Information – 613-957-2342

## 16. OTHER INFORMATION

Abbreviations:

| | |
|---|---|
| CAS No | Chemical Abstract Service number |
| OSHA | Occupational Safety and Health Administration |
| PEL | Permissible Exposure Limit |
| ACGIH | American Conference of Governmental Industrial Hygienists |
| TLV | Threshold Limit Value |
| TWA | Time Weighted Average (8 hour) |
| CL | Ceiling Limit |
| $mg/m^3$ | milligrams per cubic meter |
| IARC | International Agency for Research on Cancer |
| NIOSH | National Institute for Occupational Safety and Health |
| pH | negative log of hydrogen ion |
| > | greater than |
| DOT | U.S. Department of Transportation |
| TDG | Transportation of Dangerous Goods |
| CFR | Code for Federal Regulations |
| CERCLA | Comprehensive Environmental Response, Compensation and Liability Act |
| SARA | Superfund Amendments and Reauthorization Act |
| WHMIS | Workplace Hazardous Materials Information System |

Information in this MSDS is believed to be current and accurate at the time provided. It is the user's obligation to determine the conditions of safe use of this product.

**MATERIAL SAFETY DATA SHEET (MSDS)**

# SODIUM CYANIDE

## 1. Product Identification

**Synonyms:** Hydrocyanic acid, sodium salt

**CAS No.:** 143-33-9

**Molecular Weight:** 49.01

**Chemical Formula:** NaCN

## 2. Composition/Information on Ingredients

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

## 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.**

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.

## 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.

## 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.

## 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.

## 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 antidote 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.

## 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 and engineering controls are not feasible, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Breathing air quality must meet the requirements of the OSHA respiratory protection standard (29CFR1910.134).

**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.

## 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.

## 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.

## 11. Toxicological Information

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

Cancer Lists

| | | NTP Carcinogen | | |
|---|---|---|---|---|
| Ingredient | CAS No. | Known | Anticipated | IARC Category |
| Sodium Cyanide | 143-33-9 | No | No | None |

## 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.

## 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.

## 14. Transport Information

### Domestic (Land, D.O.T.)

**Proper Shipping Name:** RQ, SODIUM CYANIDE, SOLID

**Hazard Class:** 6.1

**UN/NA:** UN1689, Packing Group: I

**Information reported for product/size:** 12KG

### 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:** 12KG

## 15. Regulatory Information

Chemical Inventory Status - Part 1

| Ingredient | CAS No. | TSCA | EC | Japan | Australia |
|---|---|---|---|---|---|
| Sodium Cyanide | 143-33-9 | Yes | Yes | Yes | Yes |

Chemical Inventory Status - Part 2

| Ingredient | CAS No. | Korea | Canada DSL | Canada NDSL | Phil. |
|---|---|---|---|---|---|
| Sodium Cyanide | 143-33-9 | Yes | Yes | No | Yes |

Federal, State & International Regulations - Part 1

| Ingredient | CAS No. | SARA 302 RQ | SARA 302 TPQ | SARA 313 List | SARA 313 Chemical Catg. |
|---|---|---|---|---|---|
| Sodium Cyanide | 143-33-9 | 10 | 100 | No | Cyanide Comp. |

Federal, State & International Regulations - Part 2

| Ingredient | CAS No. | CERCLA | RCRA 261.33 | TSCA 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, metal finishing, metals extraction

**Revision Information:**
Oct. 2003.

## Disclaimer:

**********

**The information contained herein is provided in good faith but no representation is made as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose.**

**********

MSDS Number: **S4034** * * * * * *Effective Date:* ***07/07/04*** * * * * * *Supercedes:* ***05/11/04***

**MSDS** Material Safety Data Sheet

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

Mallinckrodt CHEMICALS | J.T.Baker

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

National Response in Canada
CANUTEC: 613-996-6666

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

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

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

# SODIUM HYDROXIDE

## 1. Product Identification

**Synonyms:** Caustic soda; lye; sodium hydroxide solid; sodium hydrate
**CAS No.:** 1310-73-2
**Molecular Weight:** 40.00
**Chemical Formula:** NaOH
**Product Codes:**
J.T. Baker: 3717, 3718, 3721, 3722, 3723, 3728, 3734, 3736, 5045, 5565
Mallinckrodt: 7001, 7680, 7708, 7712, 7772, 7798

## 2. Composition/Information on Ingredients

| Ingredient | CAS No | Percent | Hazardous |
|---|---|---|---|
| Sodium Hydroxide | 1310-73-2 | 99 - 100% | Yes |

## 3. Hazards Identification

**Emergency Overview**

---
**POISON! DANGER! CORROSIVE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED. CAUSES BURNS TO ANY AREA OF CONTACT. REACTS WITH WATER, ACIDS AND OTHER MATERIALS.**

**SAF-T-DATA(tm)** Ratings (Provided here for your convenience)
---
Health Rating: 4 - Extreme (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 2 - Moderate
Contact Rating: 4 - Extreme (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White Stripe (Store Separately)
---

**Potential Health Effects**
---

**Inhalation:**
Severe irritant. Effects from inhalation of dust or mist vary from mild irritation to serious damage of the upper respiratory tract, depending on severity of exposure. Symptoms may include sneezing, sore throat or runny nose. Severe pneumonitis may occur.
**Ingestion:**
Corrosive! Swallowing may cause severe burns of mouth, throat, and stomach. Severe scarring of tissue and death may result. Symptoms may include bleeding, vomiting, diarrhea, fall in blood pressure. Damage may appears days after exposure.
**Skin Contact:**
Corrosive! Contact with skin can cause irritation or severe burns and scarring with greater exposures.
**Eye Contact:**
Corrosive! Causes irritation of eyes, and with greater exposures it can cause burns that may result in permanent impairment of vision, even blindness.
**Chronic Exposure:**
Prolonged contact with dilute solutions or dust has a destructive effect upon tissue.
**Aggravation of Pre-existing Conditions:**
Persons with pre-existing skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance.

---

# 4. First Aid Measures

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

Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician, immediately. Wash clothing before reuse.

**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:**

Perform endoscopy in all cases of suspected sodium hydroxide ingestion. In cases of severe esophageal corrosion, the use of therapeutic doses of steroids should be considered. General supportive measures with continual monitoring of gas exchange, acid-base balance, electrolytes, and fluid intake are also required.

---

# 5. Fire Fighting Measures

**Fire:**

Not considered to be a fire hazard. Hot or molten material can react violently with water. Can react with certain metals, such as aluminum, to generate flammable hydrogen gas.

**Explosion:**

Not considered to be an explosion hazard.

**Fire Extinguishing Media:**

Use any means suitable for extinguishing surrounding fire. Adding water to caustic solution generates large amounts of heat.

**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.

---

# 6. Accidental Release Measures

Ventilate area of leak or spill. Keep unnecessary and unprotected people away from area of spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust. Do not flush caustic residues to the sewer. Residues from spills can be diluted with water, neutralized with dilute acid such as acetic, hydrochloric or sulfuric. Absorb neutralized caustic residue on clay, vermiculite or other inert substance and package in a suitable container for disposal.

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.

---

# 7. Handling and Storage

Keep in a tightly closed container. Protect from physical damage. Store in a cool, dry, ventilated area away from sources of heat, moisture and incompatibilities. Always add the caustic to water while stirring; never the reverse. 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 with aluminum or magnesium. Do not mix with acids or organic materials.

---

# 8. Exposure Controls/Personal Protection

**Airborne Exposure Limits:**
- OSHA Permissible Exposure Limit (PEL):
2 mg/m3 Ceiling
- ACGIH Threshold Limit Value (TLV):
2 mg/m3 Ceiling

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

**Personal Respirators (NIOSH Approved):**
If the exposure limit is exceeded and engineering controls are not feasible, a half facepiece particulate respirator (NIOSH type N95 or better filters) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest.. A full-face piece particulate respirator (NIOSH type N100 filters) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. 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-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

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

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

---

# 9. Physical and Chemical Properties

**Appearance:**
White, deliquescent pellets or flakes.

**Odor:**
Odorless.

**Solubility:**

111 g/100 g of water.
**Specific Gravity:**
2.13
**pH:**
13 - 14 (0.5% soln.)
**% Volatiles by volume @ 21C (70F):**
0
**Boiling Point:**
1390C (2534F)
**Melting Point:**
318C (604F)
**Vapor Density (Air=1):**
> 1.0
**Vapor Pressure (mm Hg):**
Negligible.
**Evaporation Rate (BuAc=1):**
No information found.

---

# 10. Stability and Reactivity

**Stability:**
Stable under ordinary conditions of use and storage. Very hygroscopic. Can slowly pick up moisture from air and react with carbon dioxide from air to form sodium carbonate.
**Hazardous Decomposition Products:**
Sodium oxide. Decomposition by reaction with certain metals releases flammable and explosive hydrogen gas.
**Hazardous Polymerization:**
Will not occur.
**Incompatibilities:**
Sodium hydroxide in contact with acids and organic halogen compounds, especially trichloroethylene, may causes violent reactions. Contact with nitromethane and other similar nitro compounds causes formation of shock-sensitive salts. Contact with metals such as aluminum, magnesium, tin, and zinc cause formation of flammable hydrogen gas. Sodium hydroxide, even in fairly dilute solution, reacts readily with various sugars to produce carbon monoxide. Precautions should be taken including monitoring the tank atmosphere for carbon monoxide to ensure safety of personnel before vessel entry.
**Conditions to Avoid:**
Moisture, dusting and incompatibles.

---

# 11. Toxicological Information

Irritation data: skin, rabbit: 500 mg/24H severe; eye rabbit: 50 ug/24H severe; investigated as a mutagen.

