APPENDIX 33

Emergency Response Plan

Victoria GOLD CORP

Stantec

EAGLE GOLD PROJECT

Emergency Response Plan Overview

FINAL REPORT

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1 INTRODUCTION

This document provides an overview of the information and procedures for emergency response that will be developed for the Eagle Gold Project (the Project). A comprehensive Emergency Response Plan (ERP) is required for the Quartz Mining License Application and will be developed as Project design advances. The ERP will be informed and modified by Project design, and while it will be completed prior to Project implementation, the ERP will continue to be modified throughout the life of the Project in response to Project phase, changing circumstances, regulatory requirements and responder capabilities when necessary.

The Project is a proposed gold mine that will use conventional heap leach and open pit operations over an eight year mine life. The Project consists of an open pit gold mine, crusher and conveyer system, heap leach facility, two waste rock storage areas, a process plant and several events ponds, along with related facilities and infrastructure.

The ERP will provide risk management planning and contingency response measures to address accidents, malfunctions, and emergencies that may arise at the mine site during the construction, operations, and closure and reclamation phases of the Project. The ERP will also establish notification responsibilities and response procedures in the event of an emergency. As stated above, the ERP and response procedures are part of an iterative process and will be adjusted and kept current to reflect the Project phase and resources available on site for responding to potential emergencies.

Emergency response preparedness is crucial to avoiding and mitigating any harmful effects to the environment or site personnel as a result of accidents or malfunctions. The procedures outlined herein are designed to protect the health and safety of mine personnel and the public, to minimize adverse impacts to wildlife, and to help ensure that the surrounding watershed is not degraded. The availability of an ERP enables site personnel to be prepared in the event of a spill or emergency situation. It applies to all persons on-site: mine personnel, contractor management and supervisors, subcontractor supervisors, as well as employees of contractors transporting, handling, and transferring hazardous or toxic materials on site. Victoria Gold Corp. (VIT) will require that all personnel and contractors be familiar with the ERP and emergency response procedures. Personnel will also be made aware of the location of equipment to be used in emergency response, and are asked to report any concerns regarding emergency response preparedness to their supervisor.

The ERP has been developed using industry and regulatory approved handling, storage, containment, response, and notification procedures, and is in accordance with the requirements of the *Yukon Environmental and Socio-economic Assessment Act* (YESAA).

The ERP applies to and is designed to cover potential situations within the extent of the mine site including: the operations area (open pit, crusher and conveyor system, heap leach facility, waste rock storage areas, process plant and events ponds etc.), associated camp facilities and infrastructure, and the access road. The Project is located off the Silver Trail (Highway 11), north north-east of Mayo, Yukon. Approximate driving distance to the Project site from Mayo is 85 km. Access to the Project site from the Silver Trail will be via the existing South McQuesten Road (SMR) and the Haggart Creek Road (HCR). Together, the SMR and HCR comprise a 45 km road, which is

divided by the South McQuesten River. If requested, VIT may also respond to any shipping related incidents between Whitehorse and Mayo, but is unable to assume responsibility outside this area.

1.1 Purpose

The primary purpose of the ERP is to provide a course of action in responding to accidents, system failures, or other emergency situations which may occur at the mine site during any phase of the Project. In particular, the ERP identifies the appropriate course of action for the following typical emergency situations:

- Release of hazardous or toxic substances (spill)
- Fire or explosion
- Slope failure (open pit and waste rock storage areas)
- Heap Leach Facility breach
- Natural disaster
- Security breach or threat to personnel or facilities
- Transportation emergencies
- Medical emergencies
- Missing persons
- Site evacuation.

The ERP includes internal emergency response procedures, and procedures for notifying relevant external agencies, services, and potentially affected parties. A coordinated joint emergency response is important for managing such situations.

The ERP also outlines the responsibilities of key personnel, and provides relevant contact information. General emergency response procedures are included to help avoid or reduce health and safety risks and to minimize environmental damage.

