PRAIRIE CREEK MINE
DRAFT SPILL CONTINGENCY PLAN

April, 2019
Preamble

This *Spill Contingency Plan* applies to exploration activities at the Prairie Creek Mine site.

The following formal distribution has been made of this plan:

Mackenzie Valley Land and Water Board

Canadian Zinc Corporation - Prairie Creek Mine Office

NorZinc - Vancouver Office

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Prairie Creek Mine
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<table>
<thead>
<tr>
<th>Acronyms/Abbreviations</th>
<th>Definition</th>
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<tbody>
<tr>
<td>AMSL</td>
<td>Above Mean Sea Level</td>
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<tr>
<td>CCME</td>
<td>Canadian Council of Ministers of the Environment</td>
</tr>
<tr>
<td>CIRNAC</td>
<td>Crown-Indigenous Relations and Northern Affairs Canada</td>
</tr>
<tr>
<td>CZN</td>
<td>Canadian Zinc Corporation</td>
</tr>
<tr>
<td>DFO</td>
<td>Department of Fisheries and Oceans</td>
</tr>
<tr>
<td>ENR</td>
<td>Environment and Natural Resources, Government of the Northwest Territories</td>
</tr>
<tr>
<td>Envision</td>
<td>Envision Response Solutions Inc.</td>
</tr>
<tr>
<td>GNWT</td>
<td>Government of the Northwest Territories</td>
</tr>
<tr>
<td>HDPE</td>
<td>High-Density Polyethylene</td>
</tr>
<tr>
<td>L</td>
<td>litres</td>
</tr>
<tr>
<td>m</td>
<td>metre</td>
</tr>
<tr>
<td>m³</td>
<td>cubic metre</td>
</tr>
<tr>
<td>M</td>
<td>Million</td>
</tr>
<tr>
<td>Mine</td>
<td>Prairie Creek Mine</td>
</tr>
<tr>
<td>MSDS</td>
<td>Material Safety Data Sheet (now SDS)</td>
</tr>
<tr>
<td>NNPR</td>
<td>Nahanni National Park Reserve</td>
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<tr>
<td>NWT</td>
<td>Northwest Territories</td>
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<tr>
<td>Plan</td>
<td>Spill Response Plan (also called SCP)</td>
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<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
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<tr>
<td>SCP</td>
<td>Spill Contingency Plan</td>
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<tr>
<td>SDS</td>
<td>Safety Data Sheet (formerly Materials Safety Data Sheet - MSDS)</td>
</tr>
<tr>
<td>ULSDF</td>
<td>Ultra-Low-Sulfur Diesel Fuel</td>
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<tr>
<td>WHMIS</td>
<td>Workplace Hazardous Materials Information System</td>
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</table>
**Flammable Liquids**  
Liquid products such as diesel fuel, gasoline, and other petroleum-based products that can burn.

**Hazardous Materials**  
Materials that can cause harm to human health and the environment.

**Non-hazardous Materials**  
Materials such as food wastes, paper, wood, plastics, glass, and scrap metals that are not harmful to human health or the environment but still need to be properly managed or in the event of a spill cleaned up.

**Petroleum Products**  
Materials such as diesel fuel, gasoline, grease and other products made from oil.

**Safety Data Sheets**  
Safety Data Sheets (SDSs) are summary documents that provide information about the hazards of a product and advice about safety precautions.
1.0 INTRODUCTION

This Spill Contingency Plan (SCP) describes the actions that will be undertaken for all types of spill incidents and conditions associated with exploration at CZN’s Prairie Creek Mine (the Project), specifically the treatment of mine water and the development of a 2nd underground Decline. This SCP is not intended for the mine operations phase.

This SCP has been developed for the Project and regulatory approvals in accordance with the Guidelines for Spill Contingency Planning (INAC 2007) and the Guide to the Spill Contingency Planning and Reporting Regulations issued under the Environmental Protection Act (Environment and Natural Resources 2011).

1.1 Company Name, Location and Mailing Address

Head Office:
Suite 1710-650 West Georgia Street, Vancouver, BC, V6B 4N9
Phone: 604-688-2001
Fax: 604-688-2043
Email: David.Harpley@canadianzinc.com

Prairie Creek Mine:
Iridium 9555 Satellite Phone 1 (yellow) 011-8816-315-30998
Iridium 9505A Satellite Phone 2 (black) 011-8816-315-30997
Iridium 9505A Satellite Phone 3 (orange) 011-8816-315-30996
Ground-To-Air Radio Handheld FREQ 122.800

1.2 Purpose and Scope

The purpose of the SCP is to provide a guide to all site staff in the event of an accidental release of fuel or other hazardous material associated with exploration at the construction and operation of the access road to the Prairie Creek Mine.

The SCP identifies key response personnel and their roles and responsibilities in the event of a spill, as well as the equipment and other resources available to respond to a spill. It details spill response strategies, tactics and procedures designed to minimize potential health and safety hazards and reduce potential environmental effects related to a spill incident. All persons involved with the Project must read and be familiar with the SCP. All staff will be expected to know the following:

- Location and content of the SCP;
- Properties and hazards associated with the chemicals being handled;
- Inventory and proper use of the spill response kit;
- Required appropriate personal protective equipment (PPE); and
- Required notification procedures to be employed in the event of an incident and details to be communicated
1.3 CZN Environmental Policy

It is CZN's policy to achieve and maintain a high standard of environmental care in conducting its business as a resource company, and through its developments, contribute to sustaining society’s material needs. CZN's approach to environmental management seeks continuous improvement in performance by incorporating evolving scientific knowledge and community expectations into its operations.

Specifically, it is CZN's policy to:

- Comply with and adopt the spirit of all applicable laws, regulations and standards, and where laws do not adequately protect the environment, apply standards that minimize any adverse environmental impacts resulting from its operations, products and services.

- Communicate openly and in a timely manner with government on environmental issues, and contribute to the development of policies, legislation and regulations that may affect CZN and its operations.

- Recognize local communities as stakeholders and engage with them in a process of open consultation and timely communication regarding environmental management issues and impacts and seek to involve them in decision making and implementation.

- Ensure that employees and suppliers of goods and services are informed about this policy and that they are aware of their environmental responsibilities in relation to CZN's business.

- Develop and implement management systems to identify, control and monitor potential environmental risks arising from operations, and be prepared to respond to adversity.

1.4 Project Setting

The Prairie Creek Mine is located at 61° 33’ north latitude and 124° 48’ west longitude. The Mine is situated adjacent to Prairie Creek about 48 km upstream from its confluence with the South Nahanni River, and 7 km upstream of the point where Prairie Creek crosses the boundary of the expanded Nahanni National Park Reserve.

The mine site is at an elevation of 850 m above sea level, and is situated in topography characterized by low mountains and narrow valleys with an average relief of 300 m. Short summers are typical of the area’s sub-arctic climate, where the mean annual temperature is -5°C. Annual precipitation is approximately 40 cm, most of which falls as rain.
2.0 POTENTIAL HAZARDOUS MATERIALS

During site exploration, a number of hazardous materials may be used or generated that could potentially be contaminants if released to the environment, including:

- Fuels: gasoline and diesel
- Lubricating oils and grease
- Hydraulic and motor oil
- Antifreeze and other coolants
- Hydrocarbon-contaminated soil, snow/ice and/or water
- Water treatment reagents
- Explosives and explosive residues.

Safety Data Sheets (SDS) for key hazardous materials are included in Appendix C.

Perhaps the highest spill risk is associated with fuel storage. The main fuel source locations at the Mine, and control points, are as follows (see Figure 1 for locations):

- The Tank Farm consists of four 10,000 barrel capacity tanks for diesel (presently only two contain a small proportion of diesel), two 350 barrel capacity tanks for gasoline (empty and not suitable for use), and waste oil stored in two 5,000 gallon (20,000 litre) tanks. The control point for spills in the Farm is the containment berm for the tanks. Beyond this, the secondary control point is the culverts where Harrison Creek discharges to Prairie Creek. Any spills to the south-east of the farm would be contained by the toe of the Prairie Creek containment berm;

- The two camp power generators are fed by a 500 gallon diesel tank mounted on a steel cradle inside a lined and bermed containment. The secondary control point for a spill is the main site drainage channel which flows into the Catchment Pond (the outlet of the Catchment Pond is also a control point with a gate weir);

- A 5000 gallon tank on the south-west corner of the rear Machine Shop stores lubricating oil for use in vehicles. The tank is fully contained in a cement berm. The secondary control point for a spill is the main site drainage channel;

- A 500 gallon tank on the north-west corner of the Administration Building (which currently houses the kitchen, Mine Rescue, First Aid and Mine Dry) , and a 200 gallon tank on the south-east corner provide diesel for boilers providing heat. Both tanks are inside lined and bermed containments. The secondary control point for a spill is the main site drainage channel;

- A 500 gallon diesel tank at the 870 level underground staging area provides diesel supply to the compressor and generator for mine ventilation and electrical supply. This tank is within a lined and bermed containment, and the secondary control point for a spill is the main site drainage channel;

- A limited number of 45 gallon (200 litre) drums containing aviation gas or Jet B are stored at the airstrip. The drums are located on a clay liner which slopes away from Prairie Creek to a narrow drainage collection channel. The control point for a spill beyond the containment is at the downstream end of the channel before an access road leaves the airstrip.
Fig 1: Hydrocarbon and Chemical Storage Locations

- **Prairie Creek Mine, NWT**
- **MILL**
- **Prairie Creek Mine, NWT**

### Hydrocarbon and Chemical Storage Locations

- **SCALE METRES**
- **0  10    25          50                      100**

#### Hydrocarbon Storage

- **10-30w Oil (76 x 45 gal drums)**
- **30w Oil (192 x 45 gal drums)**

#### Chemical Storage

- **Sulphide shack (4 x 50kg drums)**
- **Heavy lubricants (28 drums)**
- **Used oil/grease (45 drums)**
- **Sulphide (9 x 50kg drums)**
- **Used oil/grease (150 x 45 gal drums)**
- **Used oil tanks x 2 (500 gal)**
- **Oil tank (2500 gal)**

#### Additional Storage

- **2-350 BBL GASOLINE TANKS**
- **10,700 BBL MINE WATER DRAINAGE**
- **AT AIRSTRIP: AV-Gas (8 x 45 gal drums)**
- **Fuel for boiler (500 gal tank)**
- **Diesel tank (45 gal)**
- **Diesel tank (45 gal)**
- **Fuel tank (500 gal)**
- **Oil tank (250 gal)**
- **Used oil tank (~200 gal)**

#### Other Structures

- **KITCHEN**
- **OFFICES**
- **FIRST AID**
- **MINE DRY KITCHEN OFFICES**
- **LIVING QUARTERS**
- **STORAGE YARD**
- **INCINERATOR**
- **Sulphide shack (2-4 x 50kg drums)**
- **Heavy lubricants (28 drums)**
- **Used oil/grease (45 drums)**
- **Sulphide (9 x 50kg drums)**
- **Used oil/grease (150 x 45 gal drums)**
- **Used oil tanks x 2 (500 gal)**

#### Environmental Features

- **HARRISON CREEK CHANNEL CATCHMENT POND**
- **10,700 BBL**
- **2-350 BBL GASOLINE TANKS**
- **HARRISON CREEK CHANNEL**
- **EXISTING TOE OF HILLSIDE**
- **10,700 BBL**
- **COLD MACHINE SHOPS STORAGE**

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**Date:** July 21, 2017  
**Drawn By:** K. Cupit  
**Scale:** As shown  
**Drawing:** Hydrocarbon and Chemical Storage Locations 1-8.ai
3.0 RESPONSE ORGANIZATION

3.1 Spill classification System

A spill classification system widely used in industry will also be adopted, as follows:

**Level 1** A *minor* event that is confined to the immediate mine site and can be handled by CZN/available contractor personnel using the response resources, manpower and equipment at hand.

**Level 2** A *moderate* event where an incident has spread beyond the mine site, or where employee safety is at risk or where external resources (i.e., emergency services, or contractors/external resources are required. Public safety however is not threatened.

**Level 3** A *major* event where public safety or property is endangered, or major off-site environmental impacts have occurred or could occur, and external resources are required.

3.2 Response Team

The initial CZN incident response team (comprised of mine site personnel) will typically consist of five personnel: one Incident Commander (the Camp Manager), one Safety Officer or Medic, and three responders, one of which may be a mechanic. The Incident Commander will be responsible for all communications off the spill site and will direct and document the operations undertaken in a chronological log. Communications will be relayed via the Incident Commander to CZN Head Office for required external notification to regulators and communication with local stakeholders.

The Safety Officer’s/Medic’s primary responsibility will be to assess hazardous and unsafe situations and develop measures for assuring personnel safety. The person may also assist with response operations in the early stages of an incident or assist from time to time if required, but safety remains the priority.

As mechanical equipment such as pumps and skimmers could be involved, a mechanic with appropriate tools is included as part of the response team. The team would be supported by others delivering additional equipment, as necessary.

In the event that the spill incident requires additional external resources, including specific technical expertise, addition equipment, etc. the Incident Commander will be responsible for obtaining these resources in a timely manner from the off-site resources listed in Section 5.2 of this SCP.
4.0 ACTION PLAN

4.1 Spill Prevention

The preferred manner to deal with spills is first by avoidance through appropriate storage, handling, and transportation measures. The prevention of spills is achieved through actions such as:

Containment and Storage:

- All potentially hazardous materials will be stored at a designated storage area more than 30 m from the high-water mark of any waterbody.
- All fuel storage vessels will have secondary containment such as containment trays, berms, and/or double-walled tanks designed to hold 110% of total volume of stored fuel,
- All fuel storage tanks, including secondary containment and gas cans will be inspected daily during operations.
- All sewage and solid waste will be contained and sealed in watertight containers.
- Spill mats and/or drip pans/trays will be placed under all mobile fueling containers and under equipment when not in use, defined as idling or parked for greater than two hours.

Design:

- All stationary activities (i.e., camp activities) will be conducted at least 30 m from the ordinary high-water mark of any waterbody or watercourse.
- Tanks used for transporting any greywater will be watertight and designed to reduce surge during transport.

Spill kits are maintained on site at the main fuel farm facility, mechanic shop, gasoline station, fuel truck and at each surface diamond drill when such a drill is operating.

Inspection, Maintenance and Monitoring:

- All equipment used for operations will be in good working order and free of leaks.
- Regular inspection and maintenance will be conducted for all heavy equipment and vehicles, including fuel transfer hoses and fuel/oil lines, associated with the Project.
- Identified equipment or vehicle deficiencies will be repaired.
- Tanks used for transporting greywater will be regularly and properly inspected and maintained by the operator.
- Drips that make contact with the ground will be cleaned up immediately.
- All vehicles and camp units will be equipped with fire extinguishers.

Training:

- As part of the comprehensive Health, Safety and Environmental orientation and training effort, all personnel workers will receive SCP training prior to beginning work.
4.2 Initial Actions

Before responding to any spill, it is important to first STOP and THINK:

- Identify Hazards
- Assess Risks
- Control Risks

There are three basic priorities when responding to a spill:

- Respond Quickly
- Respond Safely
- Full Notification and Reporting

The following initial actions should be taken by the first person(s) who identifies a spill:

1. Be alert, ensure your safety and the safety of others first.
2. For a hydrocarbon spill, isolate, remove or extinguish all ignition sources.
3. Assess the hazard to persons and the environment in the vicinity of the spill or leak, identify escape routes.
4. Report the spill, leak or system failure without delay to the Camp Manager, who will in turn notify the Spill Response Team.
5. Before undertaking a response action proximal to the spill, ensure personnel have and wear the appropriate personal protective equipment (PPE).
6. Block spill drainage paths and, if possible, implement spill response measures at the site and appropriate Control Points.
7. If possible, without further assistance, control any danger to people and the environment.
8. Assess whether the spill, leak or system failure can be readily stopped or brought under control.
9. When safe to do so, stop the leak and/or flow of the spilled material. For an acid spill, ensure the proper PPE is worn and avoid the potential for direct or indirect contact.
10. Gather information on the event and the status of the situation, including the nature, extent and approximate amount of the spill and, if spill is into a waterbody, estimate speed of water flow.
11. Resume any safe, effective action to contain, clean up, or stop the flow of the spilled product. Await the arrival of the Spill Response Team.

4.3 Spill Reporting

The CZN Incident Commander must be notified immediately about the occurrence of any spill. An immediately “reportable” spill is defined as a release of a substance that is likely to be an imminent environmental or human health hazard or meets or exceeds the volumes outlined in Appendix B.
A spill that meets these criteria must be reported to the NWT 24-hour Spill Report Line at 867-920-8130 and the NT-NU Spill Form provided in Appendix A will be completed and emailed to spills@gov.nt.ca.

The Incident Commander will subsequently be responsible for:

- Determining if the spill is reportable as outlined in Appendix B.
- Reporting the spill incident to the NT-NU 24-Hour Spill Report Line (867-920-8130).
- Completing the NT-NU Spill Report Form (Appendix A).
- Notifying CZN management.

**To Report a Spill:**

Fill out the NT-NU Spill Report Form (Appendix A) as completely as possible before calling in the spill report.

Contact the **24-HOUR EMERGENCY SPILL REPORT LINE: 867-920-8130**

Where fax is available, fax the completed NT-NU Spill Report Form to 867-873-6924. Alternatively, if email is available, email the completed NT-NU Spill Report Form to spills@gov.nt.ca

The Incident Commander will also ensure that all other spill reporting (i.e., Monthly Spill Report) is completed and submitted to the applicable inspector. Spills of flammable liquids, such as diesel and gasoline, are reportable if the spilled quantity exceeds 100 L. Spills of waste oil, vehicle fluids and wastewater are reportable if the spilled quantity exceeds 100 L or 100 kg. Spills are also reportable if they are near or into a water body, irrespective of quantity. For more details, consult the reportable quantities presented in Appendix B.

The spill report will be completed in accordance with the Guide to the Spill Contingency Planning and Reporting Regulations issued under the *Environmental Protection Act* (Environment and Natural Resources 2011), and contain the following information:

- Date and time of spill
- Location of spill
- Direction spill is moving
- Name and phone number of a contact person close to the location of the spill
- Type of product spilled and quantity
- Cause of spill
- Whether spill is continuing or has stopped
- Description of product spilled
- Action taken to contain, recover, clean up, and dispose of spilled product
- Name, address and phone number of person reporting the spill
- Name of person in charge of the management and control of the spill incident at the time of the spill.
4.4 Spill Response Actions

4.4.1 General

The potential exists for spills of both petroleum products and/or various chemicals. A spill may be in the form of a liquid as in petroleum products, or in the form of a solid. A dry chemical spill may transform into a liquid chemical spill if it is allowed to gain access to a water body (lake or stream) prior to being contained and successfully cleaned up.

Spills may occur on land, snow, ice or in the water or to a combination of one or more depending on the conditions at the time of spill. Various proven practical methods of containment and recovery are well documented for use in northern climates and are summarized in the following documentation.

The first initial action is to prevent any direct health risk to responding personnel. Persons not directly associated with the clean-up operations are to be directed to leave the immediate area. The area should be isolated and limited to traffic as directed by the response team personnel.

The ability to contain and recover spilled materials is influenced by the spill location, the size and rate of release, transport and terrain conditions. This information needs to be matched against the time needed to deploy response personnel and equipment. The following response elements need to be considered:

- Equipment and support material mobilization time
- Personnel mobilization, transmit and assembly at spill site
- Actual equipment set-up and deployment time.

4.4.2 Containment

The type and size of the containment method chosen will depend on the following factors:

- **Size of spill** - Berms surrounding large spills that cover extensive areas are difficult and time consuming to build. Earth and snow berms may be more easily put into place than sand bag containment. It is also important to build the berm as close to the source as possible to minimize any spreading.

- **Terrain** - Steep or varied terrain can make an effective response difficult, particularly with heavy equipment. Spills will travel faster on steep inclines and require faster response times. Larger, flat areas will require longer berms to contain a spill; however, spills travel much slower allowing additional time frames for the construction of barriers.

- **Soil types** - Loose, coarse or dry soils will allow liquid spills to be absorbed and require additional work to remove contaminated materials. Frozen soils create a natural barrier that aid in clean up. Trenches or berms can be difficult to construct without the use of heavy machinery.

- **Proximity to water** - It is important that every precaution be taken to ensure that spills do not enter a waterway. If there is any possibility of contamination, a stream or river should be protected by diversion of the spill from the watercourse.

- **Weather** - Weather can play an important role in spill response operation, particularly if the ground is frozen (or beginning to thaw). The presence of water (either from rainfall or spring melt) can increase the clean-up requirements. Water will also increase the tendency for the spill to spread and pose a hindrance to the effective clean up. Soluble chemicals are also a concern when water is present as contamination can spread rapidly.

- **Location** - the location that the spill occurs will greatly influence the type of containment measures and the ability to successfully clean up the spill.
- **Daylight** - during the winter daylight is at a minimum. This greatly reduces the ability to assess the spill and provide an adequate response. Insufficient light requires that additional sources be available to affect the cleanup.

- **Temperature** - Air temperatures of the north, with the extremes during the winter, demand attention by response personnel to ensure the safety of the response team. Although the extreme cold can be beneficial to the containment of a spill on land, it can also be detrimental in the efficiency and response time to control and contain the spill.

Table 4-1 summarizes the Spill Response Actions for hydrocarbon spill incidents on Land, on Snow/Ice and on Water.

### Table 4-1: Summary of Spill Response Actions

<table>
<thead>
<tr>
<th>General Actions</th>
<th>On Land</th>
<th>On Snow/Ice</th>
<th>On Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stop source if safe to do so</td>
<td>No Smoking - eliminate ignition sources</td>
<td>No Smoking - eliminate ignition sources</td>
<td>Contain spill as close to release point as possible</td>
</tr>
<tr>
<td>No Smoking - eliminate ignition sources</td>
<td>Block entry into waterways by building a berm or trench</td>
<td>Block entry into waterways and contain with snow berm or other barrier</td>
<td>Use spill containment boom to concentrate slicks for recovery</td>
</tr>
<tr>
<td>Block entry of spills to waterways by building berm or trench</td>
<td>Contain with earth berm or other barrier</td>
<td>Trench or ditch to intercept or contain fuel on snow, where feasible</td>
<td>Use protection (diversionary) booming using sorbent booms to deflect slicks from nearby sensitive areas</td>
</tr>
<tr>
<td>Ground electrical containers when transferring fuel</td>
<td>Capture minor spills with appropriate sorbent pads</td>
<td>Compact the snow around the outside perimeter of the spill area</td>
<td>On small spills, recover using appropriate sorbent pads</td>
</tr>
<tr>
<td>Avoid contact with solvents or other chemicals</td>
<td>Recover large spills with pumps or vacuum equipment</td>
<td>Construct a berm with snow, either manually or with shovels or heavy equipment such as Bobcats and Front-end Loaders as available</td>
<td>Do not use sorbent booms/pads in fast currents and turbulent water</td>
</tr>
<tr>
<td>Plan and request additional cleanup assistance, if required</td>
<td></td>
<td>Contain or collect contaminated snow</td>
<td>Intercept moving slicks in quiet areas using sorbent booms</td>
</tr>
</tbody>
</table>

### 4.4.3 Spills on Land

- Once a spill is identified, all sources of ignition should be turned off (e.g., no smoking, shut off engines).