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

| Ingredient | ---NTP Carcinogen--- Known | Anticipated | IARC Category |
|---|---|---|---|
| Sodium Hydroxide (1310-73-2) | No | No | None |

# 12. Ecological Information

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

# 13. Disposal Considerations

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

# 14. Transport Information

**Domestic (Land, D.O.T.)**
---
**Proper Shipping Name:** SODIUM HYDROXIDE, SOLID
**Hazard Class:** 8
**UN/NA:** UN1823
Packing Group: II
**Information reported for product/size:** 300LB

**International (Water, I.M.O.)**
---
**Proper Shipping Name:** SODIUM HYDROXIDE, SOLID
**Hazard Class:** 8
**UN/NA:** UN1823
Packing Group: II
**Information reported for product/size:** 300LB

# 15. Regulatory Information

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

| Ingredient | TSCA | EC | Japan | Australia |
|---|---|---|---|---|
| Sodium Hydroxide (1310-73-2) | Yes | Yes | Yes | Yes |

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

| Ingredient | Korea | --Canada-- DSL | NDSL | Phil. |
|---|---|---|---|---|
| Sodium Hydroxide (1310-73-2) | Yes | Yes | No | Yes |

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

| Ingredient | -SARA 302- RQ | TPQ | ------SARA 313------ List | Chemical Catg. |
|---|---|---|---|---|
| Sodium Hydroxide (1310-73-2) | No | No | No | No |

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

| Ingredient | CERCLA | -RCRA- 261.33 | -TSCA- 8(d) |
|---|---|---|---|
| Sodium Hydroxide (1310-73-2) | 1000 | 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)

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

---

# 16. Other Information

**NFPA Ratings:** Health: **3** Flammability: **0** Reactivity: **1**
**Label Hazard Warning:**
POISON! DANGER! CORROSIVE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED. CAUSES BURNS TO ANY AREA OF CONTACT. REACTS WITH WATER, ACIDS AND OTHER MATERIALS.
**Label Precautions:**
Do not get in eyes, on skin, or on clothing.
Do not breathe dust.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
**Label First Aid:**
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give

anything by mouth to an unconscious person. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen. In all cases get medical attention immediately.

**Product Use:**

Laboratory Reagent.

**Revision Information:**

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

**Disclaimer:**

**********

**Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.**

**********

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

MSDS Number: **S4034** * * * * * *Effective Date:* ***07/07/04*** * * * * * *Supercedes:* ***05/11/04***

**MSDS** Material Safety Data Sheet

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

Mallinckrodt CHEMICALS | J.T.Baker

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CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

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

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

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

# SODIUM HYDROXIDE

## 1. Product Identification

**Synonyms:** Caustic soda; lye; sodium hydroxide solid; sodium hydrate
**CAS No.:** 1310-73-2
**Molecular Weight:** 40.00
**Chemical Formula:** NaOH
**Product Codes:**
J.T. Baker: 3717, 3718, 3721, 3722, 3723, 3728, 3734, 3736, 5045, 5565
Mallinckrodt: 7001, 7680, 7708, 7712, 7772, 7798

## 2. Composition/Information on Ingredients

| Ingredient | CAS No | Percent | Hazardous |
|---|---|---|---|
| Sodium Hydroxide | 1310-73-2 | 99 - 100% | Yes |

## 3. Hazards Identification

**Emergency Overview**

---
**POISON! DANGER! CORROSIVE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED. CAUSES BURNS TO ANY AREA OF CONTACT. REACTS WITH WATER, ACIDS AND OTHER MATERIALS.**

**SAF-T-DATA(tm)** Ratings (Provided here for your convenience)
---
Health Rating: 4 - Extreme (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 2 - Moderate
Contact Rating: 4 - Extreme (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White Stripe (Store Separately)
---

**Potential Health Effects**
---

**Inhalation:**
Severe irritant. Effects from inhalation of dust or mist vary from mild irritation to serious damage of the upper respiratory tract, depending on severity of exposure. Symptoms may include sneezing, sore throat or runny nose. Severe pneumonitis may occur.
**Ingestion:**
Corrosive! Swallowing may cause severe burns of mouth, throat, and stomach. Severe scarring of tissue and death may result. Symptoms may include bleeding, vomiting, diarrhea, fall in blood pressure. Damage may appears days after exposure.
**Skin Contact:**
Corrosive! Contact with skin can cause irritation or severe burns and scarring with greater exposures.
**Eye Contact:**
Corrosive! Causes irritation of eyes, and with greater exposures it can cause burns that may result in permanent impairment of vision, even blindness.
**Chronic Exposure:**
Prolonged contact with dilute solutions or dust has a destructive effect upon tissue.
**Aggravation of Pre-existing Conditions:**
Persons with pre-existing skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance.

---

# 4. First Aid Measures

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

# MATERIAL SAFETY DATA SHEET

# Sodium Nitrate

## Section 01 - Chemical And Product And Company Information

**Product Identifier** ..... Sodium Nitrate

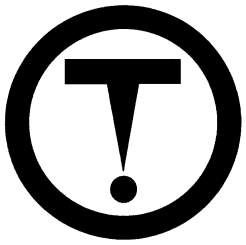
**Product Use** ..... Laboratory reagent

**Supplier Name**..... ClearTech Industries Inc.
2303 Hanselman Avenue
Saskatoon SK S7L 5Z3
Canada

**Prepared By**..... ClearTech Industries Inc. Technical Department
Phone: (306)664-2522

**Preparation Date**..... August 12, 2005

**24-Hour Emergency Phone**..... 306-664-2522



## Section 02 - Composition / Information on Ingredients

| | | |
|---|---|---|
| **Hazardous Ingredients**..... | Sodium Nitrate | 98-100% |
| **CAS Number**..... | Sodium Nitrate | 7631-99-4 |

**Synonym (s)**..... Nitratine, nitric acid, sodium salt, sodium saltpeter, sodium nitrate, crystal

## Section 03 - Hazard Identification

**Inhalation**..... Inhalation of dust irritates the respiratory tract. Symptoms may include coughing, shortness of breath.

**Skin Contact / Absorption**..... May cause irritation, symptoms including redness, itching, and pain.

**Eye Contact**..... May cause irritation, symptoms including redness, itching, and pain.

**Ingestion**..... May cause gastroenteritis and abdominal pains. Other symptoms may include dizziness, bloody diarrhea, convulsions, and collapse. Purging and diuresis can be expected. Small repeated doses may cause headache and mental impairment. Rare cases of nitrates being converted to the more toxic nitrites have been reported, mostly with infants

**Exposure Limits**..... Not available

## Section 04 - First Aid Measures

**Inhalation**..... Remove victim to fresh air. Give artificial respiration only if breathing has stopped. If breathing is difficult, give oxygen. Seek immediate medical attention.

**Skin Contact / Absorption**..... Remove contaminated clothing. Wash affected area with soap and water. Seek medical attention if irritation occurs or persists

**Eye Contact**..... Flush immediately with water for at least 20 minutes. Forcibly hold eyelids apart to ensure complete irrigation of eye tissue. Seek immediate medical attention

**Ingestion**..... Do NOT induce vomiting. Never give anything by mouth to an unconscious or convulsing person. Seek immediate medical attention. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into thelungs.

**Additional Information**..... Treatment based on sound judgment of physician and individual reactions of patient.

## Section 05 - Fire Fighting

**Conditions of Flammability**..... Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition.

**Means of Extinction**..... Use any means suitable for extinguishing surrounding fire. Water spray may be used to keep fire-exposed containers cool.

**Flash Point**..... Not applicable

**Auto-ignition Temperature**……. Not applicable

**Upper Flammable Limit** …….. Not applicable

**Lower Flammable Limit**..……..... Not applicable

**Hazardous Combustible Products**... Emits nitrous oxides when heated to decomposition.

**Special Fire Fighting Procedures**..... Wear NIOSH-approved self-contained breathing apparatus and protective clothing.

**Explosion Hazards**……..... Explosive with shock, heat or friction. Sodium Nitrate decomposes explosively when heated > 538°C.

## Section 06 - Accidental Release Measures

**Leak / Spill**.....……... Remove all sources of ignition. Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills:clean up spills in a manner that does not disperse dust into the air. Use nonsparking tools and equipment. Reduce airborne dust and prevent scattering by moistening with water. Pick up spill for recovery or disposal and place in a closed container. Small amounts of residue may be flushed to sewer with plenty of water.

**Deactivating Materials**..……..... Not available

## Section 07 - Handling and Storage

**Handling Procedures**.....…….... Keep locked up. Keep away from heat. Keep away from sources of ignition. Keep away from combustible materials. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. DO NOT ingest. DO NOT breathe dust. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as reducing agents, combustible materials, acids.

**Storage Requirements**.....……..…... Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool and well-ventilated area. Highly toxic or infectious materials should be stored in a separate locked safety storage cabinet or room.

## Section 08 - Personal Protection and Exposure Controls

### Protective Equipment

**Eyes**..... Chemical goggles, full-face shield, or a full-face respirator is to be worn at all times when product is handled. Contact lenses should not be worn; they may contribute to severe eye injury.

**Respiratory**..... For dusty or misty conditions, wear NIOSH-approved dust or mist respirator. In case of spill or leak resulting in unknown concentration, use NIOSH approved supplied air respirator.

**Gloves**..... Impervious gloves of chemically resistant material (rubber or PVC) should be worn at all times. Wash contaminated clothing with soap and water, dry thoroughly before reuse.

**Clothing**..... Body suits, aprons, and/or coveralls of chemical resistant material should be worn at all times. Wash contaminated clothing with soap and water, dry thoroughly before reuse.

**Footwear**..... Impervious boots of chemically resistant material should be worn at all times

### Engineering Controls

**Ventilation Requirements**..... Mechanical ventilation (dilution or local exhaust), process or personnel enclosure, and control of process conditions. Supply sufficient replacement air to make up for air removed by exhaust systems.