1.2 Document Control, Updating, and Testing of the ERP

VIT will maintain the control copy of the ERP, and be responsible for updating and implementing it in accordance with all relevant legislation and regulations. To ensure the relevant information in the ERP remains current, comprehensive, and effective (e.g. contact information of responders, MSDS sheets etc.), review and revisions will occur regularly and following any incident. Regular review will ensure the ERP is up-to-date with respect to current best management practices.

Current copies of the ERP will be kept at the following Project locations:

- Mine Manager's office
- Administrative offices (e.g. safety office)
- Departmental Superintendents' offices

- Environmental Coordinators' offices
- First Aid room
- Ambulance
- VIT corporate office.

Current copies of the ERP will also be provided to:

- First Nation of Na-Cho Nyäk Dun (FNNND)
- Village of Mayo
- Mayo RCMP, Fire Department, Health Centre and other First Responders
- Whitehorse General Hospital
- Environment Canada Spill Centre
- Government of Yukon, Department of Environment – Water Resources Branch
- Government of Yukon, Department of Environment – Environmental Affairs
- Government of Yukon, Energy, Mines and Resources – Minerals Development Branch
- Government of Yukon, Energy, Mines and Resources – Client Services and Inspection Branch.

The ERP will also be periodically tested to ensure its effectiveness during an emergency. The nature and timing of tests, along with the outcomes, will be recorded and used to inform modifications to the ERP. Random, unannounced emergency drills will be carried out from time to time to ensure preparedness of response crews, Project staff and contractors.

1.3 Other Documentation

Members of the VIT On Site Emergency Response Team (ERT) will have access to and be familiar with materials safety data sheets (MSDSs) and workplace hazardous materials information system (WHMIS) sheets for all chemicals and hazardous substances transported, stored, and used on-site. Copies of all MSDSs will be stored at strategic locations around the site, in the administrative offices, and at first aid stations. MSDSs for relevant materials will also be available in all locations near to where the material is used and stored.

Resource inventories of personnel, equipment, first aid kits, spill kits, and clean-up materials will also be maintained on-site and updated regularly. These inventories will also contain information on external resources (e.g. RCMP, fire department, other mining establishments with the capacity to provide assistance in the vicinity) available off-site.

1.4 Personnel Training

All staff and contractors on site will receive basic training, including environmental awareness, WHMIS, general emergency response, spill contingency measures, and communication procedures. Preparedness training will be conducted in accordance with the *Occupational Health and Safety Act*, associated Regulations, and any other relevant legislation. Members of the On Site ERT will receive

additional, more rigorous training, testing, and certification in emergency response, including such topics as:

- Advanced First Aid and CPR
- Workplace Hazardous Materials Information System (WHMIS)
- Materials safety data sheets [MSDSs] and "Action Plans" for transporting, handling and storing potentially hazardous materials
- *Transportation of Dangerous Goods Act* and Regulations
- Company policy and Environmental Management Plan (EMP)
- Relevant legislation and regulations
- Appropriate use of emergency response specific equipment and apparatus
- Response procedures: initial response, clean-up, storage, disposal, reporting, and reclamation
- Assessment and deployment of equipment and clean-up materials
- Internal/external communication systems and resources (equipment, ERT members, clean-up materials)
- Dealing with environmental variables (adverse weather, snow/ice, etc.)
- On-site and off-site transportation
- Responsibilities regarding updating of ERP and related documentation.

The nature and level of training required for individual site personnel will vary depending on their respective roles. Truck drivers transporting hazardous materials will also receive additional training on spill response, hazardous material handling, and emergency driving techniques. All supervision personnel will be trained in first aid. Refresher training will be provided to all site personnel annually. Contractors will be required to be familiar with the most recent version of the ERP and to assist in emergency response where possible.

1.5 Roles and Responsibilities

Specific roles and responsibilities will be assigned to personnel to create an organized Emergency Response Team (ERT) to manage any emergencies. Key roles and responsibilities within the ERT will be as follows.