- Identify the product involved, the source of the leak or spill, and if safe to do so and if readily possible, stop the leak or spill.

- Contain the spill to ensure the potential for the spilled material reaching a body of water is minimized;

- Secure the affected area, ensuring the area is safe for entry and does not represent a threat to human health and safety of the spill responders. Public access of the area should be restricted.

- Deploy spill kits as appropriate and consider a berm or dyke around the spill to contain the liquid product; block drainage paths down-gradient.
• Leaks from a tank may be stopped by utilizing patching kits.

• Spills (on gravel, rock, soil, vegetation) may be contained by building a soil berm down slope of the running or seeping product. Plastic tarps can be placed over the berm and at the foot of it, to permit the spilled product to pool on the tarp for easy capture.

• Absorbent pads can be used for this purpose, and the pads can be squeezed into empty drums and re-used. Larger pools can be pumped back into drums, empty storage tanks, or “TIDY” tanks.

• It is especially important to prevent the liquid product from entering a body of water as potential environmental impacts may be greater. Even if a spill is contained, it is important to collect free product as soon as possible because seepage into a permeable ground surface can occur.

• Stains on rock may be soaked up with absorbent sheeting. The sheeting should be placed in drums for disposal in an approved manner.

• Contaminated soil and vegetation may have to be removed and disposed of in an environmentally acceptable manner.

4.4.4 Spills on Snow

The presence of snow can assist in containing spilled liquid and functions as a natural absorbent to facilitate containment and recovery.

• Containment on snow is readily achieved and is very effective due to its absorbent qualities. Some liquid spills will become immobile within snow and are easily recovered for transport or disposal.

• Snow can be used in construction of berms. Whenever possible, snow should be left in place to avoid contaminating the underlying substrate berm and lined with plastic sheeting.

• A snow berm can be strengthened by spraying it with a fine water mist that forms an ice layer on top of the snow.

• The snow-liquid mixture can be scraped up and stored in a lined area or in drums for subsequent disposal.

4.4.5 Spills on Ice

For spills that occur on ice, from either direct spillage or migration, containment is greatly affected by the strength of the ice. If the spill does not penetrate the ice, and the ice is safe to work on, then the methods of containment are similar to those employed for a spill on land. Where the spill has penetrated the ice, the situation should be handled similar to that on open water.

• Once a spill is identified, all sources of ignition should be turned off (e.g. no smoking, shut off engines).

• Where a spill occurs on ice, snow should be compacted around the edge of the spill to serve as a berm (and lined with plastic sheeting). The ice will limit seepage of fuel into the water, but the contaminated snow/ice must be immediately scraped up.

• For spills on thin ice, in situ burning should be considered but requires regulatory approval (contact the 24-Hour NWT/Nunavut Spill Reporting Line).

• Remaining contaminated snow can be placed in drums or in a lined berm (on land) for subsequent approved disposal.
4.4.6 Spills into Water

It is important to immediately control the release of liquid product spilled into water and to contain it to the immediate spill area if possible. Assuming that product has entered water, actions to be taken can include:

- Deploy boom(s) to contain the spill area or to deflect the liquid product into a backwater area if available for containment/recovery of product. The effectiveness of this action can be limited by winds, currents (in the case of moving water) and other factors.

- Apply absorbent pads and similar materials to capture small product spills on water.

- Absorbent booms can be drawn in slowly to encircle spilled product and absorb it. Absorbent booms are often utilized as a secondary barrier to recover any hydrocarbons that escape containment booms.

- Contaminated material must be subsequently placed in drums or portable tanks for subsequent approved disposal.

- In the event of a larger spill on water, immediately seek the assistance of the response team.

- A skimmer may be deployed once a boom has been secured to capture the spilled product. The skimmer utilizes a mechanism to draw and recover hydrocarbons. It is then pumped through hoses to empty fuel drums or other temporary liquid storage devices.

Spill response personnel will be trained and prepared for open water response situations. The personnel will be prepared and equipped for rapid response given that open water conditions may potentially mean that a spilled liquid product could migrate more quickly than in frozen conditions.

4.5 Spill Delineation and Monitoring

In the event of a large spill or a spill where not all the spilled liquid product can be readily cleaned up with materials on hand (as described above), delineation of the affected area may be required. This could include subsurface investigation of the area (i.e., digging of test pits, soil sampling, installation of monitoring wells) to determine the horizontal and vertical extent of the spill in the soil and groundwater.

For spill-related field monitoring programs that may need to be implemented, samples collected for chemistry and benthic community assemblage assessment would include at least one upstream sample (for reference purposes) and multiple downstream samples. All other endpoints would normally include an upstream and downstream sample only.

The results of such monitoring would assist in the development of an appropriate remediation plan for the affected area. In these cases, qualified environmental consultants would be retained to provide advice on how to proceed with delineation monitoring and remediation of the spill.

4.6 Disposal of Waste from Response Activities

Used absorbent materials from hydrocarbon spill response actions will be incinerated in the Mine incinerator. Plastics are not incinerated and will be taken off-site for approved disposal.

Soil contaminated with hydrocarbons will be temporarily stored in steel drums. The contaminated material may then be transferred to a lined-cell for bioremediation. The material may be relatively heterogeneous and may include gravel and rock. This material would not be included in samples to verify completion of remediation and would remain on site and be incorporated into a Waste Rock Pile.
Soil contaminated with metals would be stored and could potentially be subsequently processed through the Mill, provided the soil does not contain any material that could interfere with the Mill process. Representative samples would be tested to verify the appropriate remedial approach. Target treatment concentrations would be the CCME Soil Quality Guidelines for the Protection of Environmental and Human Health, Residential/Parkland.

Water contaminated with hydrocarbons will be processed through an activated carbon vessel at the Mine. Water contaminated with metals can be treated in the Mine Water Treatment Plant.

### 4.7 Restoration of Affected Areas

Following initial spill response and containment, the approach to final cleanup and restoration of the affected area will be discussed and a plan developed in consultation with the applicable inspector prior to implementation.

Where necessary, site-specific studies may be undertaken to ensure appropriate cleanup objectives are met and a site-specific approach for soil replacement and revegetation is implemented.
5.0 RESOURCE INVENTORY

5.1 On-Site Resources

Spill kit contents are listed in Table 5-1.

| 1-48” x 48” x 1/16” Neoprene Pad (Drain Stop) |
| Plug N Dike Granular, 1-gal U.S. (3.8 litres) |
| Splash Protection Goggles |
| 2-PVC Oil Resistant Gloves |
| 1 Pkg. Polyethylene Disposable Bags (5 mil), 10 per Package |
| 1 Shovel (Spark Proof) |
| 1 Case T-12 3’x12’ Mini Boom, 4 Booms/Case |
| 1 Bale 11P 256 17” x 19” x 1/2” Pads, 100 Pads / Bail |

Equipment such as backhoes, dozers, crane trucks, dump trucks, vacuum trucks etc. would also be available as needed.

5.2 Off-Site Resources

CZN will endeavour to contract a bulk fuel service company located in the region, preferably close to the haul route, which has an established mobile spill response unit that would be available 24 hours a day. The company would assist CZN in its response to any large bulk fuel spill. This service company may also provide training on spill containment and cleanup to CZN employees and contractors, but this and all other items would be defined in the contract.

Additional resources and assistance will be drawn from the following sources:

Esso Bulk Fuels Agency (Fort Simpson) 867-695-2351
Environmental Protection Section, Environment Division, GNWT 867-873-7654
CIRNAC (Fort Simpson) Resource Management Officer 867-695-2626
Contaminants Phone Hot Line 800-661-0827
RCMP (Yellowknife) 867-920-8311
RCMP (Fort Simpson) 867-695-3111
Fire Dept. (Fort Simpson) 867-695-2222
Fire Dept. (Fort Liard) 867-770-2222
Ambulance (Fort Nelson) 250-774-2344
Hospital (Fort Nelson) 250-774-8100
Hospital (Fort Simpson) 867-695-7000
Hospital (Fort Simpson after hours) 867-695-3232
Fixed Wing (VILLERS Fort Nelson) 250-774-2072
Fixed Wing (WOLVERINE Fort Simpson) 867-695-2263
Helicopters (CANADIAN, Fort Nelson) 250-774-6171
(GREAT SLAVE HELI, Yellowknife) 867-873-2081

For large or more complicated spills, Esso Bulk Fuels can be contacted – they have a spill response team available for deployment. This could be facilitated by aircraft.
6.0 TRAINING AND EXERCISES

6.1 Training

All members of the Spill Response Team will be trained and familiarized with the spill response resources, including their location and access, this SCP and appropriate spill response methodologies and reporting.

Training for Spill Response Team members will be up to and including large Level 3 events. Fuel handling crews will be trained in the safe operation of these facilities, spill prevention techniques and initial spill response actions.

A typical training session will include review of the components of the SCP including:

- Action plan
- Initial actions and spill reporting procedures
- Individuals’ roles and responsibilities regarding spill prevention, detection, response and clean-up
- Location(s) of hard copies of the SCP, maps and spill kits
- Equipment available for spill response
- Content of spill kits and response trailers
- Spill response and clean-up strategies and techniques.

6.2 Spill Response Exercises

Response training will include spill response exercises where attendees will take appropriate actions and deploy suitable equipment and materials to combat a specifically designed, realistic, spill scenario. The simulated spill will involve a test medium which poses no environmental hazard but behaves like those requiring a response if spilled.

Spill exercises will be undertaken in summer (initial training) and winter (final training) conditions, and at locations representing the range of environmental conditions that exist. Popcorn, puffed wheat or a heavier inert substance will be used to simulate the “spill”.

The training sessions and exercises will be held prior to the start of each season or operations year as part of a Worker Orientation Seminar. This will ensure all returning individuals receive a refresher while any new individuals become familiar with on-site spill prevention and response measures.

CZN will retain records of all individuals who attend the training session and exercises, as well as copies of their training certificates (e.g., first aid, WHIMS).

6.3 Adaptive Management

Adaptive Management is a systematic, rigorous approach designed to link environmental monitoring to management actions. The results and lessons learned from spill incidents that may occur and response/cleanup efforts undertaken will be applied to all spill incident and response efforts through the life of the Project.
## NT-NU SPILL REPORT FORM

**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 Details

<table>
<thead>
<tr>
<th>A</th>
<th>Report Date:</th>
<th>Report Time:</th>
<th>Report Number:</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Occurrence Date:</td>
<td>Occurrence Time:</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Land Use Permit Number (if applicable):</td>
<td>Water Licence Number (if applicable):</td>
<td></td>
</tr>
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</table>

### Geographic Details

<table>
<thead>
<tr>
<th>D</th>
<th>Geographic Place Name or Distance and Direction from the Named Location:</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Latitude:</td>
</tr>
<tr>
<td></td>
<td>Degrees</td>
</tr>
</tbody>
</table>

### Spill Details

<table>
<thead>
<tr>
<th>F</th>
<th>Responsible Party or Vessel Name:</th>
<th>Responsible Party Address or Office Location:</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>Any Contractor Involved:</td>
<td>Contractor Address or Office Location:</td>
</tr>
<tr>
<td>H</td>
<td>Product Spilled:</td>
<td>Quantity in Litres, Kilograms or Cubic Metres:</td>
</tr>
<tr>
<td>I</td>
<td>Spill Source:</td>
<td>Spill Cause:</td>
</tr>
<tr>
<td>J</td>
<td>Factors Affecting Spill or Recovery:</td>
<td>Describe Any Assistance Required:</td>
</tr>
</tbody>
</table>

### Additional Information

Additional Information, Comments, Actions Proposed or Taken to Contain, Recover or Dispose of Spilled Product and Contaminated Materials:

### Contact Details

<table>
<thead>
<tr>
<th>L</th>
<th>Reported to Spill Line by:</th>
<th>Position:</th>
<th>Employer:</th>
<th>Location Calling From:</th>
<th>Telephone:</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>Any Alternate Contact:</td>
<td>Position:</td>
<td>Employer:</td>
<td>Alternate Contact Location:</td>
<td>Alternate Telephone:</td>
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</tbody>
</table>

**REPORT LINE USE ONLY**

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<thead>
<tr>
<th>N</th>
<th>Received at Spill Line by:</th>
<th>Position:</th>
<th>Employer:</th>
<th>Location Called:</th>
<th>Report Line Number:</th>
</tr>
</thead>
<tbody>
<tr>
<td>O</td>
<td>Lead Agency:</td>
<td>EC</td>
<td>COG/TCMSS</td>
<td>GNWT</td>
<td>GN</td>
</tr>
<tr>
<td></td>
<td>Significance:</td>
<td>Minor</td>
<td>Major</td>
<td>Unknown</td>
<td></td>
</tr>
<tr>
<td></td>
<td>File Status:</td>
<td>Open</td>
<td>Closed</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Agency:</td>
<td>Contact Name:</td>
<td>Contact Time:</td>
<td>Remarks:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lead Agency:</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>First Support Agency:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Second Support Agency:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Third Support Agency:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### IMMEDIATE REPORTABLE SPILL QUANTITIES

<table>
<thead>
<tr>
<th>TDG Class</th>
<th>Substance for NWT 24 Hour Spill Line</th>
<th>Immediately Reportable Quantities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Explosives</td>
<td>Any amount</td>
</tr>
<tr>
<td>2.3</td>
<td>Compressed gas (toxic)</td>
<td></td>
</tr>
<tr>
<td>2.4</td>
<td>Compressed gas (corrosive)</td>
<td></td>
</tr>
<tr>
<td>6.2</td>
<td>Infectious substances</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Radioactive</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>Unknown substance</td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>Compressed gas (flammable)</td>
<td>Any amount of gas from containers</td>
</tr>
<tr>
<td>2.2</td>
<td>Compressed gas (non-corrosive, non-flammable)</td>
<td>with a capacity greater than 100 L</td>
</tr>
<tr>
<td>3.1</td>
<td>Flammable liquids</td>
<td>&gt; 100 L</td>
</tr>
<tr>
<td>3.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1</td>
<td>Flammable solids</td>
<td>&gt; 25 kg</td>
</tr>
<tr>
<td>4.2</td>
<td>Spontaneously combustible solids</td>
<td></td>
</tr>
<tr>
<td>4.3</td>
<td>Water reactant</td>
<td></td>
</tr>
<tr>
<td>5.1</td>
<td>Oxidizing substances</td>
<td>&gt; 50 L or 50 kg</td>
</tr>
<tr>
<td>9.1</td>
<td>Miscellaneous products or substances excluding PCB mixtures</td>
<td></td>
</tr>
<tr>
<td>5.2</td>
<td>Organic peroxides</td>
<td>&gt; 1 L or 1 kg</td>
</tr>
<tr>
<td>9.2</td>
<td>Environmentally hazardous</td>
<td></td>
</tr>
<tr>
<td>6.1</td>
<td>Poisonous substances</td>
<td>&gt; 5 L or 5 kg</td>
</tr>
<tr>
<td>8</td>
<td>Corrosive substances</td>
<td></td>
</tr>
<tr>
<td>9.3</td>
<td>Dangerous wastes</td>
<td></td>
</tr>
<tr>
<td>9.1</td>
<td>PCB mixtures of 5 or more ppm</td>
<td>&gt; 0.5 L or 0.5 kg</td>
</tr>
<tr>
<td>None</td>
<td>Other contaminants (e.g. crude oil, drilling fluid, produced water, waste or spent chemicals, used or waste oil, vehicle fluids, waste water, etc.)</td>
<td>&gt; 100 L or 100 kg</td>
</tr>
<tr>
<td>None</td>
<td>Sour natural gas (i.e. contains H2S) Sweet natural gas</td>
<td>Uncontrolled release or sustained flow of 10 minutes or more</td>
</tr>
</tbody>
</table>

In addition, all releases of harmful substances, regardless of quantity, are to be reported to the NWT spill line if the release is near or into a water body, is near or into a designated sensitive environment or sensitive wildlife habitat, poses imminent threat to human health or safety, poses imminent threat to a listed species at risk or its critical habitat, or is uncontrollable.
SAFETY DATA SHEETS

**Hydrocarbons**

1. Arctic Fuel – Diesel P-50 (ULSDF)
2. Gasoline Mid-Grade
3. Jet Fuel – Aviation Turbine Fuel
4. Ethylene Glycol

**Reagents/Products**

5. Ammonium Nitrate
6. Ferric Sulphate
7. Sodium Sulphide
### SECTION 1 – PRODUCT IDENTIFICATION AND USE

<table>
<thead>
<tr>
<th>Product name</th>
<th>Arctic Diesel Fuel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical name</td>
<td>None</td>
</tr>
<tr>
<td>Common names and Product use</td>
<td>Diesel fuel No. 1, Fuel oil #1-D</td>
</tr>
<tr>
<td>WHMIS classification</td>
<td>Combustible liquid</td>
</tr>
<tr>
<td>Hazard codes</td>
<td>NFPA Flammability 2</td>
</tr>
<tr>
<td>Shipping name</td>
<td>Diesel Fuel</td>
</tr>
</tbody>
</table>

#### WHMIS classification

- **Class B Division 3**: Toxic, Combustible liquid
- **Class D Division 2 Subdivision B**: Health, Flammable

**Hazard codes**

- **NFPA**
  - Flammability: 2
  - Health: 2
  - Reactivity: 0
- **HMIS**
  - Health: 2
  - Flammability: 2
  - Reactivity: 0

**Supplier**

Irving Oil Limited, Refining Division
Box 1260, Saint John
New Brunswick Canada E2L 4H6

**Phone** (506) 202-2000
**Emergency** 1-800-424-9300
**Refinery** (506) 202-3000

### SECTION 2 – HAZARDOUS INGREDIENTS

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel fuel no. 1</td>
<td>68334-30-5</td>
<td>100</td>
<td>200 mg/m³ TWA</td>
<td>NAv for this product name or</td>
<td>100 mg/m³ TWA</td>
<td>&gt;5 g/kg</td>
<td>~5 g/m³</td>
</tr>
<tr>
<td>May contain: Benzene</td>
<td>71-43-2</td>
<td>Trace</td>
<td>0.5 ppm TWA 2.5 ppm STEL</td>
<td>1 ppm TWA 5 ppm STEL</td>
<td>0.1 ppm TWA 1.0 ppm STEL</td>
<td>930 mg/kg</td>
<td>13,200 ppm</td>
</tr>
</tbody>
</table>

**May also contain:**

- **Sulphur** (H₂S) 7704-34-9 Trace NAv NAv NAv >8.4 mg/kg NAv 444 ppm

**Arctic diesel is a complex mixture of hydrocarbons. Its exact composition depends on the source of the crude oil from which it was produced and the refining methods used. Arctic diesel contains hundreds of individual organic chemicals. This section identifies only some of the well-known chemical constituents.**

### SECTION 3 – PHYSICAL DATA

| Form | Liquid |
| Colour | Colourless to pale yellow |
| Odour | Kerosene-like |
| Odour | Not available |
| Specific gravity | 0.81 @ 15°C |
| Vapour density | 4.5 |
| Vapour | 10.5 mm Hg @ 38°C |
| Evaporation rate | NAv |
| Boiling point | 157 to 261°C (315 to 501°F) |
| Freezing point | -53°F |
| pH | NAv |
| Coefficient of water/oil | 3.3 to >6(Log P<sub>oct</sub>) |

### SECTION 4 – FIRE AND EXPLOSION HAZARDS

- **Flash point**: 40°C (104°F) (cc)
- **Auto ignition**: 210°C (410°F)
- **Lower flammable limit**: 0.7%
- **Upper flammable limit**: 5%

**Explosion data:**

- **Sensitivity**: Not expected to be sensitive
- **Mechanical impact**: Not expected to be sensitive
- **Static discharge**: Yes

**Means of extinction:**

In general, do not extinguish fire unless flow can be stopped. Use carbon dioxide, dry chemical, or foam. Cool containers with flooding quantities of water until well after the fire is out. Vapour is heavier than air. It will spread along the ground and collect in low or confined areas (sewers, basements, tanks). Vapour may travel to source of ignition and flash back. Containers may explode when heated.

**Hazardous combustion products:**

MATERIAL SAFETY DATA SHEET

Product Name: Arctic Diesel Fuel (3090)

SECTION 5 – REACTIVITY INFORMATION

Stability
Stable

Conditions to avoid
Sources of ignition. Static discharges. High temperatures.

Incompatible substances
Oxidizers such as peroxides, nitric acid, and perchlorates.

Hazardous decomposition products
Carbon monoxide. Nitrogen oxides. Aromatic hydrocarbons. H₂S and sulphur dioxide (SO₂) may be produced from minor amounts of sulphur in the product.

SECTION 6 – HEALTH HAZARD INFORMATION

Route of Entry

<table>
<thead>
<tr>
<th>Eye</th>
<th>Skin absorption</th>
<th>Inhalation</th>
<th>Ingestion</th>
</tr>
</thead>
</table>

Hazardous Contact

<table>
<thead>
<tr>
<th>Eye</th>
<th>Skin contact</th>
</tr>
</thead>
</table>

Acute exposure
Headache and other symptoms of central nervous system (CNS) depression, such as nausea and dizziness, as well as burning sensation in chest following inhalation. Aspiration into the lungs can cause severe pneumonitis (serious lung irritation), chest pain, and/or pulmonary edema (swelling). Inhalation may produce nausea, vomiting, and cramping.

Note: H₂S may offgas from the product in confined spaces such as the headspace in tanks, even though the concentration of sulphur in the product is minimal. H₂S is very toxic. At concentrations as low as 1 to 5 ppm, nausea and severe eye irritation may occur. Sense of smell may be impaired at about 20 ppm, with headache and respiratory tract lung irritation. At 250 to 500 ppm, potentially fatal pulmonary edema (fluid in the lungs) may occur. Dizziness, sudden (often fatal) collapse, unconsciousness, and death occur at higher concentrations. Pulmonary edema may be delayed as long as 48 hours.

Chronic exposure
Dermatitis. Possibly blood and nervous system disorders. Fatigue, and severe nervous and respiratory system symptoms may follow survival of H₂S poisoning.

Carcinogenicity
Benzene is known to be carcinogenic. Exposure to fuel oils during refining is considered “probably carcinogenic to humans”.

IARC and NTP classify untreated and mildly treated mineral oils as known human carcinogens. ACGIH, EPA, NIOSH, and OSHA have not classified them.

Mutagenicity
Not known to be mutagenic

Sensitization
No

Irritancy
Skin, respiratory

Teratogenicity
NAv

Reproductive toxicity
NAv

Toxicologically synergistic
Other CNS depressants can be expected to produce additive or synergistic effects. May increase photosensitizing ability of certain chemicals, such as dinitrochlorobenzene (DNCB).