**Other**..... Emergency shower and eyewash should be in close proximity.

## Section 09 - Physical and Chemical Properties

**Physical State**..... Solid

**Odor and Appearance**..... Odorless, colourless prills pellets

**Odor Threshold**..... Not applicable

**Specific Gravity (Water=1)**..... 2.26

**Vapor Pressure (mm Hg, 20C)**..... Not available

**Vapor Density (Air=1)**..... Not available

**Evaporation Rate**..... Not available

**Boiling Point**..... 380°C

**Freeze/Melting Point**..... 306.8°C

**pH**..... 7 (aqueous solution)

**Water/Oil Distribution Coefficient**.... Not available

**Bulk Density**..... Not available

**% Volatiles by Volume**..... 0%

**Solubility in Water**..... 92g/100g water @ 25°C

**Molecular Formula**..... $NNaO_3$

**Molecular Weight**..... 85.01

## Section 10 - Stability and Reactivity

**Stability**..... Product is stable

**Incompatibility**..... Reacts with acids to emit toxic fumes of nitrogen dioxide. Contact with the following may cause an explosion: barium rhodanide, boron phosphide, cyanides, sodium thiosulfate, sodium hypophosphite, sulfur plus charcoal, powdered aluminum and aluminum oxide. Fibrous organic material such as jute, wood, and similar cellulosic materials can become highly combustible by nitrate impregnation.

**Hazardous Products of Decomposition**.. Oxides of nitrogen

**Polymerization**..... Will not occur

## Section 11 - Toxicological Information

**Irritancy**..... Skin contact and eye contact

**Sensitization**..... Not available

**Chronic/Acute Effects**..... May cause gastroenteritis and abdominal pains. Other symptoms may include dizziness, bloody diarrhea, convulsions, and collapse. Purging and diuresis can be expected. Small repeated doses may cause headache and mental impairment. Rare cases of nitrates being converted to the more toxic nitrites have been reported, mostly with infants.

**Synergistic Materials**..... Not available

**Animal Toxicity Data**..... Not available

**Carcinogenicity**..... Not available

**Reproductive Toxicity**..... Not available

**Teratogenicity**..... Not available

**Mutagenicity**..... Not available

## Section 12 - Ecological Information

**Fish Toxicity**..... Not available

**Biodegradability**..... Possibly hazardous short-term degradation products are not likely. However, long term degradation products may arise. The products of degradation are less toxic than the product itself.

**Environmental Effects**..... Not available

## Section 13 - Disposal Consideration

**Waste Disposal**.....Dispose in accordance with all federal, provincial, and/or local regulations including the Canadian Environmental Protection Act.

## Section 14 - Transportation Information

**TDG Classification**

**Class**..... 5.1

**Group**..... III

**PIN Number**..... UN 1498

**Other**..... Secure containers (full and/or empty) with suitable hold down devises during shipment.

## Section 15 - Regulatory Information

**WHMIS Classification**.....C, D2

**NOTE: THE PRODUCT LISTED ON THIS MSDS HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE CANADIAN CONTROLLED PRODUCTS REGULATIONS. THIS MSDS CONTAINS ALL INFORMATION REQUIRED BY THOSE REGULATIONS**

## Section 16 - Other Information

**Note: The responsibility to provide a safe workplace remains with the user. The user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment. The information contained herein is, to the best of our knowledge and belief, accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material. It is the responsibility of the user to comply with all applicable laws and regulations.**

## ClearTech Industries Inc. - Locations

**Corporate Head Office: 2302 Hanselman Avenue, Saskatoon, SK, S7L 5Z3**
**Phone: 306-664-2522**
**Fax: 306-665-6216**

**www.ClearTech.ca**

| Location | Address | Postal Code | Phone Number | Fax Number |
|---|---|---|---|---|
| Richmond BC | 12431 Horseshoe way | V7A 4X6 | 604-272-4000 | 604-272-4596 |
| Calgary AB | 5516E - 40th St. S.E. | T2C 2A1 | 403-279-1096 | 403-236-0989 |
| Edmonton AB | 11750 - 180th Street | T5S 1N7 | 780-452-6000 | 780-452-4600 |
| Saskatoon SK | 2302 Hanselman Avenue | S7L 5Z3 | 306-933-0177 | 306-933-3282 |
| Regina SK | 555 Henderson Drive | S42 5X2 | 306-721-7737 | 306-721-8611 |
| Winnipeg MB | 340 Saulteaux Crescent | R3J 3T2 | 204-987-9777 | 204-987-9770 |
| Mississauga ON | 7480 Bath Road | L4T 1L2 | 905-612-0566 | 905-612-0575 |

# 24 Hour Emergency Number - All Locations - 306-664-2522

# 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<br>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<br>A.C.N. 000 316 138<br>15 Park Road, Seven Hills, NSW, 2147<br>Tel: (02) 9839 4000, Fax: (02) 9674 6225<br>NEW ZEALAND: Asia Pacific Specialty Chemicals (NZ) Limited<br>119 Carbine Road, Mt. Wellington, Auckland 6<br>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.

# MATERIAL SAFETY DATA SHEET

## 1. PRODUCT AND COMPANY IDENTIFICATION

**Preparation/Revision Date:**
03/19/07

**Distributor:**
Teledyne Isco, Inc.
P.O. Box 82531
Lincoln, NE 68501-2531

**Phone Number:** (402) 464-0231

**Hours:** Mon.-Fri. 8:00a.m.-4:30p.m. CST

**Product Name:** RediSep® - Normal Phase, Reverse Phase C-18, Amine, Cyano, Diol, SAX, SCX

Solid Sample Cartridges – 5g, 25g, 65g, 270g

Silica Gel

**Product Content:** Amorphous Silicon Dioxide
or
Derivatized Amorphous Silicon Dioxide

## 2. COMPOSITION / INFORMATION ON INGREDIENTS

**Component**: Amorphous Silicon Dioxide, chemically prepared **CAS #**: 7631-86-9

**Additional Information:** See section 8 for exposure limits.

## 3. HAZARDS IDENTIFICATION

**NFPA ratings (scale 0 – 4)**

Health = 1
Fire = 0
Reactivity = 0

**HIMS – ratings (scale 0 – 4)**

| | |
|---|---|
| Health | 1 |
| Fire | 0 |
| Reactivity | 0 |

The statements contained herein are offered for informational purposes only and are based upon technical data that Teledyne Isco, Inc. believes to be accurate. It is intended for use only by persons having the necessary technical skill and at their own discretion and risk. Since conditions and manner of use are outside our control, we make NO WARRANTY, EXPRESS OR IMPLIED, OR MERCHANTABILITY, FITNESS OR OTHERWISE.

## 4. FIRST AID MEASURES

**Emergency First Aid:**
GET MEDICAL ASSISTANCE IF ANY ADVERSE EFFECTS SHOULD DEVELOP.

**Skin:** Immediately rinse with water. Generally the product does not irritate the skin.

**Eyes:** Immediately rinse under running water for at least 15 minutes, lifting upper and lower eyelids occasionally.
**Inhalation:** Supply fresh air.

**Ingestion:** If large amounts are swallowed, wash mouth out with water.

## 5. FIRE FIGHTING MEASURES

**Suitable extinguishing agents:**
$CO_2$, extinguishing powder or water spray. Fight larger fire with alcohol resistant foam.

**Fire Fighting Procedures:** Use fire fighting measures that suit the environment.

**Protective equipment:** Wear protective equipment.

**Fire & Explosion Hazards:** Not an explosion hazard

**Flammability:** Not flammable

**Flash Point (ºF):** Not applicable

**Auto Igniting:** Not self igniting

**Additional Information:**
Dispose of fire debris and contaminated water in accordance with official regulations.

## 6. ACCIDENTAL RELEASE MEASURES

**Person-related safety precautions:** Avoid formation of dust. Wear protective clothing.

**Measures for cleaning/collecting:** Vacuuming or wet sweeping may be used to avoid dust dispersal.

**Measures for environmental protection:** Containerize for reclamation or disposal.

**Additional information:** See section 7 for safe handling.
See section 8 for information on personal protection equipment.
See section 13 for disposal information.

## 7. HANDLING AND STORAGE

**Handling:**

**Information for safe handling:** Prevent formation of dust.

**Information about protection against explosions and fires:**
The product is not flammable. When pouring into a container of flammable liquid, ground both containers electrically to prevent a static electric spark.

**Storage:**

**Information about storage conditions:** Keep container tightly sealed.

**Information about storage in one common storage facility:** None required.

**Class according to regulation on flammable liquids:** None Applicable

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

**Component**: Amorphous Silicon Dioxide, chemically prepared **CAS #**: 7631-86-9

**Exposure Limits:** **NIOSH short term value – IDLH:** 3000mg/$m^3$
**OSHA TWA – PEL:** 80/(%$SiO_2$) mg/$m^3$
**NIOSH TWA – REL:** 6mg/$m^3$
**ACGIH TWA – TLV:** 10mg/$m^3$ Total Dust
5mg/$m^3$ Respirable fraction

**Personal Protective Equipment:**

**General protection and hygienic measures:**
The usual precautionary measures for handling chemicals should be followed.

**Breathing equipment:**
If exposure limit is exceeded, a suitable respiratory protective device is recommended.

**Eye protection:** Safety glasses.

**Protection of hands:** The glove material has to be impermeable to the product/ the substance/ the preparation.

**Body protection:** Protective work clothing.

## 9. PHYSICAL AND CHEMCIAL PROPERTIES

**Physical State:** RediSep® - Solid, (50mm Average particle size) powder
Solid Sample Cartridge 5g, 25g – Solid, 40-63µm powder
Solid Sample Cartridge 65g, 270g – Solid, 75-150µm powder

**Color:** White to off-white
**Odor:** None
**pH at 20ºC (68ºF):** 6.0-8.0 (5% slurry)
**Melting Point (ºC):** Undetermined
**Density:** Not determined
**Bulk Density (lb/ft$^3$):** 25-35
**Solubility in Water (%):** Insoluble

## 10. STABILITY AND REACTIVITY

**Thermal decomposition/conditions to be avoided:**
No decomposition if used according to specifications.

**Dangerous Reactions:** Reacts with Hydrogen Fluoride.

**Dangerous products of decomposition:** No dangerous decomposition products known.

## 11. TOXICOLOGICAL INFORMATION

**Component**: Amorphous Silicon Dioxide, chemically prepared **CAS #**: 7631-86-9

**Acute toxicity:**
**Oral – LD50:** 10000 mg/kg (rat)
**Dermal – LD50:** >5000 mg/kg (rabbit) OECD 402
**Inhalative – LC50:** >0.139 mg/l/14h (rat)

**Primary irritant effect:**

**On the skin**: May cause irritation with dryness and abrasion.

**In the eye:** May cause abrasion, redness and pain.

**Sensitization:** No sensitizing effects known.

**Subacute to chronic toxicity:**
Amorphous silicon dioxide, chemically prepared:
No negative effects were determined during tests for chronic oral toxicity, carcinogenicity, teratogenicity and fertility. No irreversible changes and no symptoms of silicosis were determined during tests for chronic inhalative toxicity.