The **Site Response Coordinator** (SRC) will be on site at all times, with a nominated backup SRC in the event that the primary SRC is incapacitated. The SRC will have primary responsibility for coordinating and directing the response to an emergency.

In the event of a spill or other emergency, the SRC will relay relevant information to key members of the ERT (as listed below). The SRC will also notify the appropriate authorities, and submit the required reports and documentation regarding the incident.

The **Environmental Manager** will assess potential environmental impacts of the incident, and coordinate mitigation activities. Upon notification by the SRC, the Environmental Manager will assess

the impact of the incident. In the case of a spill, the Environmental Manager will evaluate and determine appropriate actions to mitigate and clean up the spill. The Environmental Manager will also direct disposal and environmental restoration efforts related to the spill, in cooperation with relevant agencies.

The **Site Construction Supervisor** (SCS), upon notification by the SRC, will direct deployment of available on-site equipment (e.g. to aid in containment and clean-up of a spill). The SCS will also manage procurement of additional equipment and personnel—including contractors—if required.

The **Site Safety Supervisor** (SSS), upon notification by the SRC, will ensure that all personnel involved in emergency response are aware of possible hazards, have been instructed in proper emergency response techniques, and have been outfitted with appropriate personal protective equipment (PPE).

1.6 Inspections and Maintenance

Inspections in accordance with manufacturer recommended frequency will be carried out to verify that all emergency response equipment is available and in good repair. The inspections will check that records of maintenance and repairs for each piece of equipment are current, repairs are complete, and that appropriate recommendations have been made. Inspections will also be carried out at all facilities involved in the handling or storage of hazardous materials or waste streams. An inspection reporting schedule and location checklist will be provided by a designated manager at the mine site.

1.7 Security

An active security/safety system will be in place at the Project site. All incoming traffic entering the mine site area will be required to check in at a main control point. Visitors will be directed to the administration offices and equipment and supplies will be directed to the warehousing, cold storage, or reagent storage areas as appropriate. All trucks, containers and vehicles delivering reagents, fuels, or explosive materials will be inspected as they enter the property. The inspection will include:

- Compliance with MSDS product stewardship guidelines (e.g. appropriate storage and spill handling readiness)
- Cargo inspection, quantity and quality against waybills and bills-of-lading
- Checks for integrity and any visible leakage
- Safety devices such as chains, flares, fire extinguishers, and communication equipment
- General condition of the vehicle and equipment.

Routine inspections of the property (including the mine site, process plant site, waste rock storage area, and explosives magazine) will be carried out on a daily basis. All pumps stations and process control points will be equipped with adequate lighting or area and yard lighting to prevent vandalism and to allow detection of spills or leaks. Primary facilities will be secured or equipped with locks (i.e., valves or pump starters). Security for gold doré will include closed circuit television (CCTV)

monitoring, restricted access to refining facilities, and safe transfer and transportation of doré bars by a recognized security firm.

2 IDENTIFICATION AND MITIGATION OF HAZARDS

A range of potential hazards, accidents, and malfunctions may occur during all Project phases. Where possible, hazards have been identified and mitigation measures designed to prevent accidents and malfunctions, and to ameliorate any potential hazards. One of the main elements of VIT's emergency response planning has been to minimize emergency potential through design features. For example, all storage areas have been designed with runoff control facilities, liners containment dyking, berms or concrete flooring of the process plant itself, to reduce the risk of a spill. Many of these design features are outlined in the Project description (Section 5 of the Project Proposal). Section 8 of the Project Proposal assesses the effects to environmental and socio-economic valued components that could occur in the unlikely event of an accident or malfunction associated with the Project. The assessment identifies:

- Regulatory requirements
- Potential effects to VCs
- Mitigation measures (e.g. preventative measures, emergency response, clean-up, and restoration).

Potential accidents and malfunctions assessed included:

- Transportation accident
- Hazardous materials spill
- Heap leach facility breach
- Slope failure (open pit and WRSAs)
- Water conveyance and storage infrastructure failure
- Power failure
- Fire and/or explosion.