SECTION 7 – FIRST AID

Inhalation
Move victim to fresh air. Give artificial respiration if breathing has stopped and if a qualified AR administrator is available. Apply CPR if both pulse and breathing have stopped. Obtain medical attention immediately.

Ingestion
Never give anything by mouth if the person is unconscious, rapidly losing consciousness, or convulsing. If the person is conscious, have them drink 8 to 10 ounces of water or milk to dilute the material in the stomach. Do not induce vomiting. If vomiting occurs spontaneously, have the person lean forward to avoid aspiration. Obtain medical attention immediately.

Eye
If irritation occurs, flush eye with lukewarm, gently flowing fresh water for at least 10 minutes.

Skin
Quickly and gently blot away excess chemical. Gently remove contaminated clothing and shoes under running water. Wash gently and thoroughly with water and non-abrasive soap. Obtain medical assistance.

SECTION 8 – PRECAUTIONARY MEASURES

Do not attempt rescue of an H₂S knockdown victim without the use of proper respiratory protective equipment.

Personal protective equipment

- Gloves: Nitrile, Viton™, polyethylene preferred.
- Goggles: Chemical safety goggle or face shield, as a good general safety practice. NIOSH-approved. SCBA or air line respirator with escape cylinder for confined spaces or work with sulphur-containing product. A qualified occupational health and safety professional should advise on respirator selection. If an air-purifying respirator is appropriate, use organic vapour covers to prevent skin contact with product. If clothing or footwear becomes contaminated with product, completely decontaminate it before re-use, or discard it.
- Respiratory equipment: NIOSH-approved. SCBA or air line respirator with escape cylinder for confined spaces or work with sulphur-containing product. A qualified occupational health and safety professional should advise on respirator selection. If an air-purifying respirator is appropriate, use organic vapour covers to prevent skin contact with product. If clothing or footwear becomes contaminated with product, completely decontaminate it before re-use, or discard it.

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Engineering controls
Enclose processes. Use local exhaust ventilation to remove vapour at its site of generation. Handle laboratory samples in a fume hood. Use mechanical ventilation in confined spaces.

Handling procedures & equipment
Avoid heating open containers of product so as to minimize vapour production and accumulation. Use non-sparking equipment, explosion-proof ventilation, and intrinsically safe electrical equipment. Ground handling equipment. Have clean emergency eyewash and shower readily available in the work area.

Leak & spill procedure
Keep unauthorized persons away. Eliminate all sources of ignition. Ventilate area. Stop leak if it can be done safely. Prevent entry into sewers, waterways, or confined spaces. Absorb or cover with dry earth, sand or other non-combustible material and use clean, non-sparking tools to transfer to container. Consult local authorities for advice.

Waste disposal
Consult local authorities for advice.

Storage
Cool, dry, well-ventilated area. No ignition sources. Containers should be vented and have flame stable during transport. May be transported hot.

Shipping
Stable during transport. May be transported hot.

SECTION 9 – PREPARATION DATE OF MSDS

Prepared by
Irving Oil Limited, Refining Division

Revision date
July 26, 2005

Phone
(506) 202-3000

To re-order MSDS,
(506) 202-2000

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SECTION 1. IDENTIFICATION

Product name: GASOLINE, UNLEADED

Synonyms: Regular, Unleaded Gasoline (US Grade), Mid-Grade, Plus, Super, WinterGas, SummerGas, Supreme, SuperClean, SuperClean WinterGas, RegularClean, PlusClean, Premium, marked or dyed gasoline, TQRUL, transitional quality regular unleaded, BOB, Blendstock for Oxygenate Blending, Conventional Gasoline, RUL, MUL, SUL, PUL.

Product code: 100127, 100126, 101823, 100507, 101811, 101814, 100141, 101813, 101810, 101812, 100063, 101822, 100138, 101821, 100064, 101820, 101819, 100506, 101818, 101816, 101817, 100488

Manufacturer or supplier’s details

Petro-Canada
P.O. Box 2844, 150 - 6th Avenue South-West
Calgary Alberta T2P 3E3
Canada

Emergency telephone number

Suncor Energy: +1 403-296-3000;
Canutec Transportation: 1-888-226-8832 (toll-free) or 613-996-6666;
Poison Control Centre: Consult local telephone directory for emergency number(s).

Recommended use of the chemical and restrictions on use

Recommended use: 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.

Prepared by: Product Safety: +1 905-804-4752

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Clear liquid.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour</td>
<td>Clear to slightly yellow or green, undyed liquid. May be dyed red for taxation purposes.</td>
</tr>
<tr>
<td>Odour</td>
<td>Gasoline</td>
</tr>
</tbody>
</table>

GHS Classification

Flammable liquids: Category 1

Skin irritation: Category 2
Germ cell mutagenicity: Category 1B
Carcinogenicity: Category 1A
Reproductive toxicity: Category 2
Specific target organ toxicity - single exposure: Category 3 (Central nervous system)
Specific target organ toxicity - repeated exposure: Category 1
Aspiration hazard: Category 1

GHS label elements
Hazard pictograms:

Signal word: Danger
Hazard statements: Extremely flammable liquid and vapour.
May be fatal if swallowed and enters airways.
Causes skin irritation.
May cause drowsiness or dizziness.
May cause genetic defects.
May cause cancer.
Suspected of damaging the unborn child.
Causes damage to organs () through prolonged or repeated exposure.

Precautionary statements: Prevention:
Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat/sparks/open flames/hot surfaces. No smoking.
Keep container tightly closed.
Ground/bond container and receiving equipment.
Use explosion-proof electrical/ventilating/lighting/equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Do not breathe dust/fume/gas/mist/vapours/spray.
Wash skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/protective clothing/eye protection/face protection.

Response:
IF SWALLOWED: Immediately call a POISON CENTER/doctor.
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
IF INHALED: Remove person to fresh air and keep comfortable.
for breathing. Call a POISON CENTER/doctor if you feel unwell. IF exposed or concerned: Get medical advice/attention. Do NOT induce vomiting. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse. In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.

**Storage:**

**Disposal:**
Dispose of contents/container to an approved waste disposal plant.

---

**Potential Health Effects**

**Primary Routes of Entry**
- Eye contact
- Ingestion
- Inhalation
- Skin contact

**Target Organs**
- Blood
- Immune system

**Inhalation**
- Inhalation may cause central nervous system effects. Symptoms and signs include headache, dizziness, fatigue, muscular weakness, drowsiness and in extreme cases, loss of consciousness.

**Skin**
- Causes skin irritation.

**Eyes**
- May irritate eyes.

**Ingestion**
- Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea. Aspiration hazard if swallowed - can enter lungs and cause damage.

**Chronic Exposure**
- Chronic exposure to benzene may result in increased risk of leukemia and other blood disorders.

**Aggravated Medical Condition**
- None known.

**Other hazards**
- None known.

**IARC**
- Group 1: Carcinogenic to humans
- Benzene 71-43-2

**OSHA**
- OSHA specifically regulated carcinogen
- Benzene 71-43-2
NTP Known to be human carcinogen
Benzene 71-43-2

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS-No.</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>gasoline, natural</td>
<td>8006-61-9</td>
<td>95 - 100 %</td>
</tr>
<tr>
<td>toluene</td>
<td>108-88-3</td>
<td>1 - 40 %</td>
</tr>
<tr>
<td>benzene</td>
<td>71-43-2</td>
<td>0.5 - 1.5 %</td>
</tr>
<tr>
<td>ethanol</td>
<td>64-17-5</td>
<td>0.1 - 0.3 %</td>
</tr>
</tbody>
</table>

SECTION 4. FIRST AID MEASURES

If inhaled : Artificial respiration and/or oxygen may be necessary.
Move to fresh air.
Seek medical advice.

In case of skin contact : In case of contact, immediately flush skin with plenty of water
for at least 15 minutes while removing contaminated clothing
and shoes.
Wash skin thoroughly with soap and water or use recognized
skin cleanser.
Wash clothing before reuse.
Seek medical advice.

In case of eye contact : Remove contact lenses.
Rinse immediately with plenty of water, also under the eyelids,
for at least 15 minutes.
Obtain medical attention.

If swallowed : Rinse mouth with water.
DO NOT induce vomiting unless directed to do so by a physi-
cian or poison control center.
Never give anything by mouth to an unconscious person.
Seek medical advice.

Most important symptoms and effects, both acute and delayed : None known.

Protection of first-aiders : First Aid responders should pay attention to self-protection
and use the recommended protective clothing
It may be dangerous to the person providing aid to give
mouth-to-mouth resuscitation.
SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media : Dry chemical
Carbon dioxide (CO2)
Water fog.
Foam

Unsuitable extinguishing media : Do NOT use water jet.

Specific hazards during firefighting : Cool closed containers exposed to fire with water spray.

Hazardous combustion products : Carbon oxides (CO, CO2), nitrogen oxides (NOx), polynuclear aromatic hydrocarbons, phenols, aldehydes, ketones, smoke and irritating vapours as products of incomplete combustion.

Further information : Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures : Use personal protective equipment.
Ensure adequate ventilation.
Evacuate personnel to safe areas.
Material can create slippery conditions.

Environmental precautions : If the product contaminates rivers and lakes or drains inform respective authorities.

Methods and materials for containment and cleaning up : Prevent further leakage or spillage if safe to do so.
Remove all sources of ignition.
Soak up with inert absorbent material.
Non-sparking tools should be used.
Ensure adequate ventilation.
Contact the proper local authorities.

SECTION 7. HANDLING AND STORAGE

Advice on safe handling : For personal protection see section 8.
Smoking, eating and drinking should be prohibited in the application area.
Use only with adequate ventilation.
In case of insufficient ventilation, wear suitable respiratory equipment.
Avoid spark promoters. Ground/bond container and equipment. These alone may be insufficient to remove static electricity.
Avoid contact with skin, eyes and clothing.
Do not ingest.
Keep away from heat and sources of ignition.
Keep container closed when not in use.
Conditions for safe storage:
- Store in original container.
- Containers which are opened must be carefully resealed and kept upright to prevent leakage.
- Keep in a dry, cool and well-ventilated place.
- Keep in properly labelled containers.
- To maintain product quality, do not store in heat or direct sunlight.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Value type (Form of exposure)</th>
<th>Control parameters / Permissible concentration</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>gasoline, natural</td>
<td>8006-61-9</td>
<td>TWA 300 ppm 900 mg/m³</td>
<td>OSHA P0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>STEL 500 ppm 1,500 mg/m³</td>
<td>OSHA P0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA 500 ppm 2,000 mg/m³</td>
<td>OSHA Z-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>STEL 500 ppm 1,500 mg/m³</td>
<td>CAL PEL</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PEL 300 ppm 900 mg/m³</td>
<td>CAL PEL</td>
<td></td>
</tr>
<tr>
<td>toluene</td>
<td>108-88-3</td>
<td>TWA 20 ppm</td>
<td>ACGIH</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>STEL 150 ppm 560 mg/m³</td>
<td>NIOSH REL</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA 200 ppm</td>
<td>NIOSH REL</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>CEIL 300 ppm</td>
<td>OSHA Z-2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Peak 500 ppm (10 minutes)</td>
<td>OSHA Z-2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>STEL 150 ppm 560 mg/m³</td>
<td>OSHA P0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PEL 10 ppm 37 mg/m³</td>
<td>CAL PEL</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ST 500 ppm</td>
<td>CAL PEL</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>STEL 150 ppm 560 mg/m³</td>
<td>CAL PEL</td>
<td></td>
</tr>
<tr>
<td>benzene</td>
<td>71-43-2</td>
<td>TWA 0.5 ppm</td>
<td>ACGIH</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>STEL 2.5 ppm</td>
<td>ACGIH</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA 0.1 ppm</td>
<td>NIOSH REL</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ST 1 ppm</td>
<td>NIOSH REL</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA 10 ppm</td>
<td>OSHA Z-2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>CEIL 25 ppm</td>
<td>OSHA Z-2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Peak 50 ppm (10 minutes)</td>
<td>OSHA Z-2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PEL 1 ppm</td>
<td>OSHA CARC</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>STEL 5 ppm</td>
<td>OSHA CARC</td>
<td></td>
</tr>
</tbody>
</table>
## Biological occupational exposure limits

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Control parameters</th>
<th>Biological specimen</th>
<th>Sampling time</th>
<th>Permissible concentration</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toluene</td>
<td>108-88-3</td>
<td>Toluene</td>
<td>In blood</td>
<td>Prior to last shift of work-week</td>
<td>0.02 mg/l</td>
<td>ACGIH BEI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Toluene</td>
<td>Urine</td>
<td>End of shift (As soon as possible after exposure ceases)</td>
<td>0.03 mg/l</td>
<td>ACGIH BEI</td>
</tr>
</tbody>
</table>

### Engineering measures
- Use only in well-ventilated areas.
- Ensure that eyewash station and safety shower are proximal to the work-station location.

### Personal protective equipment

**Respiratory protection**
- Use respiratory protection unless adequate local exhaust ventilation is provided or exposure assessment demonstrates that exposures are within recommended exposure guidelines. 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.

**Filter type**
- 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.

**Hand protection**
- Material: polyvinyl alcohol (PVA), Viton(R). 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,
Remarks : 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.

Eye protection : Wear face-shield and protective suit for abnormal processing problems.

Skin and body protection : Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place.

Protective measures : Wash contaminated clothing before re-use.

Hygiene measures : Remove and wash contaminated clothing and gloves, including the inside, before re-use. Wash face, hands and any exposed skin thoroughly after handling.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Clear liquid.

Colour : Clear to slightly yellow or green, undyed liquid. May be dyed red for taxation purposes.

Odour : Gasoline

Odour Threshold : No data available

pH : No data available

Pour point : No data available

Boiling point/boiling range : 25 - 225 °C (77 - 437 °F)

Flash point : -50 - -38 °C (-58 - -36 °F)

Method: Tagliabue.

Auto-Ignition Temperature : 257 °C (495 °F)

Evaporation rate : No data available

Flammability : Extremely flammable in presence of open flames, sparks, shocks, 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.

Upper explosion limit : 7.6 % (V)
Lower explosion limit: 1.3 %(V)

Vapour pressure: < 802.5 mmHg (20 °C / 68 °F)

Relative vapour density: 3

Relative density: 0.685 - 0.8

Solubility(ies)
Water solubility: insoluble

Partition coefficient: n-octanol/water: No data available

Viscosity

Explosive properties: Do not pressurise, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Containers may explode in heat of fire. Vapours may form explosive mixtures with air.

SECTION 10. STABILITY AND REACTIVITY

Possibility of hazardous reactions: Hazardous polymerisation does not occur. Stable under normal conditions.

Conditions to avoid: Extremes of temperature and direct sunlight.

Incompatible materials: Reactive with oxidising agents, acids and interhalogens.

Hazardous decomposition products: May release COx, NOx, phenols, polycyclic aromatic hydrocarbons, aldehydes, ketones, smoke and irritating vapours when heated to decomposition.

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure
Eye contact
Ingestion
Inhalation
Skin contact

Acute toxicity

Product:
Acute oral toxicity: Remarks: No data available
Acute inhalation toxicity: Remarks: No data available
Acute dermal toxicity: Remarks: No data available
Components:

toluene:
Acute oral toxicity : LD50 (Rat): 5,580 mg/kg,
Acute inhalation toxicity : LC50 (Rat): 7585 ppm
  Exposure time: 4 h
  Test atmosphere: dust/mist
Acute dermal toxicity : LD50 (Rabbit): 12,125 mg/kg,

benzene:
Acute oral toxicity : LD50 (Rat): 2,990 mg/kg,
Acute inhalation toxicity : LC50 (Rat): 13700 ppm
  Exposure time: 4 h
  Test atmosphere: dust/mist
Acute dermal toxicity : LD50 (Rabbit): > 8,240 mg/kg,

ethanol:
Acute oral toxicity : LD50 (Rat): 7,060 mg/kg,
Acute inhalation toxicity : LC50 (Rat): > 32380 ppm
  Exposure time: 4 h
  Test atmosphere: vapour

Skin corrosion/irritation

Product:
Remarks: No data available

Serious eye damage/eye irritation

Product:
Remarks: No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
No data available

Reproductive toxicity
No data available

STOT - single exposure
No data available
STOT - repeated exposure
No data available

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Product:
Toxicity to fish : Remarks: No data available
Toxicity to daphnia and other aquatic invertebrates : Remarks: No data available
Toxicity to algae : Remarks: No data available
Toxicity to bacteria : Remarks: No data available

Persistence and degradability

Product:
Biodegradability : Remarks: No data available

Bioaccumulative potential
No data available

Mobility in soil
No data available

Other adverse effects
No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods
Waste from residues : The product should not be allowed to enter drains, water courses or the soil.
Offer surplus and non-recyclable solutions to a licensed disposal company.
Waste must be classified and labelled prior to recycling or disposal.
Send to a licensed waste management company.
Dispose of as hazardous waste in compliance with local and national regulations.
Dispose of product residue in accordance with the instructions of the person responsible for waste disposal.

Contaminated packaging : Do not re-use empty containers.
SECTION 14. TRANSPORT INFORMATION

International Regulations

**IATA-DGR**
- UN/ID No.: UN 1203
- Proper shipping name: Gasoline
- Class: 3
- Packing group: II
- Labels: Class 3 - Flammable Liquid
- Packing instruction (cargo aircraft): 364

**IMDG-Code**
- UN number: UN 1203
- Proper shipping name: GASOLINE
- Class: 3
- Packing group: II
- Labels: 3
- EmS Code: F-E, S-E
- Marine pollutant: no

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

National Regulations

**49 CFR**
- UN/ID/NA number: UN 1203
- Proper shipping name: Gasoline
- Class: 3
- Packing group: II
- Labels: Class 3 - Flammable Liquid
- ERG Code: 128
- Marine pollutant: no

SECTION 15. REGULATORY INFORMATION

The components of this product are reported in the following inventories:

**DSL**
On the inventory, or in compliance with the inventory

**TSCA**
All chemical substances in this product are either listed on the TSCA Inventory or are in compliance with a TSCA Inventory exemption.

**EINECS**
On the inventory, or in compliance with the inventory
SECTION 16. OTHER INFORMATION

Further information

NFPA:

<table>
<thead>
<tr>
<th>Health</th>
<th>Flammability</th>
<th>Physical Hazard</th>
<th>Instability</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Special hazard.

HMIS III:

- **HEALTH**: 3*
- **FLAMMABILITY**: 3
- **PHYSICAL HAZARD**: 0
- **PERSONAL PROTECTION**: H

0 = not significant, 1 = Slight, 2 = Moderate, 3 = High, 4 = Extreme, * = Chronic

For Copy of SDS

- Internet: www.petro-canada.ca/msds
- Canada-wide: telephone: 1-800-668-0220; fax: 1-800-837-1228
- For Product Safety Information: 1 905-804-4752

Prepared by: Product Safety: +1 905-804-4752

Revision Date: 2017/04/20

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.
SAFETY DATA SHEET

JET A/A-1 AVIATION TURBINE FUEL

SECTION 1. IDENTIFICATION

Product name: JET A/A-1 AVIATION TURBINE FUEL

Synonyms: Jet A-1; Jet A-1-DI; Aviation Turbine Kerosene (ATK); JP-8; NATO F-34; Jet F-34; Aviation Turbine Fuel, Kerosene Type (CAN/CGSB 3.23 & CAN/CGSB 3.24)

Product code: 101851, 100123

Manufacturer or supplier's details
Petro-Canada
P.O. Box 2844, 150 - 6th Avenue South-West
Calgary Alberta T2P 3E3
Canada

Emergency telephone number
Suncor Energy: +1 403-296-3000;
Poison Control Centre: Consult local telephone directory for emergency number(s).

Recommended use of the chemical and restrictions on use
Recommended use: Used as aviation turbine fuel. May contain a fuel system icing inhibitor. In the arctic, Jet A-1 may also be used as diesel fuel (if it contains a lubricity additive) and heating oil.

Prepared by: Product Safety: +1 905-804-4752

SECTION 2. HAZARDS IDENTIFICATION

Appearance: Clear liquid.

Colour: Clear and colourless

Odour: Kerosene-like.

GHS Classification
- Flammable liquids: Category 3
- Skin irritation: Category 2
- Reproductive toxicity: Category 2
- Specific target organ toxicity - single exposure: Category 3 (Central nervous system)
- Aspiration hazard: Category 1
GHS label elements
Hazard pictograms:
- Flammable liquid and vapour
- May be fatal if swallowed and enters airways
- Causes skin irritation
- May cause drowsiness or dizziness
- Suspected of damaging fertility or the unborn child

Signal word: Danger

Hazard statements:

Precautionary statements:
Prevention:
- Obtain special instructions before use.
- Do not handle until all safety precautions have been read and understood.
- Keep away from heat/sparks/open flames/hot surfaces. No smoking.
- Keep container tightly closed.
- Ground/bond container and receiving equipment.
- Use explosion-proof electrical/ventilating/lighting/equipment.
- Use only non-sparking tools.
- Take precautionary measures against static discharge.
- Avoid breathing dust/fume/gas/mist/vapours/spray.
- Wash skin thoroughly after handling.
- Use only outdoors or in a well-ventilated area.
- Wear protective gloves/eye protection/face protection.
- Use personal protective equipment as required.

Response:
IF SWALLOWED: Immediately call a POISON CENTER/doctor.
IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/shower.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell.
IF exposed or concerned: Get medical advice/attention.
Do NOT induce vomiting.
If skin irritation occurs: Get medical advice/attention.
Take off contaminated clothing and wash before reuse.
In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.

Storage:
Store in a well-ventilated place. Keep container tightly closed.
Store in a well-ventilated place. Keep cool.
Store locked up.

Disposal:
Dispose of contents/container to an approved waste disposal plant.

Potential Health Effects
Primary Routes of Entry:
- Eye contact
- Ingestion
- Inhalation
Inhalation may cause central nervous system effects. Symptoms and signs include headache, dizziness, fatigue, muscular weakness, drowsiness and in extreme cases, loss of consciousness.

Skin: May irritate skin.

Eyes: May irritate eyes.

Ingestion: Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea. Aspiration hazard if swallowed - can enter lungs and cause damage.

Aggravated Medical Condition: None known.

Other hazards
None known.

IARC
No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

OSHA
No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

NTP
No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture: Mixture

Hazardous components

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS-No.</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>kerosine (petroleum)</td>
<td>8008-20-6</td>
<td>90 - 100 %</td>
</tr>
<tr>
<td>2-(2-methoxyethoxy)ethanol</td>
<td>111-77-3</td>
<td>0 - 0.2 %</td>
</tr>
</tbody>
</table>

SECTION 4. FIRST AID MEASURES

If inhaled: Move to fresh air. Artificial respiration and/or oxygen may be necessary. Seek medical advice.

In case of skin contact: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing.
and shoes. Wash skin thoroughly with soap and water or use recognized skin cleanser. Wash clothing before reuse. Seek medical advice.