**Additional toxicological information:**
When used and handled according to specifications, the product does not have any harmful effects based on the experience and information provided to us by the manufacturer.

## 12. ECOLOGY INFORMATION

**Component**: Amorphous Silicon Dioxide, chemically prepared **CAS #**: 7631-86-9

**Aquatic toxicity:** **Fish – LC50 (96 h):** >10000 mg/l (Brachydanio rerio) OECD 202
**Water Flea – EC50 (24 h):** >1000 mg/l (Daphnia magna) OECD 202

**General Note:** Generally not hazardous for water.

## 13. DISPOSAL CONSIDERATIONS

**EPA Waste Numbers:** None

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

## 14. TRANSPORT INFORMATION

Not regulated as hazardous goods by DOT, ADR, IMO or IATA.

## 15. REGULATORY INFORMATION

None of the ingredients are listed under the following:

SARA section 313 and 355
Proposition 65
EPA
IARC
NTP
TLV-ACGIH
NIOSH-Ca
OSHA-Ca
Canadian NDSL

All ingredients are listed with the following:

TSCA
MAK
Canadian DSL
Japan ENCS
Korea ECL
Philippines: PICCS
Australia: AICS
European EINECS

## 16. OTHER INFORMATION

The statements contained herein are offered for informational purposes only and are based upon technical data that Teledyne Isco, Inc. believes to be accurate. It is intended for use only by persons having the necessary technical skill and at their own discretion and risk. Since conditions and manner of use are outside our control, we make NO WARRANTY, EXPRESS OR IMPLIED, OR MERCHANTABILITY, FITNESS OR OTHERWISE.

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# Material Safety Data Sheet
## Sulfur (Precipitated and Sublimed)

ACC# 22280

## Section 1 - Chemical Product and Company Identification

**MSDS Name:** Sulfur (Precipitated and Sublimed)
**Catalog Numbers:** S71209, S79172, S79173, S79173-1, S79173-2, S79173-3, S594-500, S595-500, S791731, S791732, S791733
**Synonyms:** Sulphur; Brimstone.
**Company Identification:**

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

**For information, call:** 201-796-7100
**Emergency Number:** 201-796-7100
**For CHEMTREC assistance, call:** 800-424-9300
**For International CHEMTREC assistance, call:** 703-527-3887

## Section 2 - Composition, Information on Ingredients

| CAS# | Chemical Name | Percent | EINECS/ELINCS |
|---|---|---|---|
| 7704-34-9 | Sulfur | 100 | 231-722-6 |

**Hazard Symbols:** XI
**Risk Phrases:** 36

## Section 3 - Hazards Identification

### EMERGENCY OVERVIEW

Appearance: yellow. May cause respiratory and digestive tract irritation. Flammable solid. Causes eye irritation. May cause skin irritation. **Warning!** May cause central nervous system effects.
**Target Organs:** Central nervous system.

### Potential Health Effects

**Eye:** Causes eye irritation. Effects may be delayed. May cause lacrimation (tearing), blurred vision, and photophobia. May cause chemical conjunctivitis and corneal damage.

**Skin:** May cause skin irritation and possible burns.
**Ingestion:** May cause gastrointestinal irritation with nausea, vomiting and diarrhea.
**Inhalation:** May cause irritation of the respiratory tract with burning pain in the nose and throat, coughing, wheezing, shortness of breath and pulmonary edema. Olfactory fatigue may occur. Can produce delayed pulmonary edema.
**Chronic:** Chronic inhalation may cause effects similar to those of acute inhalation. Effects may be delayed.

## Section 4 - First Aid Measures

**Eyes:** Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
**Skin:** Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists. Wash clothing before reuse.
**Ingestion:** Never give anything by mouth to an unconscious person. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water. Get medical aid if irritation or symptoms occur.
**Inhalation:** Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid if cough or other symptoms appear.
**Notes to Physician:** Treat symptomatically and supportively.

## Section 5 - Fire Fighting Measures

**General Information:** Evacuate area and fight fire from a safe distance. As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Dust can be an explosion hazard when exposed to heat or flame. This material in sufficient quantity and reduced particle size is capable of creating a dust explosion. Flammable solid. May burn rapidly with flare burning effect. May re-ignite after fire is extinguished.
**Extinguishing Media:** Water spray may cause frothing. For large fires, use water spray, fog or regular foam. Contact professional fire-fighters immediately. For small fires, use dry chemical, carbon dioxide, sand, earth, water spray or regular foam. Cool containers with flooding quantities of water until well after fire is out.

## Section 6 - Accidental Release Measures

**General Information:** Use proper personal protective equipment as indicated in Section

8.

**Spills/Leaks:** Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Scoop up with a nonsparking tool, then place into a suitable container for disposal. Avoid generating dusty conditions. Remove all sources of ignition. Provide ventilation.

## Section 7 - Handling and Storage

**Handling:** Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. May form flammable dust-air mixtures. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep container tightly closed. Avoid contact with heat, sparks and flame. Use with adequate ventilation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

**Storage:** Keep away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

## Section 8 - Exposure Controls, Personal Protection

**Engineering Controls:** Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local explosion-proof ventilation to keep airborne levels to acceptable levels.

**Exposure Limits**

| Chemical Name | ACGIH | NIOSH | OSHA - Final PELs |
|---|---|---|---|
| Sulfur | none listed | none listed | none listed |

**OSHA Vacated PELs:** Sulfur: No OSHA Vacated PELs are listed for this chemical.

**Personal Protective Equipment**

**Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** A respiratory protection program that meets OSHA's 29 CFR ?1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

## Section 9 - Physical and Chemical Properties

**Physical State:** Solid
**Appearance:** yellow
**Odor:** rotten egg-like
**pH:** Not available.
**Vapor Pressure:** Not available.
**Vapor Density:** Not available.
**Evaporation Rate:**Not available.
**Viscosity:** Not available.
**Boiling Point:** 445 deg C
**Freezing/Melting Point:**113 deg C
**Autoignition Temperature:** 450 deg F ( 232.22 deg C)
**Flash Point:** 405 deg F ( 207.22 deg C)
**Decomposition Temperature:**Not applicable.
**NFPA Rating:** (estimated) Health: 2; Flammability: 1; Reactivity: 0
**Explosion Limits, Lower:**3.3%
**Upper:** 46.0%
**Solubility:** Insoluble in water.
**Specific Gravity/Density:** 2.07
**Molecular Formula:**S
**Molecular Weight:**32.06

## Section 10 - Stability and Reactivity

**Chemical Stability:** Stable at room temperature in closed containers under normal storage and handling conditions.
**Conditions to Avoid:** High temperatures, incompatible materials, ignition sources, dust generation, excess heat.
**Incompatibilities with Other Materials:** Strong oxidizing agents.
**Hazardous Decomposition Products:** Sulfur oxides (SOx), including sulfur oxide and sulfur dioxide.
**Hazardous Polymerization:** Has not been reported.

## Section 11 - Toxicological Information

**RTECS#:**
**CAS#** 7704-34-9: WS4250000
**LD50/LC50:**
Not available.

**Carcinogenicity:**

CAS# 7704-34-9: Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
**Epidemiology:** No information available.
**Teratogenicity:** No information available.
**Reproductive Effects:** No information available.
**Neurotoxicity:** No information available.
**Mutagenicity:** No information available.
**Other Studies:** No data available.

## Section 12 - Ecological Information

No information available.

## Section 13 - Disposal Considerations

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

## Section 14 - Transport Information

| | US DOT | IATA | RID/ADR | IMO | Canada TDG |
|---|---|---|---|---|---|
| **Shipping Name:** | SULFUR | | | | No information available. |
| **Hazard Class:** | 9 | | | | |
| **UN Number:** | NA1350 | | | | |
| **Packing Group:** | III | | | | |

## Section 15 - Regulatory Information

**US FEDERAL**

**TSCA**
CAS# 7704-34-9 is listed on the TSCA inventory.
**Health & Safety Reporting List**
None of the chemicals are on the Health & Safety Reporting List.
**Chemical Test Rules**
None of the chemicals in this product are under a Chemical Test Rule.

**Section 12b**
None of the chemicals are listed under TSCA Section 12b.
**TSCA Significant New Use Rule**
None of the chemicals in this material have a SNUR under TSCA.
**SARA**

**Section 302 (RQ)**
None of the chemicals in this material have an RQ.
**Section 302 (TPQ)**
None of the chemicals in this product have a TPQ.
**SARA Codes**
CAS # 7704-34-9: acute, chronic, flammable.
**Section 313**
No chemicals are reportable under Section 313.
**Clean Air Act:**
This material does not contain any hazardous air pollutants. This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.
**Clean Water Act:**
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
**OSHA:**
None of the chemicals in this product are considered highly hazardous by OSHA.
**STATE**
CAS# 7704-34-9 can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Massachusetts.
California No Significant Risk Level: None of the chemicals in this product are listed.
**European / International Regulations**
**European Labeling in Accordance with EC Directives**
**Hazard Symbols:**
XI
**Risk Phrases:**
R 36 Irritating to eyes.