In case of eye contact: Remove contact lenses. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

If swallowed: Rinse mouth with water. DO NOT induce vomiting unless directed to do so by a physician or poison control center. Never give anything by mouth to an unconscious person. Seek medical advice.

Most important symptoms and effects, both acute and delayed: First aider needs to protect himself.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media: Dry chemical Carbon dioxide (CO2) Water fog Foam

Unsuitable extinguishing media: Do NOT use water jet.

Specific hazards during firefighting: Cool closed containers exposed to fire with water spray.

Hazardous combustion products: Carbon oxides (CO, CO2), nitrogen oxides (NOx), sulphur oxides (SOx), smoke and irritating vapours as products of incomplete combustion.

Further information: Prevent fire extinguishing water from contaminating surface water or the ground water system.

Special protective equipment for firefighters: Wear self-contained breathing apparatus for firefighting if necessary.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures: Use personal protective equipment. Ensure adequate ventilation. Evacuate personnel to safe areas. Material can create slippery conditions.

Environmental precautions: If the product contaminates rivers and lakes or drains inform respective authorities.
Methods and materials for containment and cleaning up:
- Prevent further leakage or spillage if safe to do so.
- Remove all sources of ignition.
- Soak up with inert absorbent material.
- Non-sparking tools should be used.
- Ensure adequate ventilation.
- Contact the proper local authorities.

SECTION 7. HANDLING AND STORAGE

Advice on safe handling:
- For personal protection see section 8.
- Smoking, eating and drinking should be prohibited in the application area.
- Use only with adequate ventilation.
- In case of insufficient ventilation, wear suitable respiratory equipment.
- Avoid spark promoters. Ground/bond container and equipment. These alone may be insufficient to remove static electricity.
- Avoid contact with skin, eyes and clothing.
- Do not ingest.
- Keep away from heat and sources of ignition.
- Keep container closed when not in use.

Conditions for safe storage:
- Store in original container.
- Containers which are opened must be carefully resealed and kept upright to prevent leakage.
- Keep in a dry, cool and well-ventilated place.
- Keep in properly labelled containers.
- To maintain product quality, do not store in heat or direct sunlight.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Value type (Form of exposure)</th>
<th>Control parameters / Permissible concentration</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>kerosine (petroleum)</td>
<td>8008-20-6</td>
<td>TWA</td>
<td>100 mg/m³</td>
<td>NIOSH REL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA</td>
<td>500 ppm</td>
<td>OSHA Z-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA</td>
<td>2,000 mg/m³</td>
<td>OSHA Z-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA</td>
<td>200 mg/m³ (total hydrocarbon vapor)</td>
<td>ACGIH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA</td>
<td>400 ppm</td>
<td>OSHA P0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA</td>
<td>1,600 mg/m³</td>
<td>OSHA P0</td>
</tr>
</tbody>
</table>

Engineering measures:
- Use only in well-ventilated areas.
- Ensure that eyewash station and safety shower are proximal to the work-station location.

Personal protective equipment
Respiratory protection : Use respiratory protection unless adequate local exhaust ventilation is provided or exposure assessment demonstrates that exposures are within recommended exposure guidelines. 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.

Filter type : 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.

Hand protection Material : polyvinyl alcohol (PVA), Viton(R). 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.

Remarks : 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.

Eye protection : Wear face-shield and protective suit for abnormal processing problems.

Skin and body protection : Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place.

Protective measures : Wash contaminated clothing before re-use.

Hygiene measures : Remove and wash contaminated clothing and gloves, including the inside, before re-use. Wash face, hands and any exposed skin thoroughly after handling.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Clear liquid.

Colour : Clear and colourless

Odour : Kerosene-like.

Odour Threshold : No data available
**SECTION 10. STABILITY AND REACTIVITY**

**Possibility of hazardous reactions**
- Hazardous polymerisation does not occur. Stable under normal conditions.

**Conditions to avoid**
- Extremes of temperature and direct sunlight.
### SECTION 11. TOXICOLOGICAL INFORMATION

#### Information on likely routes of exposure

- **Eye contact**
  - No data available

- **Ingestion**
  - No data available

- **Inhalation**

- **Skin contact**

#### Acute toxicity

**Product:**

- **Acute oral toxicity**
  - Remarks: No data available

- **Acute inhalation toxicity**
  - Remarks: No data available

- **Acute dermal toxicity**
  - Remarks: No data available

**Components:**

- **kerosine (petroleum):**
  - **Acute oral toxicity**
    - LD50 (Rat): > 5,000 mg/kg,
  - **Acute inhalation toxicity**
    - LC50 (Rat): > 5 mg/l
    - Exposure time: 4 h
    - Test atmosphere: dust/mist
  - **Acute dermal toxicity**
    - LD50 (Rabbit): > 2,000 mg/kg,

**Skin corrosion/irritation**

**Product:**

- Remarks: No data available

**Serious eye damage/eye irritation**

**Product:**

- Remarks: No data available

**Respiratory or skin sensitisation**

- No data available

**Germ cell mutagenicity**

- No data available

**Carcinogenicity**

- No data available
Reproductive toxicity
No data available

STOT - single exposure
No data available

STOT - repeated exposure
No data available

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Product:
Toxicity to fish: Remarks: No data available
Toxicity to daphnia and other aquatic invertebrates: Remarks: No data available
Toxicity to algae: Remarks: No data available
Toxicity to bacteria: Remarks: No data available

Persistence and degradability

Product:
Biodegradability: Remarks: No data available

Bioaccumulative potential
No data available

Mobility in soil
No data available

Other adverse effects
No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods
Waste from residues: The product should not be allowed to enter drains, water courses or the soil.
Offer surplus and non-recyclable solutions to a licensed disposal company.
Waste must be classified and labelled prior to recycling or disposal.
Send to a licensed waste management company.
Dispose of product residue in accordance with the instructions of the person responsible for waste disposal.

Contaminated packaging : Do not re-use empty containers.

SECTION 14. TRANSPORT INFORMATION

International Regulations

IATA-DGR
UN/ID No. : UN 1863
Proper shipping name : Fuel, aviation, turbine engine
Class : 3
Packing group : III
Labels : Class 3 - Flammable Liquid
Packing instruction (cargo aircraft) : 366

IMDG-Code
UN number : UN 1863
Proper shipping name : FUEL, AVIATION, TURBINE ENGINE
Class : 3
Packing group : III
Labels : 3
EmS Code : F-E, S-E
Marine pollutant : no

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

National Regulations

49 CFR
UN/ID/NA number : UN 1863
Proper shipping name : Fuel, aviation, turbine engine
Class : 3
Packing group : III
Labels : Class 3 - Flammable Liquid
ERG Code : 128
Marine pollutant : no

SECTION 15. REGULATORY INFORMATION

The components of this product are reported in the following inventories:

DSL
On the inventory, or in compliance with the inventory

TSCA
All chemical substances in this product are either listed on the TSCA Inventory or are in compliance with a TSCA Inventory exemption.

EINECS
On the inventory, or in compliance with the inventory
SECTION 16. OTHER INFORMATION

Further information

NFPA:

Flammability

Health

Instability

Special hazard.

HMIS III:

HEALTH 2*

FLAMMABILITY 2

PHYSICAL HAZARD 0

PERSONAL PROTECTION H

0 = not significant, 1 = Slight, 2 = Moderate, 3 = High, 4 = Extreme, * = Chronic

For Copy of (M)SDS: Internet: www.petro-canada.ca/msds
Canada-wide: telephone: 1-800-668-0220; fax: 1-800-837-1228
For Product Safety Information: 1 905-804-4752

Prepared by: Product Safety: +1 905-804-4752
Revision Date: 2016/07/20

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.
SAFETY DATA SHEET

SECTION 1. IDENTIFICATION

Product identifier used on the label: Ethylene Glycol
Product Code(s): Not available.
Recommended use of the chemical and restrictions on use:
- Antifreeze; Plasticiser; Solvent
  Use pattern: Professional Use Only
  Restriction on use: None known
Chemical family: Glycols.
Name, address, and telephone number of the supplier:
Comet Chemical Company Ltd.
3463 Thomas Street
Innisfill, ON, Canada
L9S 3W4
Supplier's Telephone #: 705-436-5580
Name, address, and telephone number of the manufacturer:
Refer to supplier
Name, address, and telephone number of the supplier:
Comet Chemical Company Ltd.
3463 Thomas Street
Innisfill, ON, Canada
L9S 3W4
Supplier's Telephone #: 705-436-5580
24 Hr. Emergency Tel #: TERRRAPURE ENVIRONMENTAL : 800-567-7455

SECTION 2. HAZARDS IDENTIFICATION

Classification of the chemical
Clear colourless liquid. Odorless.
This material is classified as hazardous under U.S. OSHA regulations (29CFR 1910.1200) (Hazcom 2012) and Canadian WHMIS regulations (Hazardous Products Regulations) (WHMIS 2015).
Hazard classification:
- Acute toxicity, oral - Category 4
- Reproductive toxicity- Category 2
- Specific target organ toxicity, single exposure - Category 2 (kidneys)
- Specific Target Organ Toxicity, Single Exposure - Category 3 (cns)

Label elements

Hazard pictogram(s)

Signal Word
Warning!

Hazard statement(s)
- Harmful if swallowed.
- Suspected of damaging the unborn child.
- May cause damage to the kidneys if swallowed.
- May cause drowsiness or dizziness.
SAFETY DATA SHEET

Precautionary statement(s)

Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Wash hands thoroughly after handling.
Do not eat, drink or smoke when using this product.
Use only outdoors or in a well-ventilated area.
Do not breathe mist or vapor.
Wear protective gloves/clothing and eye/face protection.
If exposed or concerned: Call a POISON CENTER or doctor/physician.

IF SWALLOWED: Call a POISON CENTRE or doctor/physician if you feel unwell.
Rinse mouth.
If inhaled: Remove person to fresh air and keep comfortable for breathing.
Call a POISON CENTER or doctor/physician if you feel unwell.

Store locked up.
Store in a well-ventilated place. Keep container tightly closed.

Dispose of contents/container in accordance with local/regional/national/international regulations.

Other hazards

Other hazards which do not result in classification:
May cause eye, skin and respiratory tract irritation.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Pure substance

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Common name and synonyms</th>
<th>CAS #</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethylene glycol</td>
<td>1,2-Ethandiol 1,2-Dihydroxyethane EG</td>
<td>107-21-1</td>
<td>100.00</td>
</tr>
</tbody>
</table>

SECTION 4. FIRST-AID MEASURES

Description of first aid measures

Ingestion: Call a physician or poison control centre immediately. Induce vomiting ONLY under the direct supervision of qualified medical personnel or a poison control centre. Never give anything by mouth to an unconscious person.

Inhalation: Immediately remove person to fresh air. If breathing has stopped, give artificial respiration. Get medical attention.

Skin contact: Immediately flush with plenty of water, while removing contaminated clothing. If irritation persists, seek prompt medical attention. Launder clothing before reuse.

Eye contact: Immediately flush eye(s) with plenty of water. After initial flushing, remove any contact lenses if worn, and continue flushing for at least 5 to 10 minutes. If irritation persists, seek prompt medical attention.

Most important symptoms and effects, both acute and delayed:

- Harmful if swallowed. May cause damage to the kidneys if swallowed. May cause drowsiness or dizziness. Symptoms may include pain, headache, nausea, vomiting, dizziness, drowsiness and other central nervous system effects. May cause slight eye and skin irritation. Symptoms include: Redness, swelling, itching and dryness. Suspected of damaging the unborn child.

Indication of any immediate medical attention and special treatment needed:

- Immediate medical attention is required. May be harmful or fatal if swallowed. Use of ethanol may be helpful to counter the toxic effects of ethylene glycol by interfering with the absorption rate in the stomach and intestine. Onset of symptoms may be delayed for 18 to 24 hours after ingestion. Symptoms may be delayed.
SECTION 5. FIRE-FIGHTING MEASURES

Extinguishing media

Suitable extinguishing media

Use media suitable to the surrounding fire such as water fog or fine spray, alcohol foams, carbon dioxide and dry chemical.

Unsuitable extinguishing media

Do not use a solid water stream as it may scatter and spread fire.

Special hazards arising from the substance or mixture / Conditions of flammability

Burning produces obnoxious and toxic fumes.

Flammability classification (OSHA 29 CFR 1910.106)

Not flammable.

Hazardous combustion products

Carbon oxides, formaldehyde and other irritating fumes and smoke.

Special protective equipment and precautions for firefighters

Protective equipment for fire-fighters

Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

Special fire-fighting procedures

Firefighters should wear proper protective equipment and self-contained breathing apparatus with full face piece operated in positive pressure mode. Move containers from fire area if safe to do so. Water spray may be useful in cooling equipment exposed to heat and flame.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Restrict access to area until completion of clean-up. Ensure clean-up is conducted by trained personnel only. All persons dealing with clean-up should wear the appropriate protective equipment including self-contained breathing apparatus. Refer to Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION, for additional information on acceptable personal protective equipment.

Environmental precautions

Ensure spilled product does not enter drains, sewers, waterways, or confined spaces. If necessary, dike well ahead of the spill to prevent runoff into drains, sewers, or any natural waterway or drinking supply.

Methods and material for containment and cleaning up

Ventilate the area. Stop spill or leak at source if safely possible. Dike for water control. Contain and absorb spilled liquid with non-combustible, inert absorbent material (e.g. sand), then place absorbent material into a container for later disposal (see Section 13).

Special spill response procedures

If a spill/release in excess of the EPA reportable quantity is made into the environment, immediately notify the national response center in the United States (phone: 1-800-424-8802). US CERCLA Reportable quantity (RQ): Ethylene glycol (5000 lbs / 2270 kg).

SECTION 7. HANDLING AND STORAGE

Precautions for safe handling
SAFETY DATA SHEET

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. This material is a harmful liquid. Wear protective gloves/clothing and eye/face protection. Refer to Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION, for additional information on acceptable personal protective equipment. Use with adequate ventilation. Do not ingest. Do not breathe mist or vapor. Avoid contact with eyes, skin and clothing. Wash with soap and water after handling. Keep away from extreme heat and flame. Keep away from acids and other incompatibles. Use caution when opening cap. Keep containers tightly closed when not in use. Empty containers retain residue (liquid and/or vapour) and can be dangerous.

Conditions for safe storage: Store in a cool, dry, well-ventilated area. Store away from areas of excessive heat, open flames, sparks, and other possible sources of ignition. Keep away from incompatibles. Storage area should be clearly identified, clear of obstruction and accessible only to trained and authorized personnel. Inspect periodically for damage or leaks.

Incompatible materials: Alkalies; Strong oxidizing agents; Strong acids.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TWA</td>
<td>STEL</td>
</tr>
<tr>
<td>Ethylene glycol</td>
<td>100 mg/m³ (aerosol) (Ceiling)</td>
<td>N/Av</td>
</tr>
</tbody>
</table>

Exposure controls

Ventilation and engineering measures: Use sufficient mechanical ventilation to maintain exposures below the TLV. Use local exhaust if mist or spray is generated.

Respiratory protection: Respiratory protection is required if the concentrations exceed the TLV. NIOSH-approved respirators are recommended. Seek advice from respiratory protection specialists. Respirators should be selected based on the form and concentration of contaminants in air, and in accordance with OSHA (29 CFR 1910.134) or CSA Z94.4-02.

Skin protection: Wear impervious gloves, such as butyl rubber. Advice should be sought from glove suppliers.

Eye / face protection: Chemical goggles are recommended when there is a potential for splashing.

Other protective equipment: Emergency showers and eyewash facilities should be nearby. Wear a chemically resistant apron and long sleeves when dispensing, to prevent skin contact.

General hygiene considerations: Do not breathe mist or vapor. Avoid contact with eyes, skin and clothing. When using do not eat or drink. When using do not smoke. Upon completion of work, wash hands before eating, drinking, smoking or use of toilet facilities. Remove soiled clothing and wash it thoroughly before reuse.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Clear, colourless liquid.</td>
</tr>
<tr>
<td>Odour</td>
<td>Little or no odour.</td>
</tr>
<tr>
<td>Odour threshold</td>
<td>N/Av</td>
</tr>
<tr>
<td>pH</td>
<td>N/Av</td>
</tr>
<tr>
<td>Melting/Freezing point</td>
<td>- 13°C (8.6°F)</td>
</tr>
<tr>
<td>Initial boiling point and boiling range</td>
<td>198°C (388°F)</td>
</tr>
</tbody>
</table>
SAFETY DATA SHEET

Flash point : 111°C (232°F)
Flashpoint (Method) : closed cup
Evaporation rate (BuAe = 1) : N/Av
Flammability (solid, gas) : Not applicable.
Lower flammable limit (% by vol.) : 3.2%
Upper flammable limit (% by vol.) : 15.0%
Oxidizing properties : None known.
Explosive properties : Not explosive
Vapour pressure : 0.05
Vapour density : 2.1
Relative density / Specific gravity : 1.12
Solubility in water : Complete
Other solubility(ies) : Soluble in most organic solvents.
Partition coefficient: n-octanol/water or Coefficient of water/oil distribution : -1.36
Auto-ignition temperature : 398°C (748°F)
Decomposition temperature : Not available.
Viscosity : 21 cp @ 20°C (68°F)
Volatiles (% by weight) : No information available.
Volatile organic Compounds (VOC's) : N/Av
Absolute pressure of container : N/Ap
Flame projection length : N/Ap
Other physical/chemical comments : Molecular Weight: :: 62.07
Molecular formula: C2-H6-O2

SECTION 10. STABILITY AND REACTIVITY
Reactivity : Not normally reactive.
Chemical stability : Stable under normal conditions.
Possibility of hazardous reactions : No dangerous reaction known under conditions of normal use.
Conditions to avoid : Avoid excessive heat, sparks and open flame. Do not use in areas without adequate ventilation. Avoid contact with incompatible materials.
Incompatible materials : Alkalies ;Strong oxidizing agents;Strong acids.
Hazardous decomposition products : None known, refer to hazardous combustion products in Section 5.

SECTION 11. TOXICOLOGICAL INFORMATION
Information on likely routes of exposure:
Routes of entry inhalation : YES
Routes of entry skin & eye : YES
Routes of entry Ingestion : YES
Routes of exposure skin absorption : YES
SAFETY DATA SHEET

Potential Health Effects:

Signs and symptoms of short-term (acute) exposure

Sign and symptoms Inhalation

If mists are inhaled, may cause tearing, general anesthesia, headache, coughing, respiratory stimulation, nausea, vomiting, pulmonary, kidney and liver damage.

Sign and symptoms ingestion

Harmful or fatal if swallowed. Human poison by ingestion (lethal dose of Ethylene glycol for humans reported to be 100 mL). Symptoms may include pain, headache, nausea, vomiting, dizziness, drowsiness and other central nervous system effects. Initially, the central nervous system is stimulated, followed by depression. Could cause cyanosis (bluish discoloration of the skin due to deficient oxygenation of the blood). May potentially result in lethal kidney damage. Could also cause convulsions, coma, respiratory arrest and death.

Sign and symptoms skin

May cause mild skin irritation. Product may be absorbed and cause symptoms similar to those listed for ingestion.

Sign and symptoms eyes

May cause mild eye irritation. Symptoms may include inflammation and tearing.

Potential Chronic Health Effects

Mutagenicity

Not expected to be mutagenic.

Carcinogenicity

No components are listed as carcinogens by ACGIH, IARC, OSHA or NTP.

Reproductive effects & Teratogenicity

This material is classified as hazardous under U.S. OSHA regulations (29CFR 1910.1200) (Hazcom 2012) and Canadian WHMIS regulations (Hazardous Products Regulations) (WHMIS 2015). Classification:

Reproductive toxicity -Category 2
Suspected of damaging the unborn child.

Sensitization to material

Not expected to be a skin or respiratory sensitizer.

Specific target organ effects

Eyes, skin, respiratory system, central nervous system, liver and kidneys.

This material is classified as hazardous under U.S. OSHA regulations (29CFR 1910.1200) (Hazcom 2012) and Canadian WHMIS regulations (Hazardous Products Regulations) (WHMIS 2015). Classification:

Specific target organ toxicity, single exposure -Category 2
Specific Target Organ Toxicity, Single Exposure - Category 3 (cns)
May cause damage to the kidneys if swallowed.
May cause drowsiness or dizziness.

Medical conditions aggravated by overexposure

Pre-existing skin or eye disorders, and impaired liver or kidney functions.

Synergistic materials

Not available.

Toxicological data

See below for toxicological data on the substance.

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>LC50(4hr)</th>
<th>LD50</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>inh, rat</td>
<td>(Oral, rat)</td>
</tr>
<tr>
<td>Ethylene glycol</td>
<td>4300 ppm (10.92 mg/L (aerosol)</td>
<td>4000 mg/kg (rat)</td>
</tr>
</tbody>
</table>

Other important toxicological hazards

CNS depression may result from extreme exposures.
## SAFETY DATA SHEET

### SECTION 12. ECOLOGICAL INFORMATION

#### Ecotoxicity

See the following tables for individual ingredient ecotoxicity data.

**Ecotoxicity data:**

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>CAS No</th>
<th>Toxicity to Fish</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>LC50 / 96h</td>
</tr>
<tr>
<td>Ethylene glycol</td>
<td>107-21-1</td>
<td>22 810 mg/L (Rainbow trout)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>CAS No</th>
<th>Toxicity to Daphnia</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>EC50 / 48h</td>
</tr>
<tr>
<td>Ethylene glycol</td>
<td>107-21-1</td>
<td>49 000 mg/L (Daphnia magna)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>CAS No</th>
<th>Toxicity to Algae</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>EC50 / 96h or 72h</td>
</tr>
<tr>
<td>Ethylene glycol</td>
<td>107-21-1</td>
<td>6500 - 13 000 mg/L/96hr (Green algae)</td>
</tr>
</tbody>
</table>

**Persistence and degradability:**

Ethylene glycol is considered to be readily biodegradable.

**Bioaccumulation potential:**

No data is available on the product itself.

<table>
<thead>
<tr>
<th>Components</th>
<th>Partition coefficient n-octanol/ater (log Kow)</th>
<th>Bioconcentration factor (BCF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethylene glycol (CAS 107-21-1)</td>
<td>- 1.36</td>
<td>10</td>
</tr>
</tbody>
</table>

**Mobility in soil:**

No data is available on the product itself.

**Other Adverse Environmental effects:**

No data is available on the product itself.

### SECTION 13. DISPOSAL CONSIDERATIONS

**Handling for Disposal:**

Handle waste according to recommendations in Section 7.

**Methods of Disposal:**

Dispose in accordance with all applicable federal, state, provincial and local regulations. Contact your local, state, provincial or federal environmental agency for specific rules.

**RCRA:**

If this product, as supplied, becomes a waste in the United States, it may meet the criteria of a hazardous waste as defined under RCRA, Title 40 CFR 261. It is the responsibility of the waste generator to determine the proper waste identification and disposal method. For disposal of unused or waste material, check with local, state and federal environmental agencies.

### SECTION 14. TRANSPORTATION INFORMATION
SAFETY DATA SHEET

Regulatory Information | UN Number | UN proper shipping name | Transport hazard class(es) | Packing Group | Label
---|---|---|---|---|---
49CFR/DOT | None | Not regulated. | Not regulated | none | 
49CFR/DOT | None | Not regulated. | Not regulated | none | 

Additional information

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Environmental hazards

See ECOLOGICAL INFORMATION, Section 12.

Special precautions for user

None known or reported by the manufacturer.

Additional information

None.

SECTION 15 - REGULATORY INFORMATION

US Federal Information:

Components listed below are present on the following U.S. Federal chemical lists:

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>CAS #</th>
<th>TSCA Inventory</th>
<th>CERCLA Reportable Quantity(RQ) (40 CFR 117.302):</th>
<th>SARA TITLE III: Sec. 302, Extremely Hazardous Substance, 40 CFR 355:</th>
<th>SARA TITLE III: Sec. 313, 40 CFR 372, Specific Toxic Chemical Toxic Chemical de minimus Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethylene glycol</td>
<td>107-21-1</td>
<td>Yes</td>
<td>5000 lb/ 2270 kg</td>
<td>None.</td>
<td>Yes</td>
</tr>
</tbody>
</table>

SARA TITLE III: Sec. 311 and 312, SDS Requirements, 40 CFR 370 Hazard Classes: Immediate (Acute) health hazard; Chronic health hazard. Under SARA Sections 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are 500 pounds for the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

US State Right to Know Laws:

The following chemicals are specifically listed by individual States:

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>CAS #</th>
<th>California Proposition 65 Listed</th>
<th>Type of Toxicity</th>
<th>State &quot;Right to Know&quot; Lists</th>
<th>CA</th>
<th>MA</th>
<th>MN</th>
<th>NJ</th>
<th>PA</th>
<th>RI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethylene glycol</td>
<td>107-21-1</td>
<td>No</td>
<td>N/Ap</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Canadian Information:

WHMIS Classification: Refer to Section 2 for a WHMIS Classification for this product.

All ingredients are present on the DSL.
Ethylene Glycol

SDS Preparation Date (mm/dd/yyyy): 08/20/2015

SAFETY DATA SHEET

International Information:
Components listed below are present on the following International Inventory list:

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>CAS #</th>
<th>European EINECs</th>
<th>Australia AICS</th>
<th>Philippines PICCS</th>
<th>Japan ENCS</th>
<th>Korea KECI/KECL</th>
<th>China IECSC</th>
<th>NewZealand IOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethylene glycol</td>
<td>107-21-1</td>
<td>203-473-3</td>
<td>Present</td>
<td>Present</td>
<td>(2)-230</td>
<td>KE-13169</td>
<td>Present</td>
<td>HSR001534</td>
</tr>
</tbody>
</table>

SECTION 16. OTHER INFORMATION

Legend

ACGIH: American Conference of Governmental Industrial Hygienists
CA: California
CAS: Chemical Abstract Services
CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR: Code of Federal Regulations
CNS: Central Nervous System
COC: Cleveland Open Cup
CSA: Canadian Standards Association
DOT: Department of Transportation
EPA: Environmental Protection Agency
HMIS: Hazardous Materials Identification System
HSDB: Hazardous Substances Data Bank
IARC: International Agency for Research on Cancer
Inh: Inhalation
LC: Lethal Concentration
LD: Lethal Dose
MA: Massachusetts
MN: Minnesota
N/Ap: Not Applicable
N/Av: Not Available
NFPA: National Fire Protection Association
NIOSH: National Institute of Occupational Safety and Health
NJ: New Jersey
NTP: National Toxicology Program
OSHA: Occupational Safety and Health Administration
PA: Pennsylvania
PEL: Permissible exposure limit
RCRA: Resource Conservation and Recovery Act
RI: Rhode Island
RTECS: Registry of Toxic Effects of Chemical Substances
SARA: Superfund Amendments and Reauthorization Act
STEL: Short Term Exposure Limit
TLV: Threshold Limit Values
TWA: Time Weighted Average
WHMIS: Workplace Hazardous Materials Identification System

References:
Canadian Centre for Occupational Health and Safety, CCInfoWeb Databases, 2015 (Chempendium, RTECS, HSDB, INCHEM).
European Chemicals Agency, Classification Legislation, 2015
Material Safety Data Sheet from manufacturer.

Preparation Date (mm/dd/yyyy): 08/20/2015

Other special considerations for handling:
Provide adequate information, instruction and training for operators.
SAFETY DATA SHEET

HMIS Rating

<table>
<thead>
<tr>
<th>Health</th>
<th>Chronict Hazard</th>
<th>Minimal</th>
<th>Slight</th>
<th>Moderate</th>
<th>Serious</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>★</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NFPA Rating

<table>
<thead>
<tr>
<th>Health</th>
<th>Flammability</th>
<th>Instability</th>
<th>Special Hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>None</td>
</tr>
</tbody>
</table>

Prepared for:
Comet Chemical Company Ltd.
3463 Thomas Street
Innisfill, ON L9S 3W4
Information (M-F 8:00-5:00): 705-436-5580
www.cometchemical.com

Prepared by:
ICC The Compliance Center Inc.
Telephone: (888) 442-9628 (U.S.); (888) 977-4834 (Canada)
http://www.thecompliancecenter.com

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This Safety Data Sheet may not be changed, or altered in any way without the expressed knowledge and permission of ICC The Compliance Center Inc and Comet Chemical Company Ltd.

END OF DOCUMENT
SAFETY DATA SHEET
Ammonium Nitrate, Mini-Prill

Section 1. Identification

Product identifier : Ammonium Nitrate, Mini-Prill
Other means of identification : Product code: 2499-12958
Product type : Solid.

Relevant identified uses of the substance or mixture and uses advised against

<table>
<thead>
<tr>
<th>Identified uses</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial use for the formulation of preparations, intermediate use, and end use in industrial settings. Professional use in formulation of preparations and end-use.</td>
<td></td>
</tr>
<tr>
<td>Consumer use. Restricted to professional users.</td>
<td>U.S. and Canadian Federal regulations</td>
</tr>
</tbody>
</table>

Supplier's details : Agrium Wholesale
13131 Lake Fraser Drive, S.E.
Calgary, Alberta, Canada, T2J 7E8

Agrium U.S. Inc.
Suite 1700, 4582 South Ulster St.
Denver, Colorado, U.S.A., 80237

Company phone number (North America): 1-800-403-2861 (Customer Service)

Emergency telephone number (with hours of operation) : Agrium 24 Hr Emergency Telephone Numbers:
English:
Transportation Emergencies: 1-800-792-8311
Medical Emergencies: 1-303-389-1653

French or Spanish:
Transportation or Medical Emergencies: 1-303-389-1654

Section 2. Hazard identification

Classification of the substance or mixture : OXIDIZING SOLIDS - Category 3
EYE IRRITATION - Category 2A

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

GHS label elements

Hazard pictograms :

Signal word : Warning

Hazard statements : May intensify fire; oxidizer. Causes serious eye irritation.

Precautionary statements

General : Not applicable.
Prevention : Wear protective gloves. Wear eye or face protection. Wear protective clothing. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Keep away from clothing and other combustible materials. Wash hands thoroughly after handling.
Section 2. Hazard identification

**Response**

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

**Storage**

Not applicable.

**Disposal**

Dispose of contents and container in accordance with all local, regional, national and international regulations.

**Supplemental label elements**

None known.

**Other hazards which do not result in classification**

Explosion risk in case of fire. Risk of explosion if heated under confinement. Risk of vigorous reaction, ignition and explosion in contact with combustible or flammable substances.

Section 3. Composition/information on ingredients

**Substance/mixture**

Multi-constituent substance

<table>
<thead>
<tr>
<th>Ingredient name</th>
<th>% (w/w)</th>
<th>CAS number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium nitrate</td>
<td>99.5</td>
<td>6484-52-2</td>
</tr>
</tbody>
</table>

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First-aid measures

**Eye contact**

Begin eye irrigation immediately. Eye exposures to nitrates may require medical evaluation following decontamination if pain or irritation persists. Immediately rinse eyes with large quantities of water or saline for a minimum of 15 minutes. If possible, remove contact lenses being careful not to cause additional eye damage. If the initial water supply is insufficient, keep the affected area wet with a moist cloth and transfer the person to the nearest place where rinsing can be continued for the recommended length of time. For additional advice call the medical emergency number on this SDS or your poison center or doctor.

**Inhalation**

Remove person to fresh air. No known significant effects. Seek medical attention for any signs of wheezing and/or breathing difficulties. For additional advice call the medical emergency number on this SDS or your poison center or medical provider.

**Skin contact**

No known significant effects. Rinse the affected areas with water. Remove contaminated clothing, jewelry, and shoes. Wash/clean items before reuse. Seek medical attention for persistent skin pain or irritation. For additional advice call the medical emergency number on this SDS or your poison center or doctor.

**Ingestion**

Ammonium nitrate-based fertilizer. May be irritating to mouth, throat and stomach. May cause methemoglobinemia (a condition that interferes with the oxygen-carrying capacity of the blood) if ingested in large quantities or over a prolonged period of time. Oral exposures: if the affected person requires CPR, avoid mouth to mouth contact. Do not induce vomiting. If vomiting occurs, attempt to keep head lower than chest so that vomit does not enter the lungs. Wash (decontaminate) face and mouth with water to remove visible material. If the exposed person is conscious and can swallow, give 1-2 sips of water. Do not give anything else by mouth. Loosen tight clothing such as collar, tie, belt or waistband to prevent any breathing restrictions. Call for emergency transportation to a hospital if the exposed person feels sick or has breathing difficulties, or a large amount is suspected ingested. For additional advice, call the medical emergency number on this SDS or your poison center or doctor.

**Most important symptoms/effects, acute and delayed**

**Potential acute health effects**

**Eye contact**

Causes serious eye irritation.
Section 4. First-aid measures

Inhalation: No known significant effects or critical hazards. Persons with asthma may be more sensitive.

Skin contact: No known significant effects or critical hazards.

Ingestion: May be irritating to the digestive tract. May cause nausea, vomiting, diarrhea, and abdominal pain. May cause methemoglobinemia (a condition that interferes with the oxygen-carrying capacity of the blood) if ingested in large quantities or over a prolonged period of time. Persons with methemoglobinemia may have blue tinge color to lips, nails, and skin. Also they may have shortness of breath or trouble breathing. Persons more susceptible to methemoglobinemia include: very young (less than 3 months), the elderly, those with chronic obstructive pulmonary disease (COPD), anemia, coronary artery disease, recent surgery or infection, and those with a genetic deficiency of G-6-PD.

Over-exposure signs/symptoms

Eye contact: Adverse symptoms may include the following: pain or irritation, watering, redness.

Inhalation: The substance will not burn. Undergoes thermal decomposition at elevated temperatures to release toxic and flammable gases. Decomposition products may include the following materials: Ammonia, nitrogen oxides.

Adverse symptoms may include the following: headache, respiratory tract irritation, coughing.

Skin contact: No specific data is available about overexposure under normal working conditions.

Ingestion: Over-exposure by ingestion is unlikely under normal working conditions. Adverse symptoms may include the following: nausea or vomiting, stomach pains, diarrhea. Methemoglobinemia (see Acute Health Effects)

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician: In case of inhalation of decomposition products (carbon monoxide, carbon dioxide, nitrogen oxides) in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for up to 72 hours. In cases of suspected methemoglobinemia, monitor methemoglobin blood levels. Treatment is supportive; methylene blue may be indicated based on patient severity. 24 Hr Medical Emergency telephone number for professional support: English: 1-303-389-1653; French or Spanish: 1-303-389-1654.

Specific treatments: Call the medical emergency number on this SDS or your poison center or doctor immediately if large quantities have been ingested. In cases of suspected methemoglobinemia, methylene blue may be indicated based on patient severity.

Protection of first-aiders: No action shall be taken involving any personal risk or without suitable training. Mouth-to-mouth resuscitation of oral exposure patients is not recommended. First-aiders with contaminated clothing should be properly decontaminated.

See toxicological information (Section 11)
Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media: Product with the capacity to undergo self-sustaining and progressive thermal decomposition. The product acts as an oxidizing agent, and supports combustion by liberating oxygen even if smothered. Evacuate area and fight fire remotely due to the risk of explosion. Use flooding quantities of water.

Unsuitable extinguishing media: Do not attempt to smother the fire. The product acts as an oxidizing agent, and supports combustion by liberating oxygen even if smothered. Do not use CO2, dry chemicals, foam, or water fog.

Specific hazards arising from the chemical: May intensify fire; oxidizer. Molten ammonium nitrate presents an elevated risk of explosion if heated under confinement, if impacted by falling debris, or if contaminated by incompatible substances or organic matter including wood, asphalt, or other structural construction materials.

Hazardous thermal decomposition products: Decomposition products may include the following materials:
- Nitrogen oxides
- Ammonia

Special protective actions for fire-fighters: Promptly isolate the scene by removing all persons at least 800 meters (1/2 mile) from the vicinity of the incident if there is a fire. Assign emergency response personnel to guard the exclusion perimeter in all directions from the incident site.

If responding to a fire and the structure or vehicle is significantly involved, set up and use unmanned hose holders or monitor nozzles. Emergency responders should control remote firefighting apparatus from a location offering protection against possible explosion. Maintain the maximum possible distance from the fire consistent with the use of fire-fighting equipment. Apply flooding quantities of water to the ammonium nitrate until the fire is out, to cool the product and reduce risk of deflagration.

If safe to do so, ventilate the structure to minimize heat and pressure. Move containers from fire area if this can be done without risk. If safe firefighting is impossible, withdraw from area and let the fire burn.

Refer to the NFPA 400 Hazardous Materials Code Annex E for further information on the safe handling of ammonium nitrate and suggested firefighting procedures.

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.

Remark: Contain and collect the water used to fight the fire for later treatment and disposal.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel: 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 spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Provide adequate ventilation. Put on appropriate personal protective equipment.

For emergency responders: If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions: Avoid dispersal of spilled 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 and materials for containment and cleaning up
Section 6. Accidental release measures

Small spill: Use suitable protective equipment (section 8). Move containers from spill area. Avoid dust generation. Use appropriate equipment to put the spilled substance in a container for reuse or disposal. Place spilled material in a designated, labeled waste container. Dispose of via a licensed waste disposal contractor.

Large spill: Put on appropriate personal protective equipment (see Section 8). Move containers from spill area. Prevent entry into sewers, water courses, basements or confined areas. Use appropriate equipment to put the spilled substance in a container for reuse or disposal. Avoid dust generation. Do not dry sweep. Recycle to process, if possible.

or

Dispose of via a licensed waste disposal contractor. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures: Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Keep away from clothing, incompatible materials and combustible materials. Keep away from heat. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene: Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities: Store in accordance with local regulations. May form steep piles that can collapse without warning when stored in bulk. Avoid forming steep slopes when removing product. Ensure that bulk bags or smaller packaged products stored in tiers are stacked, racked, blocked, interlocked, or otherwise secured to prevent sliding, rolling, or collapse. Use caution when opening truck or railcar doors as product may have shifted during transport.

Must be stored in a dry location. Absorbs moisture on long-term storage under high humidity conditions. Store away from incompatible materials (see Section 10). When product is stored in sealable containers, keep container tightly closed and sealed until ready for use. Sealable containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Ensure compliance with OSHA 29CFR1910.109 requirements.

Separate from reducing agents and combustible materials. Use appropriate containment to avoid environmental contamination. Refer to NFPA 400 Hazardous Materials Code for further information on the safe storage and handling of hazardous materials.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

<table>
<thead>
<tr>
<th>Ingredient name</th>
<th>Exposure limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canadian Regulations: Ammonium nitrate</td>
<td>Alberta TWA: 10 mg/m3 Inhalable, 3 mg/m3 Respirable, for Particles Not Otherwise Regulated.</td>
</tr>
</tbody>
</table>

Date of issue/Date of revision: 7/4/2016  Date of previous issue: 2/10/2016  Version: 2.1
Section 8. Exposure controls/personal protection

| Hand protection   | 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.|
| Eye/face protection | 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. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: sealed eyewear |
| Body protection   | 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. Recommended: disposable overall |
| Other skin protection  | Appropriate footwear and any additional skin protection measures 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 protection | 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. Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Use a properly fitted, particulate filter respirator complying with an approved standard if a risk assessment indicates this is necessary. For U.S. work sites where respiratory protection is required, ensure that a respiratory protection program meeting 29 CFR 1910.134 requirements is in place. |

Section 9. Physical and chemical properties

| Physical state | Granular solid. |
| Color | Off-white. |
| Odor | Odorless. |
| Odor threshold | Not available. |
| pH | Not available. |
| Melting point | 169.6°C (337.3°F) |
| Boiling point | Not applicable. Decomposes. |
| Flash point | Not applicable. |
| Burning time | Not applicable. |
| Evaporation rate | Not applicable. |
| Flammability (solid, gas) | Non-flammable. |
| Lower and upper explosive (flammable) limits | Not applicable. Inorganic salt. |
Section 9. Physical and chemical properties

**Vapor pressure**: Not available.

**Vapor density**: Not available.

**Relative density**: No results available.

**Solubility**: Easily soluble in the following materials: hot water.
Soluble in the following materials: cold water.

**Solubility in water**: 1900 g/l

**Partition coefficient: n-octanol/water**: Not available.

**Auto-ignition temperature**: Not available.

**Decomposition temperature**: >210°C (>410°F)

**Viscosity**: Not available.

Section 10. Stability and reactivity

**Reactivity**: The pure product is stable at normal storage temperatures and pressures. May react explosively when mixed with chlorinated materials such as hypochlorites. May react explosively even in the absence of air at elevated pressure and/or temperature. Reactive or incompatible with the following materials:

- Flammable material
- Combustible material
- Metal powder
- Metal salt
- Halogenated compounds
- Acids
- Alkalis

**Chemical stability**: The pure product is stable at normal storage temperatures and pressures.

**Possibility of hazardous reactions**: Hazardous reactions or instability may occur under certain conditions of storage or use. Conditions may include the following:

- Contact with incompatible materials, such as acids, alkalis, heavy metal compounds and reducing agents, will result in hazardous decomposition.
- Contact with combustible materials
- Fire or heat

Reactions may include the following:

- Risk of causing or intensifying fire
- Hazardous decomposition
- Pressure build-up
- Risk of explosion with or without contact with air

**Conditions to avoid**: Prevent product contamination. Avoid contamination by any source including metals, dust and organic materials. Avoid high temperatures in combination with high pressures.

**Incompatible materials**: See above

**Hazardous decomposition products**: Under normal conditions of storage and use, hazardous decomposition products should not be produced.
# Section 11. Toxicological information

## Information on toxicological effects

### Acute toxicity

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
<th>Species</th>
<th>Dose</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium nitrate</td>
<td>LD50 Oral</td>
<td>Rat - Male, Female</td>
<td>2217 mg/kg</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>LD50 Oral</td>
<td>Rat - Male, Female</td>
<td>2950 mg/kg</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>LD50 Dermal</td>
<td>Rat - Male, Female</td>
<td>&gt;5000 mg/kg</td>
<td>-</td>
</tr>
</tbody>
</table>

**Conclusion/Summary**: Not available. Very low toxicity to humans or animals.

### Carcinogenicity

Not available.

**Conclusion/Summary**: Not available. Potential for nitrosamine formation if ingested. Do not ingest.

### Mutagenicity

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Test</th>
<th>Experiment</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium nitrate</td>
<td>OECD 471 Bacterial Reverse Mutation Test</td>
<td>Experiment: In vitro Subject: Bacteria</td>
<td>Negative</td>
</tr>
<tr>
<td></td>
<td>OECD 476 In vitro Mammalian Cell Gene Mutation Test</td>
<td>Experiment: In vitro Subject: Mammalian-Animal</td>
<td>Negative</td>
</tr>
</tbody>
</table>

**Conclusion/Summary**: No mutagenic effect.

### Sensitization

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Route of exposure</th>
<th>Species</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium nitrate</td>
<td>skin</td>
<td>Mouse</td>
<td>Not sensitizing</td>
</tr>
</tbody>
</table>

**Skin**: Non-sensitizer.

**Respiratory**: Non-sensitizer.

### Irritation/Corrosion

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
<th>Score</th>
<th>Exposure</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium nitrate</td>
<td>Skin</td>
<td>0</td>
<td>-</td>
<td>72 hours</td>
</tr>
<tr>
<td></td>
<td>Eyes</td>
<td>3</td>
<td>-</td>
<td>3 days</td>
</tr>
</tbody>
</table>

**Skin**: Non-irritating to the skin.

**Eyes**: Irritating to the eyes.

### Reproductive toxicity

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Maternal toxicity</th>
<th>Fertility</th>
<th>Development toxin</th>
<th>Species</th>
<th>Dose</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium nitrate</td>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
<td>Rat - Male, Female</td>
<td>Oral: 1500 mg/kg</td>
<td>53 days; 7 days per week</td>
</tr>
</tbody>
</table>

**Conclusion/Summary**: Not considered to be toxic to the reproductive system.

### Teratogenicity

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
<th>Species</th>
<th>Dose</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium nitrate</td>
<td>Negative - Oral</td>
<td>Rat - Female</td>
<td>1500 mg/kg</td>
<td>53 days</td>
</tr>
</tbody>
</table>

**Conclusion/Summary**: No known significant effects or critical hazards.

### Specific target organ toxicity (single exposure)

Not available.

---

**Date of issue/Date of revision**: 7/4/2016  
**Date of previous issue**: 2/10/2016  
**Version**: 2.1  
**Page**: 8/15
Section 11. Toxicological information

Specific target organ toxicity (repeated exposure)
Not available.

Aspiration hazard
Not available.

Information on the likely routes of exposure

Potential acute health effects

Eye contact
: Causes serious eye irritation.

Inhalation
: No known significant effects or critical hazards. Persons with asthma may be more sensitive.

Skin contact
: No known significant effects or critical hazards.

Ingestion
: May be irritating to the digestive tract. May cause nausea, vomiting, diarrhea, and abdominal pain. May cause methemoglobinemia (a condition that interferes with the oxygen-carrying capacity of the blood) if ingested in large quantities or over a prolonged period of time. Persons with methemoglobinemia may have blue tinge color to lips, nails, and skin. Also they may have shortness of breath or trouble breathing. Persons more susceptible to methemoglobinemia include: very young (less than 3 months), the elderly, those with chronic obstructive pulmonary disease (COPD), anemia, coronary artery disease, recent surgery or infection, and those with a genetic deficiency of G-6-PD.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact
: Adverse symptoms may include the following:
  - pain or irritation
  - watering
  - redness

Inhalation
: The substance will not burn. Undergoes thermal decomposition at elevated temperatures to release toxic and flammable gases. Decomposition products may include the following materials:
  - Ammonia
  - nitrogen oxides

  Adverse symptoms may include the following:
  - headache
  - respiratory tract irritation
  - coughing

Skin contact
: No specific data is available about overexposure under normal working conditions.