**Safety Phrases:**

**WGK (Water Danger / Protection)**
CAS# 7704-34-9: 1
**Canada**
CAS# 7704-34-9 is listed on Canada's DSL List. CAS# 7704-34-9 is listed on Canada's DSL List.
This product has a WHMIS classification of B4, D2B.
CAS# 7704-34-9 is not listed on Canada's Ingredient Disclosure List.
**Exposure Limits**

# Section 16 - Additional Information

**MSDS Creation Date:** 12/12/1997
**Revision #3 Date:** 8/02/2000

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

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

## First Aid

| | |
|---|---|
| **Swallowed** | Rinse mouth thoroughly with water immediately.<br>Give water to drink. DO NOT induce vomiting.<br>Seek immediate medical assistance.<br>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.<br>Eyelids to be held open.<br>Seek immediate medical assistance. |
| **Skin** | Wash affected areas with copious quantities of water immediately.<br>Remove contaminated clothing and wash before re-use.<br>Treat skin and clothing with 1% sodium bicarbonate solution to neutralize acid residues.<br>If irritation occurs seek medical advice. |
| **Inhaled** | Remove victim from exposure - avoid becoming a casualty.<br>Allow patient to assume most comfortable position and keep warm.Keep at rest until fully recovered.<br>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.<br>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.<br>Store in a cool,dry place.<br>Keep dry - reacts with water; may lead to drum rupture.<br>Keep containers securely sealed and protected against physical damage.<br>Store away from strong bases.<br>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.<br>Clear area of all unprotected personnel.<br>Contain using sand and earth - prevent run-off into drains and waterways.<br>For large spills notify Emergency Services.<br>In the event of a small spill:<br>Neutralise remaining product with lime or soda ash, adjusting pH to 6-10.<br>Flush to sewer as a greatly diluted solution.<br>Wear full protective clothing (see Personal Protection/Ventilation Section)<br>.Self contained breathing apparatus may be needed for prolonged periods of exposure.<br>Refer to appropriate State Waste Disposal Authority<br>Observe local regulations. |

## Fire/Explosion Hazard

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

## OTHER INFORMATION

| | |
|---|---|
| **Toxicology** | Oral LD50(rat): 2140 mg/kg |
| **Environ. Protection** | Highly toxic to aquatic life.<br>Avoid contaminating waterways.<br>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.<br>S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.<br>S30 Never add water to this product.<br>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.<br>RISK AND SAFETY PHRASES<br>R35- Causes severe burns.<br>S2- Keep out of reach of children<br>S26- In case of contact with eyes ,rinse immediately with plenty of water and contact a doctor or Poisons Information Centre.<br>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<br>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

PETRO-CANADA

# Material Safety Data Sheet

| WHMIS (Pictograms) | WHMIS (Classification) | Protective Clothing | TDG (pictograms) |
|---|---|---|---|
| | **B-2, D-2A, D-2B** | | |

## *Section 1. Chemical Product and Company Identification*

| | |
|---|---|
| **Product Name** | **GASOLINE, UNLEADED** |
| **Synonym** | Regular, Unleaded Gasoline (US Grade), Mid-Grade, Plus, Super, WinterGas, SummerGas, Supreme, SuperClean WinterGas, RegularClean, PlusClean, Premium, marked or dyed gasoline, Super Premium (94 RO), TQRUL, transitional quality regular unleaded, BOB, Blendstock for Oxygenate Blending |
| **Manufacturer** | PETRO-CANADA<br>P.O. Box 2844<br>Calgary, Alberta<br>T2P 3E3 |
| **Material Uses** | Unleaded gasoline is used in spark ignition engines including motor vehicles, inboard and outboard boat engines, small engines such as chain saws and lawn mowers, and recreational vehicles. |

**Code** W102E

**Validated on 7/4/2005.**

**In case of Emergency** Petro-Canada: 403-296-3000
Canutec Transportation: 613-996-6666
Poison Control Centre: Consult local telephone directory for emergency number(s).

## *Section 2. Composition and Information on Ingredients*

| | | | *Exposure Limits (ACGIH)* | | |
|---|---|---|---|---|---|
| **Name** | **CAS #** | **% (W/W)** | **TLV-TWA(8 h)** | **STEL** | **CEILING** |
| Gasoline | 8006-61-9 | 85-100 | 300 ppm | 500 ppm | Not established |
| Methyl tert-butyl ether | 1634-04-4 | 0-15 | 50 ppm | Not established | Not established |
| Benzene | 71-43-2 | <1.5 | 0.5 ppm | 2.5 ppm | Not established |
| Note: Petro-Canada does not use MTBE in the manufacturing of its gasoline, however MTBE can be introduced from time to time through the use of external gasoline blendstocks. | | | | | |

| | |
|---|---|
| **Manufacturer Recommendation** | Not applicable |
| **Other Exposure Limits** | Consult local, state, provincial or territory authorities for acceptable exposure limits. |

## *Section 3. Hazards Identification.*

| | |
|---|---|
| **Potential Health Effects** | Flammable liquid. Exercise caution when handling this material. May cause cancer. May cause heritable genetic effects (mutagenicity). This product contains an ingredient or ingredients, which have been shown to cause chronic toxic effects. Contact with this product may cause skin and eye irritation. Inhalation of this product may cause respiratory tract irritation and Central Nervous System (CNS) Depression, symptoms of which may include; weakness, dizziness, slurred speech, drowsiness, unconsciousness and in cases of severe overexposure; coma and death. Ingestion of this product may cause gastro-intestinal irritation. Aspiration of this product may result in severe irritation or burns to the respiratory tract. For more information refer to Section 11 of this MSDS. |

## *Section 4. First Aid Measures*

| | |
|---|---|
| **Eye Contact** | Avoid direct contact. Quickly and gently blot or brush away chemical. Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for 15-20 minutes or until the chemical is removed, while holding the eyelid(s) open. Take care not to rinse contaminated water into the unaffected eye or onto the face. Obtain medical attention immediately. |
| **Skin Contact** | Avoid direct contact. Wear chemical resistant protective clothing if necessary. Quickly and gently, blot or brush away excess chemical. Wash gently and thoroughly with warm water and non-abrasive soap for 15-20 minutes or until chemical is removed. Under running water, remove contaminated clothing, shoes and leather goods (e.g., watch bands, belts, etc.). Obtain medical attention immediately. Completely decontaminate clothing, shoes and leather goods before reuse or discard. |
| **Inhalation** | Take proper precautions to ensure your own safety before attempting rescue (e.g. wear appropriate protective equipment). If breathing has stopped, trained personnel should begin artificial respiration (AR) or, if the heart has stopped, cardiopulmonary resuscitation (CPR) immediately. Immediately transport victim to an emergency care facility. |

*Continued on Next Page*

| | |
|---|---|
| **Ingestion** | NEVER give anything by mouth if victim is rapidly losing consciousness, or is unconscious or convulsing. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. Have victim drink 240 to 300 mL (8 to 10 oz) of water to dilute material in stomach. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. Repeat administration of water. If breathing has stopped, trained personnel should begin artificial respiration (AR) or, if the heart has stopped, cardiopulmonary resuscitation (CPR) immediately. Quickly transport victim to an emergency care facility. |
| **Note to Physician** | Not available |

## *Section 5. Fire-fighting Measures*

| | | | |
|---|---|---|---|
| **Flammability** | Flammable liquid (NFPA). | **Flammable Limits** | Lower: 1.3%; Upper: 7.6% (NFPA). |
| **Flash Points** | Closed Cup: -50 to -38°C (-58 to -36°F), ASTM D56 Standard Test Method for Flash Point by Tag Closed Tester. | **Auto-Ignition Temperature** | 257°C (495°F) (NFPA). |
| **Fire Hazards in Presence of Various Substances** | Extremely flammable in presence of open flames, sparks, and heat. Vapours are heavier than air and may travel considerable distance to sources of ignition and flash back. Rapid escape of vapour may generate static charge causing ignition. May accumulate in confined spaces. | **Explosion Hazards in Presence of Various Substances** | Do not cut, weld, heat, drill or pressurize empty container. Containers may explode in heat of fire. Vapours may form explosive mixtures with air. |
| **Products of Combustion** | Carbon oxides (CO, CO2), nitrogen oxides (NOx), polynuclear aromatic hydrocarbons, phenols, smoke and irritating vapours as products of incomplete combustion.<br><br>See Section 11 (Other Considerations) for information regarding the toxicity of the combustion products. | | |
| **Fire Fighting Media and Instructions** | NAERG2004 GUIDE 128, Flammable liquids (Non-polar/Water-immiscible). CAUTION: This product has a very low flash point: Use of water spray when fighting fire may be inefficient. If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also consider initial evacuation for 800 meters (1/2 mile) in all directions. SMALL FIRES: Dry chemical, CO2, water spray or regular foam. LARGE FIRES: Water spray, fog or regular foam. Do not use straight streams. Move containers from fire area if you can do it without risk. Fires Involving Tanks or Car/Trailer Loads: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting devices or any discolouration of tank. ALWAYS stay away from the ends of tanks. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible withdraw from area and let fire burn. Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection. | | |

## *Section 6. Accidental Release Measures*

| | |
|---|---|
| **Material Release or Spill** | IN THE EVENT OF A LARGE SPILL CONSIDER THE FOLLOWING CONTROL MEASURES: Consult current National Emergency Response Guide Book (NAERG) for appropriate spill measures if necessary. Extinguish all ignition sources. Stop leak if safe to do so. Evacuate non-essential personnel. Ventilate area. Dike spilled material. Use appropriate inert absorbent material to absorb spilled product. Collect used absorbent for later disposal. Ensure clean-up personnel wear appropriate personal protective equipment. Avoid contact with spilled material. Avoid contaminating sewers, streams, rivers and other water courses with spilled material. Avoid breathing vapours or mists of material. Ground and bond all equipment used to clean up the spilled material, as it may be a static accumulator. Notify appropriate authorities immediately. |