Ingestion
: Over-exposure by ingestion is unlikely under normal working conditions. Adverse symptoms may include the following:
  - nausea or vomiting
  - stomach pains
  - diarrhea
  - Methemoglobinemia (see Acute Health Effects)

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects
: Eye irritation
  - Infant-methemoglobinemia

Potential delayed effects
: Not available.

Long term exposure

Potential immediate effects
: Not available.

Potential delayed effects
: Not available.
Section 11. Toxicological information

Potential chronic health effects

<table>
<thead>
<tr>
<th>General</th>
<th>No known significant effects or critical hazards.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carcinogenicity</td>
<td>Potential for nitrosamine formation if ingested. Do not ingest.</td>
</tr>
<tr>
<td>Mutagenicity</td>
<td>No known significant effects or critical hazards.</td>
</tr>
<tr>
<td>Teratogenicity</td>
<td>No known significant effects or critical hazards.</td>
</tr>
<tr>
<td>Developmental effects</td>
<td>No known significant effects or critical hazards.</td>
</tr>
<tr>
<td>Fertility effects</td>
<td>No known significant effects or critical hazards.</td>
</tr>
</tbody>
</table>

Section 12. Ecological information

Toxicity

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
<th>Species</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium nitrate</td>
<td>Chronic NOEC 6 to 12 mg/l Fresh water</td>
<td>Crustaceans - Cladocera</td>
<td>21 days</td>
</tr>
<tr>
<td></td>
<td>NOEC &gt;1700 mg/l Marine water</td>
<td>Algae</td>
<td>10 days</td>
</tr>
<tr>
<td></td>
<td>Acute EC50 490 mg/l Fresh water</td>
<td>Daphnia</td>
<td>48 hours</td>
</tr>
<tr>
<td></td>
<td>Acute LC50 447 mg/l Fresh water</td>
<td>Fish</td>
<td>48 hours</td>
</tr>
</tbody>
</table>

Conclusion/Summary: Very low acute toxicity to fish. Practically non-toxic to aquatic organisms.

Persistence and degradability

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Aquatic half-life</th>
<th>Photolysis</th>
<th>Biodegradability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium nitrate</td>
<td>-</td>
<td>-</td>
<td>Readily</td>
</tr>
</tbody>
</table>

Bioaccumulative potential

Not available.

Mobility in soil

| Soil/water partition coefficient (Koc) | Not applicable. Inorganic salt. Bioaccumulative potential - low |

Other adverse effects: No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods: The generation of waste should be avoided or minimized wherever possible. 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. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.
## Section 14. Transport information

<table>
<thead>
<tr>
<th>UN number</th>
<th>UN proper shipping name</th>
<th>Transport hazard class(es)</th>
<th>Packing group</th>
<th>Environmental hazards</th>
<th>TDG Classification</th>
<th>DOT Classification</th>
<th>Mexico Classification</th>
<th>IMDG</th>
<th>IATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1942</td>
<td>Ammonium nitrate, with not more than 0.2 per cent combustible substances, including any organic substance calculated as carbon, to the exclusion of any other added substance (ammonium nitrate, solid)</td>
<td>5.1</td>
<td>III</td>
<td>No.</td>
<td>1942</td>
<td>1942</td>
<td>1942</td>
<td>1942</td>
<td>1942</td>
</tr>
<tr>
<td></td>
<td>Ammonium nitrate, with not more than 0.2 per cent combustible substances, including any organic substance calculated as carbon, to the exclusion of any other added substance (ammonium nitrate, solid)</td>
<td>5.1</td>
<td>III</td>
<td>No.</td>
<td>1942</td>
<td>1942</td>
<td>1942</td>
<td>1942</td>
<td>1942</td>
</tr>
<tr>
<td></td>
<td>Ammonium nitrate, with not more than 0.2 per cent combustible substances, including any organic substance calculated as carbon, to the exclusion of any other added substance</td>
<td>5.1</td>
<td>III</td>
<td>No.</td>
<td>1942</td>
<td>1942</td>
<td>1942</td>
<td>1942</td>
<td>1942</td>
</tr>
<tr>
<td></td>
<td>Ammonium nitrate, with not more than 0.2 per cent combustible substances, including any organic substance calculated as carbon, to the exclusion of any other added substance</td>
<td>5.1</td>
<td>III</td>
<td>No.</td>
<td>1942</td>
<td>1942</td>
<td>1942</td>
<td>1942</td>
<td>1942</td>
</tr>
</tbody>
</table>

### Additional information
- **Explosive Limit and Limited Quantity Index**: 5
- **Passenger Carrying Road or Rail Index**: 25
- **Special provisions**
  - Special Provisions re TDG: 37
  - Classification per the current revision, Transportation of Dangerous Goods Regulation, Part 2, Sec 2.3.
- **Passenger aircraft**
  - Quantity limitation: 25 kg
- **Cargo aircraft**
  - Quantity limitation: 100 kg
- **Special provisions**
  - A1, A29, B120, IB8, IP3, T1, TP33
- Classification per the current revision, Transportation of Dangerous Goods Regulation, Part 2, Sec 2.3.
- **Emergency schedules (EmS)**
  - F-H, S-Q
- **Passenger and Cargo Aircraft**
  - Quantity limitation: 25 kg
  - Packaging instructions: 516
  - **Cargo Aircraft Only**
  - Quantity limitation: 100 kg
  - Packaging instructions: 518
  - **Limited Quantities - Passenger Aircraft**
  - Quantity limitation: 10 kg
  - Packaging instructions: Y516

### Special precautions for user
- **Transport within user's premises**: always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.
Section 14. Transport information

Transport in bulk according to Annex II of MARPOL and the IBC Code

Section 15. Regulatory information

Canadian lists

Canadian NPRI: The following components are listed: Total of ammonia (NH₃ — CAS RN 7664-41-7) and the ammonium ion (NH₄⁺ — CAS RN 14798-03-9) in solution, expressed as ammonia.

CEPA Toxic substances: None of the components are listed.

Canada inventory: All components are listed or exempted.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals
Not listed.

Montreal Protocol (Annexes A, B, C, E)
Not listed.

Stockholm Convention on Persistent Organic Pollutants
Not listed.

Rotterdam Convention on Prior Inform Consent (PIC)
Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals
Not listed.

Inventory list

Australia: All components are listed or exempted.
China: All components are listed or exempted.
Europe: This material is listed or exempted.
Japan: All components are listed or exempted.
Malaysia: All components are listed or exempted.
New Zealand: All components are listed or exempted.
Phillipines: All components are listed or exempted.
Republic of Korea: All components are listed or exempted.
Taiwan: All components are listed or exempted.
Turkey: Not determined.

U.S. Federal Regulations

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs): Not listed
Clean Air Act Section 602 Class I Substances: Not listed
Clean Air Act Section 602 Class II Substances: Not listed
DEA List I Chemicals (Precursor Chemicals): Not listed
DEA List II Chemicals (Essential Chemicals): Not listed
SARA 302/304 Composition/information on ingredients: Not Applicable
SARA 304 RQ: Not Applicable.

TSCA 8(a) CDR Exempt/Partial exemption: Not determined
TSCA 8(b) inventory: All components are listed or exempted.

Date of issue/Date of revision: 7/4/2016
Date of previous issue: 2/10/2016
Version: 2.1 12/15
Section 15. Regulatory information

SARA 311/312
Classification: Fire hazard
Immediate (acute) health hazard

Composition/information on ingredients

<table>
<thead>
<tr>
<th>Name</th>
<th>%</th>
<th>Fire hazard</th>
<th>Sudden release of pressure</th>
<th>Reactive</th>
<th>Immediate (acute) health hazard</th>
<th>Delayed (chronic) health hazard</th>
</tr>
</thead>
</table>

SARA 313

<table>
<thead>
<tr>
<th>Form R - Reporting requirements</th>
<th>Product name</th>
<th>CAS number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplier notification</td>
<td>Ammonium nitrate</td>
<td>6484-52-2</td>
<td>100</td>
</tr>
</tbody>
</table>

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts: The following components are listed: Ammonium nitrate
New York: None of the components are listed.
New Jersey: The following components are listed: Ammonium nitrate; Nitric acid, ammonium salt
Pennsylvania: The following components are listed: Nitric acid, ammonium salt
California Prop. 65: Not listed.

Section 16. Other information

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

<table>
<thead>
<tr>
<th>Health</th>
<th>Flammability</th>
<th>Physical hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on SDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA).

The customer is responsible for determining the PPE code for this material.

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

<table>
<thead>
<tr>
<th>Health</th>
<th>Flammability</th>
<th>Instability/Reactivity</th>
<th>Special</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>OX</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

Copyright ©2013, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

History

Date of printing: 7/4/2016
Date of issue/Date of revision: 7/4/2016
Section 16. Other information

Date of previous issue : 2/10/2016
Version : 2.1

 Indicates information that has changed from previously issued version.
This Safety Data Sheet has been revised to comply with Hazcom 2012 and WHMIS 2015 requirements.

Key to abbreviations :
ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
UN = United Nations
HPR = Hazardous Products Regulations

Procedure used to derive the classification

<table>
<thead>
<tr>
<th>Classification</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>OXIDIZING SOLIDS - Category 3</td>
<td>Expert judgment</td>
</tr>
<tr>
<td>EYE IRRITATION - Category 2A</td>
<td>On basis of test data</td>
</tr>
</tbody>
</table>

References :
Hazardous Products Act and Regulations, current revision at time of (M)SDS preparation, Health Canada;
Domestic Substances List, current revision at time of (M)SDS preparation, Environment Canada;
29 CFR Part 1910, current revision at time of SDS preparation, U.S. Occupational Safety and Health Administration;
40 CFR Parts 1-799, current revision at time of SDS preparation, U.S. Environmental Protection Agency;
49 CFR Parts 1-199, current revision at time of SDS preparation, U.S. Department of Transport;
Threshold Limit Values for Chemical Substances, current edition at time of SDS preparation, American Conference of Governmental Industrial Hygienists;
NFPA 400, National Fire Codes, National Fire Protection Association, current edition at time of SDS preparation;
NFPA 704, National Fire Codes, National Fire Protection Association, current edition at time of SDS preparation;
Corrosion Data Survey, Sixth Edition, 1985, National Association of Corrosion Engineers;
Hazardous Substances Data Bank, current revision at time of SDS preparation, National Library of Medicine, Bethesda, Maryland
Pocket Guide to Chemical Hazards, current revision at time of SDS preparation, National Institute for Occupational Safety and Health, Cincinnati, Ohio ;
Agency for Toxic Substances and Disease Registry Databank, current revision at time of SDS preparation, U.S. Department of Health and Human Services, Atlanta, Georgia
National Toxicology Program, Report on Carcinogens, Division of the National Institute of Environmental Health Sciences, Research Triangle Park, North Carolina.
Registry of Toxic Effects of Chemical Substances. National Institute for Occupational Safety and Health, Cincinnati, Ohio
The Fertilizer Institute, Product Toxicology Testing Program Results, TFI, Washington , D.C., 2003

Notice to reader

Date of issue/Date of revision : 7/4/2016  Date of previous issue : 2/10/2016  Version : 2.1
DISCLAIMER AND LIMITATION OF LIABILITY

The information and recommendations contained in this Safety Data Sheet ("SDS") relate only to the specific material referred to herein (the "Material") and do not relate to the use of such Material in combination with any other material or process. The information and recommendations contained herein are believed to be current and correct as of the date of this SDS. HOWEVER, THE INFORMATION AND RECOMMENDATIONS ARE PRESENTED WITHOUT WARRANTY, REPRESENTATION OR LICENSE OF ANY KIND, EXPRESS OR IMPLIED, WITH RESPECT TO THEIR ACCURACY, CORRECTNESS OR COMPLETENESS, AND THE SELLER, SUPPLIER AND MANUFACTURER OF THE MATERIAL AND THEIR RESPECTIVE AFFILIATES (COLLECTIVELY, THE "SUPPLIER") DISCLAIM ALL LIABILITY FOR RELIANCE ON SUCH INFORMATION AND RECOMMENDATIONS. This SDS is not a guarantee of safety. A buyer or user of the Material (a "Recipient") is responsible for ensuring that it has all current information necessary to safely use the Material for its specific purpose.

FURTHERMORE, THE RECIPIENT ASSUMES ALL RISK IN CONNECTION WITH THE USE OF THE MATERIAL. THE RECIPIENT ASSUMES ALL RESPONSIBILITY FOR ENSURING THE MATERIAL IS USED IN A SAFE MANNER IN COMPLIANCE WITH APPLICABLE ENVIRONMENTAL, HEALTH, SAFETY AND SECURITY LAWS, POLICIES AND GUIDELINES. THE SUPPLIER DOES NOT WARRANT THE MERCHANTABILITY OF THE MATERIAL OR THE FITNESS OF THE MATERIAL FOR ANY PARTICULAR USE AND ASSUMES NO RESPONSIBILITY FOR INJURY OR DAMAGE CAUSED DIRECTLY OR INDIRECTLY BY OR RELATED TO THE USE OF THE MATERIAL.
SECTION 1: IDENTIFICATION

Product Identifier
- Product Form: Mixture
- Product Name: Ferric Sulfate 60%

Intended Use of the Product

Name, Address, and Telephone of the Responsible Party

Manufacturer
CHEMTRADE LOGISTICS INC.
155 Gordon Baker Road
Suite 300
Toronto, Ontario M2H 3N5
For SDS Info: (416) 496-5856
www.chemtradelogistics.com

Emergency Telephone Number
- Emergency Number:
  - Canada: CANUTEC +1-613-996-6666 / US: CHEMTREC +1-800-424-9300
  - INTERNATIONAL: +1-703-741-5970
  - Chemtrade Emergency Contact: (866) 416-4404

For Chemical Emergency, Spill, Leak, Fire, Exposure, or Accident, call CHEMTREC – Day or Night

SECTION 2: HAZARDS IDENTIFICATION

Classification of the Substance or Mixture

GHS Classification
- Acute Tox. 4 (Oral): H302
- Skin Corr. 1A: H314
- Eye Dam. 1: H318

Full text of hazard classes and H-statements: see section 16

Label Elements

GHS Labeling
- Hazard Pictograms:
  - GHS05
  - GHS07
- Signal Word: Danger
- Hazard Statements:
  - H290 - May be corrosive to metals.
  - H302 - Harmful if swallowed.
  - H314 - Causes severe skin burns and eye damage.
  - H318 - Causes serious eye damage.
- Precautionary Statements:
  - P234 - Keep only in original container.
  - P260 - Do not breathe vapors, mist, or spray.
  - P264 - Wash hands, forearms, and other exposed areas thoroughly after handling.
  - P270 - Do not eat, drink or smoke when using this product.
  - P280 - Wear protective gloves, protective clothing, and eye protection.
  - P301+P312 - IF SWALLOWED: Call a POISON CENTER or doctor if you feel unwell.
  - P301+P330+P331 - IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
  - P303+P361+P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water.
  - P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for
Ferric Sulfate 60%
Safety Data Sheet

breathing.
P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310 - Immediately call a POISON CENTER or doctor.
P321 - Specific treatment (see section 4 on this SDS).
P330 - Rinse mouth.
P363 - Wash contaminated clothing before reuse.
P390 - Absorb spillage to prevent material damage.
P405 - Store locked up.
P406 - Store in corrosive resistant container with a resistant inner liner.
P501 - Dispose of contents/container in accordance with local, regional, national, territorial, provincial, and international regulations.

Other Hazards
May produce explosive hydrogen gas on contact with incompatibilities or upon thermal decomposition.

Unknown acute toxicity
No data available

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Mixture</th>
<th>Product Identifier</th>
<th>%*</th>
<th>GHS Ingredient Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>(CAS-No.) 7732-18-5</td>
<td>25 - 64</td>
<td>Not classified</td>
</tr>
<tr>
<td>Sulfuric acid, iron(3+) salt (3:2)**</td>
<td>(CAS-No.) 10028-22-5</td>
<td>45 - 70*</td>
<td>Met. Corr. 1, H290</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Acute Tox. 4 (Oral), H302</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Skin Irrit. 2, H315</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Eye Dam. 1, H318</td>
</tr>
<tr>
<td>Sulfuric acid***</td>
<td>(CAS-No.) 7664-93-9</td>
<td>1 – 5*</td>
<td>Skin Corr. 1A, H314</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Eye Dam. 1, H318</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Carc. 1A, H350</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Aquatic Acute 3, H402</td>
</tr>
</tbody>
</table>

Full text of H-phrases: see section 16
*Percentages are listed in weight by weight percentage (w/w%) for liquid and solid ingredients. Gas ingredients are listed in volume by volume percentage (v/v%).
**As Fe2(SO4)3●9H2O (Dry Ferric Sulfate)
***Strong inorganic acid aerosols/mists containing this substance are carcinogenic to humans. However, under conditions of normal use this is not a potential route of exposure, and does not warrant a carcinogenicity classification for the mixture.
*The actual concentration of the ingredient(s) is withheld as a trade secret in accordance with Regulations Amending the Hazardous Products Regulations (HPR) SOR/2018-68 and 29 CFR 1910.1200.

SECTION 4: FIRST AID MEASURES

Description of First-aid Measures
General: Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible).
Inhalation: When symptoms occur: go into open air and ventilate suspected area. Obtain medical attention if breathing difficulty persists.
Skin Contact: Remove contaminated clothing. Immediately flush skin with plenty of water for at least 30 minutes. Wash contaminated clothing before reuse. Get immediate medical advice/attention.
Eye Contact: Rinse cautiously with water for at least 30 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice/attention.
Ingestion: Rinse mouth. Do NOT induce vomiting. Obtain medical attention.

Most Important Symptoms and Effects Both Acute and Delayed
General: Harmful if swallowed. Causes severe skin burns and eye damage. May be corrosive to the respiratory tract.
Inhalation: May be corrosive to the respiratory tract.
Skin Contact: Causes severe irritation which will progress to chemical burns.
**Ferric Sulfate 60%**

Safety Data Sheet


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**Eye Contact:** Causes permanent damage to the cornea, iris, or conjunctiva.

**Ingestion:** This material is harmful orally and can cause adverse health effects or death in significant amounts. May cause burns or irritation of the linings of the mouth, throat, and gastrointestinal tract.

**Chronic Symptoms:** None expected under normal conditions of use.

**Indication of Any Immediate Medical Attention and Special Treatment Needed**

If exposed or concerned, get medical advice and attention. If medical advice is needed, have product container or label at hand.

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### SECTION 5: FIRE-FIGHTING MEASURES

**Extinguishing Media**

- **Suitable Extinguishing Media:** Water spray, dry chemical, foam, carbon dioxide.
- **Unsuitable Extinguishing Media:** Do not use a heavy water stream. Use of heavy stream of water may spread fire.

**Special Hazards Arising From the Substance or Mixture**

- **Fire Hazard:** Not considered flammable but may burn at high temperatures.
- **Explosion Hazard:** Contact with metallic substances may release flammable hydrogen gas.
- **Reactivity:** May be corrosive to metals. Contact with metals may release flammable hydrogen gas. May react exothermically with water releasing heat. Adding an acid to a base or base to an acid may cause a violent reaction.

**Advice for Firefighters**

- **Precautionary Measures Fire:** Exercise caution when fighting any chemical fire.
- **Firefighting Instructions:** Use water spray or fog for cooling exposed containers.
- **Protection During Firefighting:** Do not enter fire area without proper protective equipment, including respiratory protection.
- **Hazardous Combustion Products:** Sulfur oxides. Corrosive vapors.
- **Other Information:** Do not allow run-off from fire fighting to enter drains or water courses.

**Reference to Other Sections**

Refer to Section 9 for flammability properties.

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### SECTION 6: ACCIDENTAL RELEASE MEASURES

**Personal Precautions, Protective Equipment and Emergency Procedures**

- **General Measures:** Do not get in eyes, on skin, or on clothing. Do not breathe vapor, mist or spray.

**For Non-Emergency Personnel**

- **Protective Equipment:** Use appropriate personal protective equipment (PPE).
- **Emergency Procedures:** Evacuate unnecessary personnel.

**For Emergency Personnel**

- **Protective Equipment:** Equip cleanup crew with proper protection.
- **Emergency Procedures:** Upon arrival at the scene, a first responder is expected to recognize the presence of dangerous goods, protect oneself and the public, secure the area, and call for the assistance of trained personnel as soon as conditions permit.
- **Ventilation:** Ventilate area.

**Environmental Precautions**

Prevent entry to sewers and public waters. Avoid release to the environment. Collect spillage.

**Methods and Materials for Containment and Cleaning Up**

- **For Containment:** Contain any spills with dikes or absorbents to prevent migration and entry into sewers or streams. As an immediate precautionary measure, isolate spill or leak area in all directions.
- **Methods for Cleaning Up:** Clean up spills immediately and dispose of waste safely. Cautiously neutralize spilled liquid. Absorb spillage to prevent material damage. Transfer spilled material to a suitable container for disposal. Contact competent authorities after a spill.

**Reference to Other Sections**

See Section 8 for exposure controls and personal protection and Section 13 for disposal considerations.

---

### SECTION 7: HANDLING AND STORAGE

**Precautions for Safe Handling**

Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Handle empty containers with care because they may still present a hazard. Do not get in eyes, on skin, or on clothing. Do not breathe mist, spray, vapors.

**Additional Hazards When Processed:** May be corrosive to metals. May release corrosive vapors.

**Hygiene Measures:** Handle in accordance with good industrial hygiene and safety procedures.
Ferric Sulfate 60%
Safety Data Sheet

Conditions for Safe Storage, Including Any Incompatibilities

Technical Measures: Comply with applicable regulations.

Storage Conditions: Keep container closed when not in use. Store in a dry, cool place. Keep/Store away from extremely high or low temperatures and incompatible materials. Store in original container or corrosive resistant and/or lined container.


Specific End Use(s)


SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Control Parameters

For substances listed in section 3 that are not listed here, there are no established Exposure limits from the manufacturer, supplier, importer, or the appropriate advisory agency including: ACGIH (TLV), AIHA (WEEL), NIOSH (REL), OSHA (PEL), Canadian provincial governments, or the Mexican government.

<table>
<thead>
<tr>
<th>Sulfuric acid (7664-93-9)</th>
<th>Mexico</th>
<th>OEL TWA (mg/m³)</th>
<th>1 mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA ACGIH</td>
<td>ACGIH TWA (mg/m³)</td>
<td>0.2 mg/m³ (thoracic particulate matter)</td>
<td></td>
</tr>
<tr>
<td>USA ACGIH</td>
<td>ACGIH chemical category</td>
<td>Suspected Human Carcinogen contained in strong inorganic acid mists</td>
<td></td>
</tr>
<tr>
<td>USA OSHA</td>
<td>OSHA PEL (TWA) (mg/m³)</td>
<td>1 mg/m³</td>
<td></td>
</tr>
<tr>
<td>USA NIOSH</td>
<td>NIOSH REL (TWA) (mg/m³)</td>
<td>1 mg/m³</td>
<td></td>
</tr>
<tr>
<td>USA IDLH</td>
<td>US IDLH (mg/m³)</td>
<td>15 mg/m³</td>
<td></td>
</tr>
<tr>
<td>Alberta</td>
<td>OEL STEL (mg/m³)</td>
<td>3 mg/m³</td>
<td></td>
</tr>
<tr>
<td>Alberta</td>
<td>OEL TWA (mg/m³)</td>
<td>1 mg/m³</td>
<td></td>
</tr>
<tr>
<td>British Columbia</td>
<td>OEL TWA (mg/m³)</td>
<td>0.2 mg/m³ (Thoracic, contained in strong inorganic acid mists)</td>
<td></td>
</tr>
<tr>
<td>Manitoba</td>
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<td>0.2 mg/m³ (thoracic particulate matter)</td>
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</tr>
<tr>
<td>New Brunswick</td>
<td>OEL STEL (mg/m³)</td>
<td>3 mg/m³</td>
<td></td>
</tr>
<tr>
<td>New Brunswick</td>
<td>OEL TWA (mg/m³)</td>
<td>1 mg/m³</td>
<td></td>
</tr>
<tr>
<td>Newfoundland &amp; Labrador</td>
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<td>0.2 mg/m³ (thoracic particulate matter)</td>
<td></td>
</tr>
<tr>
<td>Nova Scotia</td>
<td>OEL TWA (mg/m³)</td>
<td>0.2 mg/m³ (thoracic particulate matter)</td>
<td></td>
</tr>
<tr>
<td>Nunavut</td>
<td>OEL STEL (mg/m³)</td>
<td>0.6 mg/m³ (thoracic fraction)</td>
<td></td>
</tr>
<tr>
<td>Nunavut</td>
<td>OEL TWA (mg/m³)</td>
<td>0.2 mg/m³ (thoracic fraction)</td>
<td></td>
</tr>
<tr>
<td>Northwest Territories</td>
<td>OEL STEL (mg/m³)</td>
<td>0.6 mg/m³ (thoracic fraction, strong acid mists only)</td>
<td></td>
</tr>
<tr>
<td>Northwest Territories</td>
<td>OEL TWA (mg/m³)</td>
<td>0.2 mg/m³ (thoracic fraction, strong acid mists only)</td>
<td></td>
</tr>
<tr>
<td>Ontario</td>
<td>OEL TWA (mg/m³)</td>
<td>0.2 mg/m³ (thoracic)</td>
<td></td>
</tr>
<tr>
<td>Prince Edward Island</td>
<td>OEL TWA (mg/m³)</td>
<td>0.2 mg/m³ (thoracic particulate matter)</td>
<td></td>
</tr>
<tr>
<td>Québec</td>
<td>VEC'D (mg/m³)</td>
<td>3 mg/m³</td>
<td></td>
</tr>
<tr>
<td>Québec</td>
<td>VEMP (mg/m³)</td>
<td>1 mg/m³</td>
<td></td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>OEL STEL (mg/m³)</td>
<td>0.6 mg/m³ (thoracic fraction)</td>
<td></td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>OEL TWA (mg/m³)</td>
<td>0.2 mg/m³ (thoracic fraction)</td>
<td></td>
</tr>
<tr>
<td>Yukon</td>
<td>OEL STEL (mg/m³)</td>
<td>1 mg/m³</td>
<td></td>
</tr>
<tr>
<td>Yukon</td>
<td>OEL TWA (mg/m³)</td>
<td>1 mg/m³</td>
<td></td>
</tr>
</tbody>
</table>

Exposure Controls

Appropriate Engineering Controls: Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Ensure adequate ventilation, especially in confined areas. Ensure all national/local regulations are observed.
Ferric Sulfate 60%
Safety Data Sheet


**Materials for Protective Clothing:** Acid-resistant clothing.

**Hand Protection:** Wear protective gloves.

**Eye Protection:** Chemical safety goggles and face shield.

**Skin and Body Protection:** Wear suitable protective clothing.

**Respiratory Protection:** If exposure limits are exceeded or irritation is experienced, approved respiratory protection should be worn. In case of inadequate ventilation, oxygen deficient atmosphere, or where exposure levels are not known wear approved respiratory protection.

**Environmental Exposure Controls:** Do not allow the product to be released into the environment.

**Consumer Exposure Controls:** Do not eat, drink, or smoke during use.

---

**SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES**

**Information on Basic Physical and Chemical Properties**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical State</td>
<td>Liquid</td>
</tr>
<tr>
<td>Appearance</td>
<td>Reddish brown</td>
</tr>
<tr>
<td>Odor</td>
<td>Not available</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>Not available</td>
</tr>
<tr>
<td>pH</td>
<td>&lt; 1</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>Not available</td>
</tr>
<tr>
<td>Melting Point</td>
<td>&lt; -18 °C (&lt; -0.4 °F)</td>
</tr>
<tr>
<td>Freezing Point</td>
<td>Not available</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>Not available</td>
</tr>
<tr>
<td>Flash Point</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Auto-ignition Temperature</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Decomposition Temperature</td>
<td>Not available</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>Not flammable</td>
</tr>
<tr>
<td>Lower Flammable Limit</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Upper Flammable Limit</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>Not available</td>
</tr>
<tr>
<td>Relative Vapor Density at 20°C</td>
<td>Not available</td>
</tr>
<tr>
<td>Relative Density</td>
<td>Not available</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>1.24 - 1.62</td>
</tr>
<tr>
<td>Solubility</td>
<td>100%</td>
</tr>
<tr>
<td>Partition Coefficient: N-Octanol/Water</td>
<td>Not available</td>
</tr>
<tr>
<td>Viscosity</td>
<td>Not available</td>
</tr>
<tr>
<td>VOC content</td>
<td>&lt; 1 %</td>
</tr>
</tbody>
</table>

---

**SECTION 10: STABILITY AND REACTIVITY**

**Reactivity:** May be corrosive to metals. Contact with metals may evolve flammable hydrogen gas. May react exothermically with water releasing heat. Adding an acid to a base or base to an acid may cause a violent reaction.

**Chemical Stability:** Stable under recommended handling and storage conditions (see section 7).

**Possibility of Hazardous Reactions:** Hazardous polymerization will not occur.

**Conditions to Avoid:** Extremely high or low temperatures and incompatible materials.

**Incompatible Materials:** Strong acids, strong bases, strong oxidizers. Alkalis. Metals.

**Hazardous Decomposition Products:** Thermal decomposition generates: Corrosive vapors. Sulfur oxides.
SECTION 11: TOXICOLOGICAL INFORMATION

Information on Toxicological Effects - Product

Acute Toxicity (Oral): Oral: Harmful if swallowed.
Acute Toxicity (Dermal): Not classified
Acute Toxicity (Inhalation): Not classified

LD50 and LC50 Data:

<table>
<thead>
<tr>
<th>Substance</th>
<th>LD50 Oral Rat</th>
<th>LC50 Fish 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferric Sulfate 60%</td>
<td>802.10 mg/kg</td>
<td></td>
</tr>
<tr>
<td>ATE (Oral)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Skin Corrosion/Irritation: Causes severe skin burns and eye damage.

pH: < 1

Eye Damage/Irritation: Causes serious eye damage.

pH: < 1

Respiratory or Skin Sensitization: Not classified

Germ Cell Mutagenicity: Not classified

Carcinogenicity: Not classified

Specific Target Organ Toxicity (Repeated Exposure): Not classified

Reproductive Toxicity: Not classified

Specific Target Organ Toxicity (Single Exposure): Not classified

Aspiration Hazard: Not classified

Symptoms/Effects After Inhalation: May be corrosive to the respiratory tract.
Symptoms/Effects After Skin Contact: Causes severe irritation which will progress to chemical burns.
Symptoms/Effects After Eye Contact: Causes permanent damage to the cornea, iris, or conjunctiva.
Symptoms/Effects After Ingestion: This material is harmful orally and can cause adverse health effects or death in significant amounts. May cause burns or irritation of the linings of the mouth, throat, and gastrointestinal tract.

Chronic Symptoms: None expected under normal conditions of use.

Information on Toxicological Effects - Ingredient(s)

LD50 and LC50 Data:

<table>
<thead>
<tr>
<th>Substance</th>
<th>LD50 Oral Rat</th>
<th>LC50 Fish 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid, iron(3+) salt (3:2) (10028-22-5)</td>
<td>500 - 2000 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Sulfuric acid (7664-93-9)</td>
<td>2140 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Water (7732-18-5)</td>
<td>&gt; 90000 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Sulfuric acid (7664-93-9)</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

IARC Group

OSHA Hazard Communication Carcinogen List

SECTION 12: ECOLOGICAL INFORMATION

Toxicity No additional information available

<table>
<thead>
<tr>
<th>Substance</th>
<th>LC50 Fish 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid (7664-93-9)</td>
<td>500 mg/l (Exposure time: 96 h - Species: Brachydanio rerio [static])</td>
</tr>
<tr>
<td>LC50 Fish 2</td>
<td>42 mg/l (Exposure time: 96 h - Species: Gambusia affinis [static])</td>
</tr>
</tbody>
</table>

Persistence and Degradability

Ferric Sulfate 60%

Persistence and Degradability: May cause long-term adverse effects in the environment.

Bioaccumulative Potential

Ferric Sulfate 60%

Bioaccumulative Potential: Not established.

Sulfuric acid (7664-93-9)

BCF Fish 1: (no bioaccumulation)
Ferric Sulfate 60%

Safety Data Sheet

Mobility in Soil  Not available

Other Adverse Effects
Other Information: Avoid release to the environment.

SECTION 13: DISPOSAL CONSIDERATIONS

Waste Disposal Recommendations: Dispose of contents/container in accordance with local, regional, national, territorial, provincial, and international regulations.
Additional Information: Container may remain hazardous when empty. Continue to observe all precautions.
Ecology - Waste Materials: Avoid release to the environment. This material is hazardous to the aquatic environment. Keep out of sewers and waterways.

SECTION 14: TRANSPORT INFORMATION

<table>
<thead>
<tr>
<th>TRANSPORTATION CLASSIFICATION</th>
<th>DOT</th>
<th>TDG</th>
<th>IMDG</th>
<th>IATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification Number</td>
<td>UN3264</td>
<td>UN3264</td>
<td>UN3264</td>
<td>UN3264</td>
</tr>
<tr>
<td>Proper Shipping Name</td>
<td>CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (CONTAINS FERRIC SULFATE, SULFURIC ACID)</td>
<td>CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (CONTAINS FERRIC SULFATE, SULFURIC ACID)</td>
<td>CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (CONTAINS FERRIC SULFATE, SULFURIC ACID)</td>
<td>CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (CONTAINS FERRIC SULFATE, SULFURIC ACID)</td>
</tr>
<tr>
<td>Transport Hazard Class(es)</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Packing Group</td>
<td>II</td>
<td>II</td>
<td>II</td>
<td>II</td>
</tr>
<tr>
<td>Environmental Hazards</td>
<td>Marine Pollutant: No</td>
<td>Marine Pollutant: No</td>
<td>Marine Pollutant: No</td>
<td>Marine Pollutant: N/A</td>
</tr>
<tr>
<td>Emergency Response</td>
<td>ERG Number: 154</td>
<td>ERAP Index: Not applicable</td>
<td>EMS: F-A, S-B</td>
<td>ERG code (IATA): 8L</td>
</tr>
<tr>
<td>Additional Information</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

SECTION 15: REGULATORY INFORMATION

US Federal Regulations

<table>
<thead>
<tr>
<th>Chemical Name (CAS No.)</th>
<th>CERCLA RQ</th>
<th>EPCRA 304 RQ</th>
<th>SARA 302 TPQ</th>
<th>SARA 313</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid, iron(3+) salt (3:2) (10028-22-5)</td>
<td>1000 lb</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>No</td>
</tr>
<tr>
<td>Sulfuric acid (7664-93-9)</td>
<td>1000 lb</td>
<td>1000 lb</td>
<td>1000 lb</td>
<td>Yes</td>
</tr>
</tbody>
</table>

SARA 311/312
Ferric Sulfate 50%
Immediate (acute) health hazard

US TSCA Flags  Not present

US State Regulations

California Proposition 65

<table>
<thead>
<tr>
<th>Chemical Name (CAS No.)</th>
<th>Carcinogenicity</th>
<th>Developmental Toxicity</th>
<th>Female Reproductive Toxicity</th>
<th>Male Reproductive Toxicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid, iron(3+) salt (3:2) (10028-22-5)</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Sulfuric acid (7664-93-9)</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

State Right-To-Know Lists

<table>
<thead>
<tr>
<th>Chemical Name (CAS No.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid, iron(3+) salt (3:2) (10028-22-5)</td>
</tr>
</tbody>
</table>
Ferric Sulfate 60%
Safety Data Sheet

U.S. - Massachusetts - Right To Know List - Yes
U.S. - New Jersey - Right to Know Hazardous Substance List - Yes
U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List - Yes
U.S. - Pennsylvania - RTK (Right to Know) - Special Hazardous Substances - No
U.S. - Pennsylvania - RTK (Right to Know) List - Yes

<table>
<thead>
<tr>
<th>Chemical Name (CAS No.)</th>
<th>Australia AICS</th>
<th>Turkey CICR</th>
<th>Korea ECL</th>
<th>EU EINECS</th>
<th>EU ELINCS</th>
<th>EU SVHC</th>
<th>EU NLP</th>
<th>Mexico INSQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid, iron(3+) salt (3:2) (10028-22-5)</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Sulfuric acid (7664-93-9)</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Canadian Regulations

Sulfuric acid, iron(3+) salt (3:2) (10028-22-5)
Listed on the Canadian DSL (Domestic Substances List)
Not listed on the Canadian NDSL (Non-Domestic Substances List)

Sulfuric acid (7664-93-9)
Listed on the Canadian DSL (Domestic Substances List)
Not listed on the Canadian NDSL (Non-Domestic Substances List)

International Inventories/Lists

<table>
<thead>
<tr>
<th>Chemical Name (CAS No.)</th>
<th>China IECSC</th>
<th>Japan ENCS</th>
<th>Japan ISHL</th>
<th>Japan PDSCL</th>
<th>Japan PRTR</th>
<th>Philippines PICCS</th>
<th>New Zealand NZIOC</th>
<th>US TSCA</th>
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</thead>
<tbody>
<tr>
<td>Sulfuric acid, iron(3+) salt (3:2) (10028-22-5)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Sulfuric acid (7664-93-9)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
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<td>Yes</td>
<td>Yes</td>
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SECTION 16: OTHER INFORMATION, INCLUDING DATE OF PREPARATION OR LAST REVISION

Date of Preparation or Latest Revision : 05/10/2018

Revision Summary

<table>
<thead>
<tr>
<th>Section</th>
<th>Change</th>
<th>Date Changed</th>
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<tr>
<td>3</td>
<td>HPR Statement</td>
<td>05/10/2018</td>
</tr>
<tr>
<td>3</td>
<td>NFPA/HMIS update</td>
<td>05/10/2018</td>
</tr>
</tbody>
</table>

Other Information : This document has been prepared in accordance with the SDS requirements of the OSHA Hazard Communication Standard 29 CFR 1910.1200 and Canada’s Hazardous Products Regulations (HPR).

GHS Full Text Phrases:

<table>
<thead>
<tr>
<th>Acute Tox. 4 (Oral)</th>
<th>Acute toxicity (oral) Category 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquatic Acute 3</td>
<td>Hazardous to the aquatic environment - Acute Hazard Category 3</td>
</tr>
<tr>
<td>Eye Dam. 1</td>
<td>Serious eye damage/eye irritation Category 1</td>
</tr>
<tr>
<td>Met. Corr. 1</td>
<td>Corrosive to metals Category 1</td>
</tr>
<tr>
<td>Skin Corr. 1A</td>
<td>Skin corrosion/irritation Category 1A</td>
</tr>
<tr>
<td>Skin Irrit. 2</td>
<td>Skin corrosion/irritation Category 2</td>
</tr>
<tr>
<td>H290</td>
<td>May be corrosive to metals</td>
</tr>
<tr>
<td>H302</td>
<td>Harmful if swallowed</td>
</tr>
<tr>
<td>H314</td>
<td>Causes severe skin burns and eye damage</td>
</tr>
</tbody>
</table>
Ferric Sulfate 60%
Safety Data Sheet

<table>
<thead>
<tr>
<th>H315</th>
<th>Causes skin irritation</th>
</tr>
</thead>
<tbody>
<tr>
<td>H318</td>
<td>Causes serious eye damage</td>
</tr>
<tr>
<td>H402</td>
<td>Harmful to aquatic life</td>
</tr>
</tbody>
</table>

**NFPA 704**
- **NFPA Health Hazard**: 3
- **NFPA Fire Hazard**: 0
- **NFPA Reactivity Hazard**: 0

**HMIS Rating**
- **Health**: 3
- **Flammability**: 0
- **Physical**: 2
- **PPE**: See Section 8

**Abbreviations and Acronyms**
- AICS – Australian Inventory of Chemical Substances
- ACGIH – American Conference of Governmental Industrial Hygienists
- AIHA – American Industrial Hygiene Association
- ATE – Acute Toxicity Estimate
- BCF – Bioconcentration factor
- BEI – Biological Exposure Indices (BEI)
- CAS No. – Chemical Abstracts Service number
- CERCLA RQ – Comprehensive Environmental Response, Compensation, and Liability Act – Reportable Quantity
- CICR – Turkish Inventory and Control of Chemicals
- EC50 – Median effective concentration
- ECL – Korea Existing Chemicals List
- EINECS – European Inventory of Existing Commercial Chemical Substances
- ELINCS – European List of Notified Chemical Substances
- EmS – IMDG Emergency Schedule Fire & Spillage
- ENCS – Japanese Existing and New Chemical Substances Inventory
- EPA – Environmental Protection Agency
- EPCRA 304 RQ – EPCRA 304 Extremely Hazardous Substance Emergency Planning and Community Right-to-Know Act – Reportable Quantity
- ERAP Index – Emergency Response Assistance Plan Quantity Limit
- ERI-REACH – EC Regulation No. 1907/2006
- ERG code (IATA) – Emergency Response Drill Code as found in the International Civil Aviation Organization (ICAO)
- ERG No. – Emergency Response Guide Number
- HCCL – Hazard Communication Carcinogen List
- HMIS – Hazardous Materials Information System
- IARC – International Agency for Research on Cancer
- IATA – International Air Transport Association – Dangerous Goods Regulations
- IDLH – Immediately Dangerous to Life or Health
- IECS – Inventory of Existing Chemical Substances Produced or Imported in China
- IMDG – International Maritime Dangerous Goods Code
- INSQ – Mexican National Inventory of Chemical Substances
- ISHL – Japan Industrial Safety and Health Law
- LC50 – Median Lethal Concentration
- LDS0 – Median Lethal Dose
- LOAEL – Lowest Observed Adverse Effect Level
- LOEC – Lowest-observed-effect Concentration
- Log Pow – Octanol/water Partition Coefficient
- NIOSH – National Institute for Occupational Safety and Health
- NLP – Europe No Longer Polymers List
- NOAEL – No-Observed Adverse Effect Level
- NOEC – No-Observed Effect Concentration
- NZIOC – New Zealand Inventory of Chemicals
- OEL – Occupational Exposure Limits
- PEL – Permissible Exposure Limits
- PICCS – Philippine Inventory of Chemicals and Chemical Substances
- PDSCL – Japan Poisonous and Deleterious Substances Control Law
- PPE – Personal Protective Equipment
- PRTR – Japan Pollutant Release and Transfer Register
- REL – Recommended Exposure Limit
- REL – Self Accelerating Decomposition Temperature
- SARA 302 – Section 302, 40 CFR Part 355
- SARA 311/312 – Sections 311 and 312, 40 CFR Part 370 Hazard Categories
- SARA 313 – Section 313, 40 CFR Part 372
- SARA 313 – Section 313, 40 CFR Part 372
- SRCL – Specifically Regulated Carcinogen List
- STEL – Short Term Exposure Limit
- SVHC – European Candidate List of Substance of Very High Concern
- TLM – Median Tolerance Limit
- TLP – Threshold Limit Value
- TPQ – Threshold Planning Quantity
- TSCA – United States Toxic Substances Control Act
- TWA – Time Weighted Average
- WEEL – Workplace Environmental Exposure Levels
Ferric Sulfate 60%
Safety Data Sheet

Handle product with due care and avoid unnecessary contact. This information is supplied under U.S. OSHA’s “Right to Know” (29 CFR 1910.1200) and Canada’s WHMIS regulations. Although certain hazards are described herein, we cannot guarantee these are the only hazards that exist. The information contained herein is based on data available to us and is believed to be true and accurate but it is not offered as a product specification. No warranty, expressed or implied, regarding the accuracy of this data, the hazards connected with the use of the product, or the results to be obtained from the use thereof, is made and Chemtrade and its affiliates assume no responsibility. Chemtrade is a member of the CIAC (Chemistry Industry Association of Canada) and adheres to the codes and principles of Responsible Care™.
SAFETY DATA SHEET

SODIUM SULFIDE - FLAKES 60-62 %

Revision Date 01/24/2018

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier
- Trade name: SODIUM SULFIDE - FLAKES 60-62 %
- Chemical name: Disodium sulfide
- Synonyms: SODIUM SULFIDE HYDRATED
- Molecular formula: Na2S xH2O; x >= 2.66

1.2 Relevant identified uses of the substance or mixture and uses advised against

Uses of the Substance / Mixture
- Chemical industry
- Waste treatment
- Water treatment
- De-hairing agent
- Textile industry
- Manufacture of pulp, paper and paper products

Uses advised against
- none

1.3 Details of the supplier of the safety data sheet

Company
SOLVAY FLUORIDES, LLC
3737 Buffalo Speedway,
Suite 800,
Houston, TX 77098
USA
Tel: 800-515-6065

1.4 Emergency telephone

FOR EMERGENCIES INVOLVING A SPILL, LEAK, FIRE, EXPOSURE OR ACCIDENT, CONTACT CHEMTREC (24-Hour Number): 800-424-9300 within the United States and Canada, or 703-527-3887 for international collect calls.

SECTION 2: Hazards identification

Although OSHA has not adopted the environmental portion of the GHS regulations, this document may include information on environmental effects.

2.1 Classification of the substance or mixture

HCS 2012 (29 CFR 1910.1200)
- Corrosive to Metals, Category 1
- Acute toxicity, Category 3
- Skin corrosion, Category 1B
- Serious eye damage, Category 1
- H290: May be corrosive to metals.
- H301: Toxic if swallowed.
- H314: Causes serious eye damage.
- H318: Causes serious eye damage.
2.2 Label elements

**HCS 2012 (29 CFR 1910.1200)**

Pictogram

- Danger

**Hazard Statements**

- H290  May be corrosive to metals.
- H301  Toxic if swallowed.
- H314  Causes severe skin burns and eye damage.