## *Section 7. Handling and Storage*

| | |
|---|---|
| **Handling** | FLAMMABLE MATERIAL. Handle with care. Avoid contact with any sources of ignition, flames, heat, and sparks. Avoid skin contact. Avoid eye contact. Avoid inhalation of product vapours or mists. Wear proper personal protective equipment (See Section 8). Empty containers may contain product residue. Do not pressurize, cut, heat, or weld empty containers. Do not reuse containers without commercial cleaning and/or reconditioning. Personnel who handle this material should practice good personal hygiene during and after handling to help prevent accidental ingestion of this product. Ensure all equipment is grounded/bonded. Avoid confined spaces and areas with poor ventilation. Do not ingest this product. |
| **Storage** | Store as flammable material. Store away from incompatible and reactive materials (See section 5 and 10). Store away from heat and sources of ignition. Store in dry, cool, well-ventilated area. Keep container tightly closed. Ensure the storage containers are grounded/bonded. Avoid direct sunlight. |

## Section 8. Exposure Controls/Personal Protection

| | |
|---|---|
| **Engineering Controls** | For normal application, special ventilation is not necessary. If user's operations generate vapours or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit. Make-up air should always be supplied to balance air removed by exhaust ventilation. Ensure that eyewash station and safety shower are close to work-station. |
| **Personal Protection** | - ***The selection of personal protective equipment varies, depending upon conditions of use.*** |
| **Eyes** | As a minimum, safety glasses with side shields should be worn when handling this material. |
| **Body** | If this material may come in contact with the body during handling and use, we recommend wearing appropriate protective clothing to prevent contact with the skin. (Contact your PPE provider for more information.) |
| **Respiratory** | A NIOSH-approved air-purifying respirator with an organic vapour cartridge or canister may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits. Protection provided by air-purifying respirators is limited. Use a positive-pressure, air-supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstances where air-purifying respirators may not provide adequate protection. |
| **Hands** | If this material may come in contact with the hands during handling and use, we recommend wearing gloves of the following material(s): polyvinyl alcohol (PVA), fluoro-elastomer. Consult your PPE provider for breakthrough times and the specific glove that is best for you based on your use patterns. |
| **Feet** | Wear appropriate footwear to prevent product from coming in contact with feet and skin. |

## Section 9. Physical and Chemical Properties

| | | | |
|---|---|---|---|
| **Physical State and Appearance** | Clear liquid. | **Viscosity** | Not available. |
| **Colour** | Clear to slightly yellow, undyed liquid. May be dyed red for taxation purposes. | **Pour Point** | Not applicable. |
| **Odour** | Gasoline. MTBE has a terpene-like odour. | **Softening Point** | Not applicable. |
| **Odour Threshold** | Less than 1 ppm. | **Dropping Point** | Not applicable. |
| **Boiling Point** | 25 to 220°C (77 to 428°F) Initial boiling point by ASTM D86 Standard Test Method. | **Penetration** | Not applicable. |
| **Density** | 0.685 - 0.80 kg/L @ 15°C (59°F). | **Oil / Water Dist. Coefficient** | Not available |
| **Vapour Density** | 3 to 4 (Air = 1) (NFPA). | **Ionicity (in water)** | Not available |
| **Vapour Pressure** | <107 kPa @ 37.8ºC (100ºF) | **Dispersion Properties** | Not available |
| **Volatility** | Volatile. | **Solubility** | Hydrocarbon components virtually insoluble in water. Soluble in alcohol, ether, chloroform, and benzene. Dissolves fats, oils and natural resins. |

## Section 10. Stability and Reactivity

| | | | |
|---|---|---|---|
| **Corrosivity** | Non corrosive. | | |
| **Stability** | The product is stable under normal handling and storage conditions. | **Hazardous Polymerization** | Will not occur under normal working conditions. |
| **Incompatible Substances / Conditions to Avoid** | Reactive with oxidizing agents, acids, interhalogens and uranium hexafluoride. | **Decomposition Products** | May release COx, NOx, phenols, polynuclear aromatic hydrocarbons, acrid smoke and irritating vapours when heated to decomposition. |

## Section 11. Toxicological Information

| | |
|---|---|
| **Routes of Entry** | Skin contact, eye contact, inhalation, and ingestion. |
| **Acute Lethality** | Gasoline (8006-61-9):<br>Acute Oral toxicity (LD50): 13600 mg/kg (rat)<br>Acute Dermal toxicity (LD50): >5000 mg/kg (rabbit)<br><br>MTBE (1634-04-4):<br>Acute Oral toxicity (LD50): 2963 mg/kg (rat)<br>Acute Dermal toxicity (LD50): >6800 mg/kg (rabbit)<br>Acute Inhalation toxicity (LC50): 23576 ppm/4h (rat)<br><br>Benzene (71-43-2): |

| | |
|---|---|
| | Acute Oral toxicity (LD50): 930 mg/kg (rat)<br>Acute Dermal toxicity (LD50): >9400 mg/kg (rabbit)<br>Acute Inhalation toxicity (LC50): 13229 ppm/4h (rat) |
| **Chronic or Other Toxic Effects** | |
| Dermal Route: | Contact may cause skin irritation. Prolonged or repeated contact may defat and dry skin, and cause dermatitis. |
| Inhalation Route: | Inhalation of this product may cause respiratory tract irritation. Inhalation of this product may cause Central Nervous System (CNS) Depression, symptoms of which may include; weakness, dizziness, slurred speech, drowsiness, unconsciousness and in cases of severe overexposure; coma and death. |
| Oral Route: | Ingestion of this product may cause gastro-intestinal irritation. Aspiration of this product may result in severe irritation or burns to the respiratory tract. Ingestion of this product may cause Central Nervous System (CNS) Depression, symptoms of which may include; weakness, dizziness, slurred speech, drowsiness, unconsciousness and in cases of severe overexposure; coma and death. |
| Eye Irritation/Inflammation: | Contact may cause eye irritation. |
| Immunotoxicity: | Not available |
| Skin Sensitization: | Contact with this product is not expected to cause skin sensitization, based upon the available data and the known hazards of the components. |
| Respiratory Tract Sensitization: | Contact with this product is not expected to cause respiratory tract sensitization, based upon the available data and the known hazards of the components. |
| Mutagenic: | This product contains a component(s) at >= 0.1% that has been shown to cause mutagenicity in laboratory tests. Therefore, this product is considered to be a mutagen. (Benzene) |
| Reproductive Toxicity: | This product is not known to contain any components at >= 0.1% that have been shown to cause reproductive toxicity. Therefore, based upon the available data and the known hazards of the components, this product is not expected to be a reproductive toxin. |
| Teratogenicity/Embryotoxicity: | This product is not known to contain any components at >= 0.1% that have been shown to cause teratogenicity and/or embryotoxicity. Therefore, based upon the available data and the known hazards of the components, this product is not expected to be a teratogen/embryotoxin. |
| Carcinogenicity (ACGIH): | This product contains the following chemical(s) at >=0.1% that are listed as carcinogenic compounds. Therefore this product is considered to be carcinogenic.<br>[Considered to be A1 by the ACGIH. Benzene (71-43-2)]<br>[Considered to be A3 by the ACGIH. Gasoline (8006-61-9), MTBE (1634-04-4)] |
| Carcinogenicity (IARC): | This product contains the following chemical(s) at >=0.1% that are listed as carcinogenic compounds. Therefore this product is considered to be carcinogenic.<br>[Considered to be carcinogenic to humans (group 1) by IARC. Benzene (71-43-2)]<br>[Considered to be carcinogenic to humans (group 2B) by IARC. Gasoline (8006-61-9)] |
| Carcinogenicity (NTP): | This product contains the following chemical(s) at >=0.1% that are listed as carcinogenic compounds. Therefore this product is considered to be carcinogenic.<br>[Known to be a human carcinogen according to NTP. Benzene (71-43-2)] |
| Carcinogenicity (IRIS): | This product contains the following chemical(s) at >=0.1% that are listed as carcinogenic compounds. Therefore this product is considered to be carcinogenic.<br>[Considered to be carcinogenic by IRIS. Benzene (71-43-2)] |
| Carcinogenicity (OSHA): | This product contains the following chemical(s) at >=0.1% that are listed as carcinogenic compounds. Therefore this product is considered to be carcinogenic.<br>[Considered to be carcinogenic by OSHA. Benzene (71-43-2)] |
| **Other Considerations** | Gasoline engine exhaust is possibly carcinogenic to humans (IARC Group 2B). |

## *Section 12. Ecological Information*

| | | | |
|---|---|---|---|
| **Environmental Fate** | Not available | **Persistance/ Bioaccumulation Potential** | Not available |
| **BOD5 and COD** | Not available | **Products of Biodegradation** | Not available |
| **Additional Remarks** | No additional remark. | | |

## Section 13. Disposal Considerations

**Waste Disposal** Spent/ used/ waste product may meet the requirements of a hazardous waste. Consult your local or regional authorities. Ensure that waste management processes are in compliance with government requirements and local disposal regulations.

## Section 14. Transport Information

| | | | |
|---|---|---|---|
| **TDG Classification** | GASOLINE, 3, UN1203, PGII (CL-TDG) | **Special Provisions for Transport** | See Transportation of Dangerous Goods Regulations. |

## Section 15. Regulatory Information

**Other Regulations**

This product is acceptable for use under the provisions of WHMIS-CPR. All components of this formulation are listed on the CEPA-DSL (Domestic Substances List).

All components of this formulation are listed on the US EPA-TSCA Inventory.

All components of this product are on the European Inventory of Existing Commercial Chemical Substances (EINECS).

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

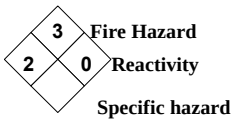
Please contact Product Safety for more information.

| | | | |
|---|---|---|---|
| **DSD/DPD (Europe)** | Not evaluated. | **HCS (U.S.A.)** | CLASS: Contains material which may cause cancer.<br>CLASS: Flammable liquid having a flash point lower than 37.8°C (100°F).<br>CLASS: Irritating substance.<br>CLASS: Target organ effects. |
| **ADR (Europe) (Pictograms)** | NOT EVALUATED FOR EUROPEAN TRANSPORT<br>NON ÉVALUÉ POUR LE TRANSPORT EUROPÉEN. | **DOT (U.S.A) (Pictograms)** | Not evaluated for transport<br>Non évalué pour le transport |

**HMIS (U.S.A.)**

| | |
|---|---|
| Health Hazard | 2* |
| Fire Hazard | 3 |
| Reactivity | 0 |
| Personal Protection | H |

**NFPA (U.S.A.)**




**Rating**
0 Insignificant
1 Slight
2 Moderate
3 High
4 Extreme

## Section 16. Other Information

**References** Available upon request.

* Marque de commerce de Petro-Canada - Trademark

**Glossary**

ACGIH - American Conference of Governmental Industrial Hygienists
ADR - Agreement on Dangerous goods by Road (Europe)
ASTM - American Society for Testing and Materials
BOD5 - Biological Oxygen Demand in 5 days
CAS - Chemical Abstract Services
CEPA - Canadian Environmental Protection Act
CERCLA - Comprehensive Environmental Response, Compensation and Liability Act
CFR - Code of Federal Regulations
CHIP - Chemical Hazard Information and Packaging Approved Supply List
COD - Chemical Oxygen Demand
CPR - Controlled Products Regulations
DOT - Department of Transportation (U.S.A.)
DSCL - Dangerous Substances Classification and Labeling (Europe)
DSD/DPD - Dangerous Substance or Dangerous Preparations Directives (Europe)
DSL - Domestic Substance List (Canada)
EEC/EU - European Economic Community/European Union
EINECS - European Inventory of Existing Commercial Chemical Substances
EPCRA - Emergency Planning And Community Right-To-Know Act
FDA - Food and Drug Administration
FIFRA - Federal Insecticide, Fungicide, and Rodenticide Act
HCS - Hazardous Communication System
HMIS - Hazardous Material Information System
IARC - International Agency for Research on Cancer
IRIS - Integrated Risk Information System
LD50/LC50 - Lethal Dose/Concentration kill 50%
LDLo/LCLo - Lowest Published Lethal Dose/Concentration
NFPA - National Fire Prevention Association
NIOSH - National Institute for Occupational Safety & Health
NPRI - National Pollutant Release Inventory
NSNR - New Substances Notification Regulations (Canada)
NTP - National Toxicology Program
OSHA - Occupational Safety & Health Administration
PEL - Permissible Exposure Limit
RCRA - Resource Conservation and Recovery Act
SARA - Superfund Amendments and Reorganization Act
STEL - Short Term Exposure Limit (15 minutes)
TDG - Transportation Dangerous Goods (Canada)
TDLo/TCLo - Lowest Published Toxic Dose/Concentration
TLV-TWA - Threshold Limit Value-Time Weighted Average
TLm - Median Tolerance Limit
TSCA - Toxic Substances Control Act
USEPA - United States Environmental Protection Agency
USP - United States Pharmacopoeia
WHMIS - Workplace Hazardous Material Information System

**For Copy of MSDS**

**Prepared by Product Safety - JDW on 7/4/2005.**

**Internet: www.petro-canada.ca/msds**

**Canada-wide: telephone: 1-800-668-0220; fax: 1-800-837-1228**

**For Product Safety Information: (905) 804-4752**

**Data entry by Product Safety - JDW.**

***To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.***

# Material Safety Data Sheet

| WHMIS (Pictograms) | WHMIS (Classification) | Personal Protective Equipment |
|---|---|---|
| | **WHMIS CLASS B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).** | |

## *Section 1. Product and Company Identification*

| | | | |
|---|---|---|---|
| **Product Name / Trade name** | **Varsol** | **Associated Product's Item Code** | **13-374HD** |
| **Synonym** | Petroleum Distillate | **CAS #** | 64742-88-7 |
| **Chemical Family** | Aliphatic hydrocarbon (Solvent.) | **Validation Date** | **June 26 2006** |
| **Chemical Formula** | Not applicable. (mixture of hydrocarbons) | **Print Date** | June 26 2006 |
| **Manufacturer** | Recochem Inc.<br>850 Montee de Liesse<br>Montreal, Quebec<br>514-341-3550 | **In Case of Emergency** | Recochem Inc.<br>Communications and Regulatory Affairs Department<br>(905) 791-1788 |
| **Material Uses** | Consumer products: Various. | | |

## *Section 2. Hazardous Ingredients*

| Name | CAS # | % by Weight | Exposure Limits | |
|---|---|---|---|---|
| | | | Canadian Values (ACGIH) | U.S. Values (OSHA) |
| Petroleum distillate | 64742-88-7 | 100 | **ACGIH (Canada, 2003).**<br>TWA: 100 ppm 8 hour(s).<br>TWA: 525 mg/m$^3$ 8 hour(s). | Petroleum distillate **OSHA (United States, 2003).**<br>TWA: 500 ppm 8 hour(s).<br>TWA: 2900 mg/m$^3$ 8 hour(s). |

## *Section 3. Hazard Identification*

| | |
|---|---|
| **Emergency Overview** | CAUTION! Combustible liquid.<br>HARMFUL OR FATAL IF SWALLOWED.<br>Keep away from heat, sparks and flame. Keep container closed. Use only with adequate ventilation. Keep out of reach of children. |
| **Potential Acute Health Effects** | **See Section #11: "Toxicological Information" for further human health effects.**<br><br>This product may cause mild irritatation to eyes and skin upon contact.<br>Prolonged and repeated contact with skin can cause drying of the skin resulting in irritation and dermatitis.<br>Inflammation of the eye is characterized by mild redness, watering, and itching.<br>Skin inflammation is characterized by mild itching, scaling, reddening.<br>Ingestion can cause burning sensation, vomiting, drowsiness and in severe cases pulmonary edema.<br>Inhalation of excessive amounts may result in impairment, such as drowsiness, lack of coordination, headache and nausea. |
| **Note to Physician** | Aspiration hazard if swallowed- can enter lungs and cause damage. Small amounts of liquid aspirated into the respiratory system during ingestion or from vomiting may cause mild to severe pulmonary injury and possible death. |

*Continued on Next Page*

## Section 4. First Aid Measures

| | |
|---|---|
| **Eye Contact** | Rinse with water for a few minutes. If irritation persists, seek medical attention. |
| **Skin Contact** | Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. If irritation persists, get medical attention. Wash contaminated clothing before reusing. |
| **Inhalation** | Allow the victim to rest in a well ventilated area. Seek medical attention. |
| **Ingestion** | DO NOT induce vomiting. Allow the victim to rest in a well-ventilated area. Seek medical attention. |

## Section 5. Fire Fighting Measures

| | |
|---|---|
| **Products of Combustion** | Carbon oxides (CO, $CO_2$), smoke, fumes. |
| **Fire Fighting Media and Instructions** | Combustible liquid, insoluble in water.<br>SMALL FIRE: Use DRY chemicals, $CO_2$, alcohol foam or water spray.<br>LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion. |
| **Fire Hazards** | Container explosion may occur under fire conditions or when heated. Vapour may travel considerable distance to source of ignition and flash back. Vigourously supports combustion. Combustible when exposed to heat or flame. |
| **Explosion Hazards** | Vapours may travel along ground and flashback along vapour trail. |

## Section 6. Accidental Release Measures

| | |
|---|---|
| **Small Spill and Leak** | Absorb with an inert material and put the spilled material in an appropriate waste disposal. |
| **Large Spill and Leak** | Combustible liquid, insoluble in water.<br>Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Prevent entry into sewers and surface waterways. Absorb with DRY earth, sand or other non-combustible material. Place in appropriate container and dispose of in accordance with regional regulations. |

## Section 7. Handling and Storage

| | |
|---|---|
| **Handling** | Keep away from heat, sparks and flame. Keep container closed. Use only with adequate ventilation. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. |
| **Storage** | **See Section #10 for applicable incompatible materials.**<br>Combustible materials should be stored away from extreme heat and away from strong oxidizing agents. Keep away from heat. Keep away from sources of ignition. Keep container tighltly closed in a cool, well-ventilated place. Keep out of reach of children. |

## Section 8. Exposure Controls, Personal Protection

| | |
|---|---|
| **Engineering Controls** | Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location. |
| **Personal Protection** | |
| ***Eyes*** | Safety glasses. |
| ***Body*** | No special protective clothing is required. |
| ***Respiratory*** | Wear appropriate respirator when ventilation is inadequate. Be sure to use an approved/certified respirator or equivalent. |
| ***Hands*** | Gloves (impervious materials such as Viton®, Neoprene® or butyl rubber). |

*Continued on Next Page*

## Section 9. Physical and Chemical Properties

| | | | |
|---|---|---|---|
| **Physical State and Appearance** | Liquid. | **Odour** | Petroleum distillates |
| **Molecular Weight** | Not applicable. | **Taste** | Not available. |
| **pH** | Not applicable. | **Colour** | Colourless. |
| **Boiling/Condensation Point** | 150 to 210°C (302 to 410°F) | **Volatility** | 100% (v/v). 100% (w/w). |
| **Melting/Freezing Point** | -58°C (-72.4°F) | **Evaporation Rate** | 0.1 compared to Butyl acetate. |
| **Specific Gravity** | 0.79 (Water = 1) | **Odour Threshold** | Not available. |
| **Vapour Pressure** | 2.2 mm of Hg (@ 20°C) | **Viscosity** | Kinetic: 1.14 cS |
| **Vapour Density** | 4.8 (Air = 1) | **Solubility** | Easily soluble in diethyl ether, n-octanol. Insoluble in water. |
| **VOC Content** | 790 (g/l). | **Other Properties** | Not available. |

| | |
|---|---|
| **The Product is:** | Combustible. |
| **Auto-ignition Temperature** | 229°C (444.2°F) |
| **Flash Point** | Closed cup: 42°C (107.6°F). (Tagliabue. (ASTM D56)) |
| **Flammable Limits** | LOWER: 1% UPPER: 13.3% |
| **Fire Hazards in Presence of Various Substances** | Flammable in presence of open flames, sparks and static discharge. This product is combustible if exposed to heat or when in involved in a fire and in contact with combustible materials which may act as a wick. |