**Precautionary Statements**

**Prevention**

- P234  Keep only in original container.
- P260  Do not breathe dusts or mists.
- P264  Wash skin thoroughly after handling.
- P270  Do not eat, drink or smoke when using this product.
- P280  Wear protective gloves/ protective clothing/ eye protection/ face protection.

**Response**

- P301 + P310 + P330  IF SWALLOWED: Immediately call a POISON CENTER/doctor. Rinse mouth.
- P301 + P330 + P331  IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
- P303 + P361 + P353  IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
- P304 + P340 + P310  IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.
- P305 + P351 + P338 + P310  IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.
- P363  Wash contaminated clothing before reuse.
- P390  Absorb spillage to prevent material damage.

**Storage**

- P405  Store locked up.
- P406  Store in corrosive resistant container with a resistant inner liner.

**Disposal**

- P501  Dispose of contents/ container to an approved waste disposal plant.

2.3 Other hazards which do not result in classification

- H400: Very toxic to aquatic life.

---

**SECTION 3: Composition/information on ingredients**

**3.1 Substance**
Hazardous Ingredients and Impurities

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>Identification number CAS-No.</th>
<th>Concentration [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disodium sulfide (hydrate)</td>
<td>27610-45-3</td>
<td>&gt;= 90 - &lt; 95</td>
</tr>
<tr>
<td>Sodium hydrogensulfide (hydrate)</td>
<td>207683-19-0</td>
<td>&gt;= 5 - &lt; 10</td>
</tr>
<tr>
<td>Carbonic acid sodium salt (1:2)</td>
<td>497-19-8</td>
<td>&gt;= 1 - &lt; 5</td>
</tr>
<tr>
<td>Thiosulfuric acid (H2S2O3), sodium salt (1:2)</td>
<td>7772-98-7</td>
<td>&gt;= 1 - &lt; 5</td>
</tr>
</tbody>
</table>

The specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.

3.2 Mixture
Not applicable, this product is a substance.

SECTION 4: First aid measures

4.1 Description of first-aid measures

In case of inhalation
- Move to fresh air.
- Oxygen or artificial respiration if needed.
- Victim to lie down in the recovery position, cover and keep him warm.
- Call a physician immediately.

In case of skin contact
- Take off contaminated clothing and shoes immediately.
- Wash off immediately with plenty of water.
- Keep warm and in a quiet place.
- Call a physician or poison control center immediately.
- Wash contaminated clothing before re-use.

In case of eye contact
- Call a physician or poison control center immediately.
- Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
- In the case of difficulty of opening the lids, administer an analgesic eye wash (oxybuprocaine).
- Take victim immediately to hospital.

In case of ingestion
- Call a physician or poison control center immediately.
- Take victim immediately to hospital.
- If swallowed, rinse mouth with water (only if the person is conscious).
- Do NOT induce vomiting.
- Artificial respiration and/or oxygen may be necessary.

4.2 Most important symptoms and effects, both acute and delayed

In case of inhalation
Symptoms
- At high concentrations:
  - slight irritation

**Effects**
- No hazards to be specially mentioned.

**In case of skin contact**

**Symptoms**
- Redness
- Swelling of tissue
- Burn

**Effects**
- Corrosive

**In case of eye contact**

**Symptoms**
- Redness
- Lachrymation
- Swelling of tissue
- Burn

**Effects**
- May cause irreversible eye damage.
- May cause blindness.

**In case of ingestion**

**Symptoms**
- Nausea
- Abdominal pain
- Bloody vomiting
- Diarrhea
- Suffocation
- Cough
- Severe shortness of breath

**Effects**
- If ingested, severe burns of the mouth and throat, as well as a danger of perforation of the esophagus and the stomach.

4.3 **Indication of any immediate medical attention and special treatment needed**
- no data available

**SECTION 5: Firefighting measures**

**Flash point**
Not applicable, inorganic

**Autoignition temperature**
> 806 °F (> 430 °C)

**Flammability / Explosive limit**
No data available

5.1 **Extinguishing media**

**Suitable extinguishing media**
- Foam
SAFETY DATA SHEET

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- powder

**Unsuitable extinguishing media**
- Water
- Carbon dioxide (CO2)

5.2 Special hazards arising from the substance or mixture

**Specific hazards during fire fighting**
- Not combustible.
- Hazardous decomposition products

**Hazardous combustion products:**
- Sulfur oxides

5.3 Advice for firefighters

**Special protective equipment for fire-fighters**
- Exposure to decomposition products may be a hazard to health.
- In the event of fire, wear self-contained breathing apparatus.
- Use personal protective equipment.
- Wear chemical resistant oversuit
- Cool containers/tanks with water spray.
- Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

**Advice for emergency responders**
- Isolate the area.
- Wear self-contained breathing apparatus and protective suit.

**Advice for non-emergency personnel**
- Prevent further leakage or spillage if safe to do so.

**Advice for non-emergency personnel**
- Sweep up to prevent slipping hazard.
- Avoid dust formation.

6.2 Environmental precautions
- Discharge into the environment must be avoided.
- Do not flush into surface water or sanitary sewer system.
- In case of accidental release or spill, immediately notify the appropriate authorities if required by Federal, State/Provincial and local laws and regulations.

6.3 Methods and materials for containment and cleaning up
- Pick up and arrange disposal without creating dust.
- Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
- Refer to protective measures listed in sections 7 and 8.
SECTION 7: Handling and storage

7.1 Precautions for safe handling
- Use product only in closed system.
- Ensure adequate ventilation.
- Keep away from heat.
- Keep away from incompatible products

Hygiene measures
- Eye wash bottles or eye wash stations in compliance with applicable standards.
- When using do not eat, drink or smoke.
- Handle in accordance with good industrial hygiene and safety practice.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/Storage conditions
- Store in original container.
- Keep in a well-ventilated place.
- Keep in a dry place.
- Keep in properly labeled containers.
- Keep container closed.
- Keep away from heat.
- Avoid dust formation.
- Keep away from incompatible products

Packaging material

Suitable material
- Steel drum
- Polyethylene

7.3 Specific end use(s)
- Contact your supplier for additional information

SECTION 8: Exposure controls/personal protection

Introductory Remarks: These recommendations provide general guidance for handling this product. Because specific work environments and material handling practices vary, safety procedures should be developed for each intended application. Assistance with selection, use and maintenance of worker protection equipment is generally available from equipment manufacturers.

8.1 Control parameters

Components with workplace occupational exposure limits

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Value type</th>
<th>Value</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbonic acid sodium salt (1:2)</td>
<td>TWA</td>
<td>10 mg/m3</td>
<td>Solvay Acceptable Exposure Limit</td>
</tr>
</tbody>
</table>
8.2 Exposure controls

Control measures

Engineering measures
- Provide appropriate exhaust ventilation at places where dust is formed.
- Apply technical measures to comply with the occupational exposure limits.

Individual protection measures

Respiratory protection
- In case of insufficient ventilation, wear suitable respiratory equipment.
- When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.
- In case of decomposition (see section 10), face mask with combined type B-P3 cartridge.
- Use only respiratory protection that conforms to international/ national standards.
- Use NIOSH approved respiratory protection.

Hand protection
- chemical resistant gloves
Suitable material
- PVC
- Neoprene
- Natural Rubber

Eye protection
- Goggles

Skin and body protection
- Dust impervious protective suit
- Apron
- Boots
- Neoprene
- PVC

Hygiene measures
- Eye wash bottles or eye wash stations in compliance with applicable standards.
- When using do not eat, drink or smoke.
- Handle in accordance with good industrial hygiene and safety practice.

SECTION 9: Physical and chemical properties

Physical and Chemical properties here represent typical properties of this product. Contact the business area using the Product information phone number in Section 1 for its exact specifications.

9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Form: flakes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state: solid</td>
<td>Color: yellow</td>
</tr>
<tr>
<td>Particle size: 3,500 µm d 50</td>
<td></td>
</tr>
</tbody>
</table>

Odor
- odorless rotten-egg like slight

Odor Threshold
- No data available
Molecular weight 132.09 g/mol

**pH**
12.9 (1 %)
13.1 saturated aqueous solution

**Melting point/freezing point**
Melting point/range: 156 - 199 °F (69 - 93 °C) (ca. 747.81 mmHg (997 hPa))

**Initial boiling point and boiling range**
Boiling point/boiling range: Not applicable

**Flash point**
Not applicable, inorganic

**Evaporation rate (Butylacetate = 1)**
Not applicable, inorganic

**Flammability (solid, gas)**
The product is not flammable.

**Flammability / Explosive limit**
Explosiveness: Not explosive

**Autoignition temperature**
> 806 °F (> 430 °C)

**Vapor pressure**
Not applicable, inorganic

**Vapor density**
Not applicable, inorganic

**Density**

**Relative density**
1.64 (70 °F (21 °C))

**Solubility**
Water solubility:
178 g/l (68 °F (20 °C))

Solubility in other solvents:
Alcohol : slightly soluble

**Partition coefficient: n-octanol/water**
Not applicable, inorganic

**Decomposition temperature**
Not applicable

**Viscosity**
Viscosity, dynamic: Solid form, Not applicable

**Explosive properties**
No data available

**Oxidizing properties**
Not considered as oxidizing.

9.2 Other information

**Corrosion of Metals**
Corrosive to metals
SECTION 10: Stability and reactivity

10.1 Reactivity
- Contact with acids liberates toxic gas.

10.2 Chemical stability
- Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
- Corrosive in contact with metals, Contact with acids liberates toxic gas.

10.4 Conditions to avoid
- Keep away from flames and hot surfaces.
- Exposure to moisture.

10.5 Incompatible materials
- Carbon dioxide (CO2)
- Acids
- Oxidizing agents
- Metals

10.6 Hazardous decomposition products
- Sulfur oxides
- Hydrogen sulfide (H2S)

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Acute oral toxicity
Disodium sulfide (hydrate)  
LD50 : 246 mg/kg - Rat , male and female  
Method: OECD Test Guideline 401  
This product is classified as acute toxicity category 3

Acute inhalation toxicity
Corrosive to the respiratory tract.

Acute dermal toxicity
Disodium sulfide (hydrate)  
study scientifically unjustified

Acute toxicity (other routes of administration)
No data available

Skin corrosion/irritation
Disodium sulfide (hydrate)  
Corrosive

Serious eye damage/eye irritation
Disodium sulfide (hydrate)  
Corrosive
Respiratory or skin sensitization

Disodium sulfide (hydrate) study scientifically unjustified

Mutagenicity

Genotoxicity in vitro
Disodium sulfide (hydrate) Ames test with and without metabolic activation
negative Method: OECD Test Guideline 471
Gene mutation assays in mammalian cells. Strain: mouse lymphoma cells with and without metabolic activation
negative Method: OECD Test Guideline 476

Genotoxicity in vivo
Disodium sulfide (hydrate) In vivo micronucleus test - Mouse male and female Intraperitoneal route Method: OECD Test Guideline 474
negative

Carcinogenicity

No data available

This product does not contain any ingredient designated as probable or suspected human carcinogens by:
NTP
IARC
OSHA

Toxicity for reproduction and development

Toxicity to reproduction / fertility
Disodium sulfide (hydrate) By analogy

Developmental Toxicity/Teratogenicity
Disodium sulfide (hydrate) By analogy
Inhalation Teratogenicity NOAEL: 80ppm Method: OECD Test Guideline 421 Test substance, Hydrogen sulfide
STOT

STOT-single exposure
Disodium sulfide (hydrate)  
The substance or mixture is not classified as specific target organ toxicant, single exposure according to GHS criteria.

STOT-repeated exposure
Disodium sulfide (hydrate)  
The substance or mixture is not classified as specific target organ toxicant, repeated exposure according to GHS criteria.

Disodium sulfide (hydrate)  
By analogy
  - Rat
  - Mouse
Inhalation (vapor) 90-day , male and female
NOAEC: 80 ppm(m)
Test substance: Hydrogen sulfide

Experience with human exposure
No data available

Aspiration toxicity
No data available

SECTION 12: Ecological information

12.1 Toxicity

Aquatic Compartment

Acute toxicity to fish
Disodium sulfide (hydrate)  
LC50 - 96 h : 0.0027 mg/l - Fish
Test substance: Hydrogen sulfide
By analogy
Acute toxicity to daphnia and other aquatic invertebrates.

Disodium sulfide (hydrate)  
EC50 - 96 h : 0.02 mg/l - Crustaceans  
Test substance: Hydrogen sulfide  
Fresh water  
By analogy

EC50 - 96 h : 0.032 mg/l - Crustaceans  
Test substance: Hydrogen sulfide  
salt water  
By analogy

Toxicity to aquatic plants

Disodium sulfide (hydrate)  
EC50 - 120 h : 1,900 mg/l  
Analytical monitoring: yes  
Fresh water  
By analogy

EC50 - 4 h : 0.104 mg/l - Skeletonema costatum (marine diatom)  
Analytical monitoring: yes  
salt water  
By analogy

Toxicity to microorganisms

No data available

Chronic toxicity to fish

Disodium sulfide (hydrate)  
NOEC: 0.0046 mg/l - 826 Days - Lepomis macrochirus (Bluegill sunfish)  
Test substance: Hydrogen sulfide  
By analogy

Chronic toxicity to daphnia and other aquatic invertebrates.

No data available

Chronic Toxicity to aquatic plants

No data available

M-Factor

Disodium sulfide (hydrate)  
Acute aquatic toxicity = 100  
( according to the Globally Harmonized System (GHS) )

12.2 Persistence and degradability

Abiotic degradation
Stability in water
Disodium sulfide (hydrate)
Water, Soil, complexation/precipitation of inorganic and organic materials
Water, Soil, Oxidation, Degradation products: sulfates

Photodegradation
Disodium sulfide (hydrate)
Chemical degradation
Half-life (direct photolysis): 1 h
Sensitizer: OH/O3 radicals
Degradation. indirect photolysis: 0.6 - 2 %
Test substance: Hydrogen sulfide
Air
Degradation products:
Sulphur dioxide
sulfates
Sulfides

Physical- and photo-chemical elimination
No data available

Biodegradation
Biodegradability
aerobic
Method: Oxidation
Test substance: Sulfides
Degradation products:
sulfites
sulfates

anaerobic
Method: biodegradation by sulforeduction
Test substance: sulfates
Degradation products:
Hydrogen sulfide

anaerobic
Method: methanogenesis
Test substance: sulfates
Inhibitor

Degradability assessment
Not applicable, inorganic substance

12.3 Bioaccumulative potential

Partition coefficient: n-octanol/water
Not applicable, inorganic substance

Bioconcentration factor (BCF)
Disodium sulfide (hydrate)
Not potentially bioaccumulable
12.4 Mobility in soil

**Adsorption potential (Koc)**
Disodium sulfide (hydrate) | Water/soil
considerable solubility and mobility

Air
mobility as solid aerosols

**Known distribution to environmental compartments**
No data available

12.5 Results of PBT and vPvB assessment
Not applicable

12.6 Other adverse effects
No data available

**Remarks**
Very toxic to aquatic organisms., Product fate is highly dependent on environmental conditions: pH, temperature, redox potential, mineral and organic content of the medium,

---

**SECTION 13: Disposal considerations**

13.1 Waste treatment methods

**Product Disposal**
- In accordance with local and national regulations.
- Where possible recycling is preferred to disposal or incineration.
- Use an FeCl₃ solution to precipitate FeS.
- Filtrate the product and send the cake to a landfill for industrial waste.

**Waste Code**
- Environmental Protection Agency
  - Hazardous Waste – YES

- Environmental Protection Agency
  - Hazardous Waste – YES

- RCRA Hazardous Waste (40 CFR 302)
  - D003 - Reactive waste – (R)

- RCRA Hazardous Waste (40 CFR 302)
  - D002 - Corrosive waste – (C)
  - D003 - Reactive waste – (R)

**Advice on cleaning and disposal of packaging**
- The empty and clean containers are to be reused in conformity with regulations.
- Uncleaned empty packaging
- Dispose of as unused product.
### SECTION 14: Transport information

Transportation status: IMPORTANT! Statements below provide additional data on listed transport classification. The listed Transportation Classification does not address regulatory variations due to changes in package size, mode of shipment or other regulatory descriptors.

**DOT**

<table>
<thead>
<tr>
<th>14.1 UN number</th>
<th>UN 1849</th>
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<tbody>
<tr>
<td>14.2 Proper shipping name</td>
<td>SODIUM SULFIDE, HYDRATED</td>
</tr>
<tr>
<td>14.3 Transport hazard class</td>
<td>8</td>
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<tr>
<td>Label(s)</td>
<td>8</td>
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<tr>
<td>14.4 Packing group</td>
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<tr>
<td>ERG No</td>
<td>153</td>
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<td>14.5 Environmental hazards</td>
<td>Marine pollutant</td>
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**TDG**

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<td>14.5 Environmental hazards</td>
<td>Marine pollutant</td>
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</table>

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SODIUM SULFIDE - FLAKES 60-62 %
Revision Date 01/24/2018

IMDG

14.1 UN number  UN 1849
14.2 Proper shipping name  SODIUM SULPHIDE, HYDRATED
14.3 Transport hazard class  8
Label(s):  8
14.4 Packing group  II
14.5 Environmental hazards  YES
Marine pollutant
14.6 Special precautions for user  F-A, S-B
For personal protection see section 8.

IATA

14.1 UN number  UN 1849
14.2 Proper shipping name  SODIUM SULPHIDE, HYDRATED
14.3 Transport hazard class  8
Label(s):  8
14.4 Packing group  II
Packing instruction (cargo aircraft)  863
Max net qty / pkg  50.00 kg
Packing instruction (passenger aircraft)  859
Max net qty / pkg  15.00 kg
14.5 Environmental hazards  YES
14.6 Special precautions for user  For personal protection see section 8.

Note: The above regulatory prescriptions are those valid on the date of publication of this sheet. Given the possible evolution of transportation regulations for hazardous materials, it would be advisable to check their validity with your sales office.
SECTION 15: Regulatory information

15.1 Notification status

<table>
<thead>
<tr>
<th>Inventory Information</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States TSCA Inventory</td>
<td>Listed on Inventory</td>
</tr>
<tr>
<td>Mexico INSQ (INSQ)</td>
<td>Listed on Inventory</td>
</tr>
<tr>
<td>Canadian Domestic Substances List (DSL)</td>
<td>Listed on Inventory</td>
</tr>
<tr>
<td>New Zealand. Inventory of Chemical Substances</td>
<td>Listed on Inventory</td>
</tr>
<tr>
<td>Australia Inventory of Chemical Substances (AICS)</td>
<td>Listed on Inventory</td>
</tr>
<tr>
<td>Japan. CSCL - Inventory of Existing and New Chemical Substances</td>
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<tr>
<td>Korea. Korean Existing Chemicals Inventory (KECI)</td>
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</tr>
<tr>
<td>China. Inventory of Existing Chemical Substances in China (IECSC)</td>
<td>Listed on Inventory</td>
</tr>
<tr>
<td>Philippines Inventory of Chemicals and Chemical Substances (PICCS)</td>
<td>Listed on Inventory</td>
</tr>
<tr>
<td>EU. European Registration, Evaluation, Authorisation and Restriction of Chemical (REACH)</td>
<td>If product is purchased from Solvay in Europe it is in compliance with REACH, if not please contact the supplier.</td>
</tr>
</tbody>
</table>

15.2 Federal Regulations

US. EPA EPCRA SARA Title III

SARA HAZARD DESIGNATION SECTIONS 311/312 (40 CFR 370)

<table>
<thead>
<tr>
<th>Category</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrosive to Metals</td>
<td>Yes</td>
</tr>
<tr>
<td>Acute toxicity (any route of exposure)</td>
<td>Yes</td>
</tr>
<tr>
<td>Skin corrosion or irritation</td>
<td>Yes</td>
</tr>
<tr>
<td>Serious eye damage or eye irritation</td>
<td>Yes</td>
</tr>
</tbody>
</table>

The categories not mentioned are not relevant for the product.

Section 313 Toxic Chemicals (40 CFR 372.65)
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Section 302 Emergency Planning Extremely Hazardous Substance Threshold Planning Quantity (40 CFR 355)
This material does not contain any components with a section 302 EHS TPQ.

Section 302 Emergency Planning Extremely Hazardous Substance Reportable Quantity (40 CFR 355)
This material does not contain any components with a SARA 302 RQ.

Section 304 Emergency Release Notification Reportable Quantity (40 CFR 355)
This material does not contain any components with a section 304 EHS RQ.
**SAFETY DATA SHEET**

**SODIUM SULFIDE - FLAKES 60-62 %**

Revision Date  01/24/2018

**US. EPA CERCLA Hazardous Substances and Reportable Quantities (40 CFR 302.4)**

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>CAS-No.</th>
<th>Reportable quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium hydrogensulfide (hydrate)</td>
<td>207683-19-0</td>
<td>5000 lb</td>
</tr>
</tbody>
</table>

Calculated RQ exceeds reasonably attainable upper limit.

**15.3 State Regulations**

**US. California Safe Drinking Water & Toxic Enforcement Act (Proposition 65)**

This product does not contain any chemicals known to the State of California to cause cancer, birth, or any other reproductive defects.

**SECTION 16: Other information**

**NFPA (National Fire Protection Association) - Classification**

<table>
<thead>
<tr>
<th>Category</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health</td>
<td>3 serious</td>
</tr>
<tr>
<td>Flammability</td>
<td>1 slight</td>
</tr>
<tr>
<td>Instability or Reactivity</td>
<td>1 slight</td>
</tr>
<tr>
<td>Special Notices</td>
<td>None</td>
</tr>
</tbody>
</table>

**HMIS (Hazardous Materials Identification System (Paint & Coating)) - Classification**

<table>
<thead>
<tr>
<th>Category</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health</td>
<td>3 serious</td>
</tr>
<tr>
<td>Flammability</td>
<td>1 slight</td>
</tr>
<tr>
<td>Reactivity</td>
<td>1 slight</td>
</tr>
<tr>
<td>PPE</td>
<td>Determined by User; dependent on local conditions</td>
</tr>
</tbody>
</table>

**Further information**

- Product evaluated under the US GHS format.

**Date Prepared:** 01/24/2018

- ACGIH  American Conference of Governmental Industrial Hygienists
- OSHA   Occupational Safety and Health Administration
- NTP    National Toxicology Program
- IARC   International Agency for Research on Cancer
- NIOSH  National Institute for Occupational Safety and Health

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information, and belief at the date of its publication. Such information is only given as a guidance to help the user handle, use, process, store, transport, dispose, and release the product in satisfactory safety conditions and is not to be considered as a warranty or quality specification. It should be used in conjunction with technical sheets but do not replace them. Thus, the information only relates to the designated specific product and may not be applicable if such product is used in combination with other materials or in any other manufacturing process, unless otherwise specifically indicated. It does not release the user from ensuring he is in conformity with all regulations linked to its activity.