## Section 10. Stability and Reactivity

| | |
|---|---|
| **Stability** | The product is stable. |
| **Conditions of Instability** | No additional remark. |
| **Incompatibility with Various Substances** | Reactive with oxidizing agents. |

## Section 11. Toxicological Information

| | |
|---|---|
| **Routes of Entry** | Eye contact. Inhalation. Ingestion. |
| **Toxicity to Animals** | Acute oral toxicity (LD50): >5000 mg/kg [Rat]. |

**Acute Effects on Humans**

| | |
|---|---|
| ***Eyes*** | May cause mild eye irritation. |
| ***Skin*** | May cause mild skin irritation. |
| ***Inhalation*** | Slightly hazardous in case of inhalation. Exposure to very high concentrations can cause dizziness, lightheadness, headache, nausea, and blurrred vision. Higher levels may cause unconsciousness. |
| ***Ingestion*** | This product is of very low acute toxicity. Aspiration hazard if swallowed- can enter lungs and cause damage. |

*Continued on Next Page*

| | |
|---|---|
| **Chronic Effects on Humans** | **CARCINOGENIC EFFECTS**: Not available.<br>**MUTAGENIC EFFECTS**: Not available.<br>**TERATOGENIC EFFECTS**: Not available.<br>**DEVELOPMENTAL TOXICITY**: Not available.<br>Prolonged and repeated contact with skin can cause drying of the skin resulting in irritation and dermatitis. Effect of chronic exposure include soporific or intoxicating effect if prolonged and in sufficient concentration. Avoid breathing vapour or mist. |

## Section 12. Ecological Information

| | |
|---|---|
| **Ecotoxicity** | **For accidential discharges into environment, see Section #6: "Accidential Release Measures" for suggested instructions.**<br><br>No additional remark. |

## Section 13. Disposal Considerations

| | |
|---|---|
| **Waste Information** | Waste must be disposed of in accordance with federal, state or provincial and local environmental control regulations. |

## Section 14. Transport Information

**Canada Transportation of Dangerous Goods (TDG) Information**

| | |
|---|---|
| **Primary Class** | Class 3: Flammable liquid. |
| **Subsidiary Class (if applicable)** | - |
| **Proper shipping name** | PETROLEUM DISTILLATES, N.O.S. |
| **Hazard Identification Number** | UN 1268 |
| **Packing Group** | III |
| **Special Provisions** | In containers of 450L or less this product is not classified as a Dangerous Goods according to TDG exemption 1.33 |

**International Maritime Dangerous Goods (IMDG) Transportation Information**

| | |
|---|---|
| **Primary Class** | Class 3: Flammable liquid. |
| **Subsidiary Class (if applicable)** | - |
| **Proper shipping name** | PETROLEUM DISTILLATES, N.O.S. |
| **Hazard Identification Number** | UN 1268 |
| **Packing Group** | III |
| **Marine Pollutant** | Not pollutant. |
| **Special Provisions** | In containers of 5 L (5Kg) capacity or less this product is classified as a "Consumer Commodity" under IMDG regulations. |

No placard (handling and hazard label) required.

**United States Department of Transportation (DOT) Information**

| | |
|---|---|
| **Primary Class** | Class 3: Flammable liquid. |
| **Subsidiary class (if applicable)** | - |
| **Proper shipping name** | PETROLEUM DISTILLATES, N.O.S. |

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| | |
|---|---|
| **Hazard Identification Number** | UN 1268 |
| **Packing Group** | III |
| **Special Provisions** | In containers of 454L or less this product is not classified as a Gangerous Good according to exception 173.150 f(1-2) |
| **International Air Transport Association (IATA)** | For air shipment classification and associated regulations, please refer to the latest edition of IATA Dangerous Goods Regulations. |

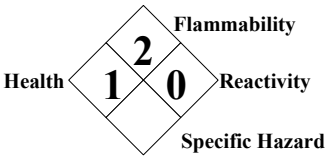
## Section 15. Other Regulatory Information and Pictograms

| | |
|---|---|
| **WHMIS Classification (Canada)** | WHMIS CLASS B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F). |
| **Canada Domestic Substances List (DSL) Status** | This product and/ or all of its components are on the DSL. |
| **HCS Classification (U.S.A.)** | Combustible liquid |
| **U.S.A. Regulatory Lists** | This product and/ or all of its components are on the TSCA inventory list. |

**Hazardous Material Information System (U.S.A.)**

| | |
|---|---|
| Health | 1 |
| Flammability | 2 |
| Reactivity | 0 |
| Personal Protection | G |

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




## Section 16. Other Information

**Validated and verified by Compliance and Technical Information Manager on** June 26 2006 | **Printed** June 26 2006

**Notice to Reader**

*To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein.*
*Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.*

## APPENDIX J

## SPILL REPORTING FORMS

**Internal Spill Reporting Form**

| AEM | Meadowbank Project | Spill report |
|---|---|---|
| Date and time of spill : | | |
| Location of spill : | | |
| First responder name : | | |
| Person on the contact list contacted : | | |
| Nature of contaminant : | | |
| Volume/quantity of the container / tank | | |
| Quantity spilled : | | |
| Cause of the spill : | | |
| | | |
| | | |
| | | |
| | | |
| Contaminant collected by : | | |
| Follow-up done by : : | | |
| Actions taken : | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| Incident investigation recommended : YES ☐ | NO ☐ | |
| Report completed by: | Date : | |
| Government agency notified : | YES ☐ | NO ☐ |
| Date of notification to government agency : | | |
| Date of report : _____ | Signature of environmental personnel : _____ | |

**Spill Logbook Entry Form**

| Date of Spill | Date of Spill Report completion | Description (type, approximate quantity, location of spill) | Clean-up action taken | Logged by: |
|---|---|---|---|---|
| | | | | |
| | | | | |
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| | | | | |
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| | | | | |

# 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 | | | |

# Instructions for Completing the NT-NU Spill Report Form

**This form can be filled out electronically and faxed to the spill line at 867-873-6924. Commencing on January 2, 2007, the form can also be e-mailed as an attachment to spills@gov.nu.ca. Until further notice, please verify receipt of e-mail transmissions with a follow-up telephone call. Spills can still be phoned in by calling collect at 867-920-8130.**

| | |
|---|---|
| **A. Report Date/Time** | The actual date and time that the spill was reported to the spill line. If the spill is phoned in, the Spill Line will fill this out. **Please do not fill in the Report Number**: the spill line will assign a number after the spill is reported. |
| **B. Occurrence Date/Time** | Indicate, to the best of your knowledge, the exact date and time that the spill occurred. Not to be confused with the report date and time (see above). |
| **C. Land Use Permit Number /Water Licence Number** | This only needs to be filled in if the activity has been licenced by the Nunavut Water Board and/or if a Land Use Permit has been issued. Applies primarily to mines and mineral exploration sites. |
| **D. Geographic Place Name** | In most cases, this will be the name of the city or town in which the spill occurred. For remote locations – outside of human habitations – identify the most prominent geographic feature, such as a lake or mountain and/or the distance and direction from the nearest population center. **You must include the geographic coordinates** (Refer to Section E). |
| **E. Geographic Coordinates** | This only needs to be filled out if the spill occurred outside of an established community such as a mine site. Please note that the location should be stated in degrees, minutes and seconds of Latitude and Longitude. |
| **F. Responsible Party Or Vessel Name** | This is the person who was in management/control/ownership of the substance at the time that it was spilled. In the case of a spill from a ship/vessel, include the name of the ship/vessel. Please include full address, telephone number and e-mail. Use box K if there is insufficient space. **Please note that, the owner of the spilled substance is ultimately responsible for any spills of that substance, regardless of who may have actually caused the spill.** |
| **G. Contractor involved?** | Were there any other parties/contractors involved? An example would be a construction company who is undertaking work on behalf of the owner of the spilled substance and who may have contributed to, or directly caused the spill and/or is responding to the spill. |
| **H. Product Spilled** | Identify the product spilled; most commonly, it is gasoline, diesel fuel or sewage. For other substances, avoid trade names. Wherever possible, use the chemical name of the substance and further, identify the product using the four digit UN number (eg: UN1203 for gasoline; UN1202 for diesel fuel; UN1863 for Jet A & B) |
| **I. Spill Source** | Identify the source of the spill: truck, ship, home heating fuel tank and, if known, the cause (eg: fuel tank overfill, leaking tank; ship ran aground; traffic accident, vandalism, storm, etc.). Provide an estimate of the extent of the contaminated/impacted area (eg: 10 $m^2$) |
| **J. Factors Affecting Spill** | Any factors which might make it difficult to clean up the spill: rough terrain, bad weather, remote location, lack of equipment. Do you require advice and/or assistance with the cleanup operation? Identify any hazards to persons, property or equipment: for example, a gasoline spill beside a daycare centre would pose a safety hazard to children. Use box K if there is insufficient space. |
| **K. Additional Information** | Provide any additional, pertinent details about the spill, such as any peculiar/unique hazards associated with the spilled material. State what action is being taken towards cleaning up the spill; disposal of spilled material; notification of affected parties. If necessary, append additional sheets to the spill report. Number the pages in the same format found in the lower right hand corner of the spill form: eg. “Page 1 of 2", “Page 2 of 2" etc. **Please number the pages to ensure that recipients can be certain that they received all pertinent documents.** If only the spill report form was filled out, number the form as “Page 1 of 1". |
| **L. Reported to Spill Line by** | Include your full name, employer, contact number and the location from which you are reporting the spill. Use box K if there is insufficient space. |
| **M. Alternate Contact** | Identify any alternate contacts. This information assists regulatory agencies to obtain additional information if they cannot reach the individual who reported the spill. |
| **N. Report Line Use Only** | **Leave Blank**. This box is for the **Spill Line’s use only**. |