Mitigation measures to reduce the likelihood and minimize the extent of the above potential accidents and malfunctions are also provided in Section 5 and 8 of the Project Proposal.

3 EMERGENCY RESPONSE PROCEDURES

3.1 General Procedures and Reporting

The following general course of action will be followed by any person who indentifies an emergency situation. Depending on the exact nature of the emergency, variations and situation-specific procedures will be implemented.

Step 1:

Ensure the immediate safety of all affected personnel. Where it is safe and reasonable to do so, remove all personnel from dangers posed by the emergency. Do not place yourself in danger.

Step 2:

Contact appropriate supervisor – usually the SRC.

Step 3:

Take steps, under the direction of the appropriate supervisor (SRC, Environmental Manager, SSS or SCS), to stop, slow or reduce the severity of the emergency (if safe to do so).

Step 4:

Report the details of the emergency to the appropriate supervisors and external agencies (under the direction of the SRC).

3.2 Release of Hazardous or Toxic Substances (Spill)

A **spill** is defined as:

> *a release of substance*
>
> *(a) into the natural environment;*
>
> *(b) from or out of a structure, vehicle, or other container; and*
>
> *(c) that is abnormal in quantity or quality in light of all the circumstances of the release; or*
>
> *(d) in excess of an amount specified in the regulations. (Yukon Government 2010)*

Where a **substance** is defined as:

> *a hazardous substance, pesticide, contaminant, or special waste. (Yukon Government 1991).*

The mine site will use substantial amounts of diesel fuel, along with gasoline, lubricating oils, hydraulics oil, and a range of hazardous chemical reagents. Some of the materials are fire and explosion hazards, and can also be problematic if spilled. Storage and handling facilities have been designed for spill containment (e.g. runoff controls, liners, containment dikes, or concrete floors) to minimize these risks. Hazardous substances on-site are listed in Table 3.2-1 below.

Table 3.2-1: Hazardous Substances On-site

Substance	TDGA Class[a]	Reportable Quantity[b]
Gasoline and Diesel	Class 3.	200 L (any amount if spilled into a watercourse).
Lubricating and Hydraulic oils	Not regulated.	200 L (any amount if spilled into a watercourse).
Sodium cyanide (briquettes)	Class 6.1.	N/A
Sodium hydroxide (anhydrous)	Class 8.	5 kg or 5 L.
Hydrochloric acid (32%/10M)	Class 8.	5 kg or 5 L.
Lime (CaO)	Class 8 (aircraft only).	5 kg or 5 L.
Hydrogen peroxide (50%)	Class 5.1	50 kg or 50 L.
Copper sulfate pentahydrate ($CuSO_4.5H_2O$)	Class 9.	50 kg or 50 L.
Fortan Advantage/Fortis Advantage/Fortis Advantage ANE (Ammonium nitrate/Mineral oil/Diesel fuel)	Class 1.5D	Any amount.
Portland cement	Not regulated.	N/A
Smelting flux component 10% (borax)	Not regulated.	N/A
Smelting flux component 80% (fluorspar – CaF_2)	Not regulated.	N/A
Smelting flux component 5% (sodium carbonate)	Not regulated.	N/A
Smelting flux component 5% (sodium nitrate)	Class 5.1.	50 kg or 50 L.
Antiscalant – Leach circuit (Millsperse 802)	Not regulated.	N/A
Antiscalant – Stripping circuit (Nalco 7814) (Tetrasodium EDTA, Sodium hydroxide)	Class 8 (marine and aircraft only).	5 kg or 5 L.

NOTES:
[a] *Transportation of Dangerous Goods Act* (*TDGA*) Classes taken from MSDS sheets (Appendix A)
[b] Source: Yukon Government 1996

Potential release scenarios that may occur on-site include:

- Mechanical failure of equipment or ruptures at storage facilities
- Accidental release from tanks or piping
- Accidental release from transport container or vehicle along access road
- Spill during resupply of fuel storage facilities
- Transfer spill during loading or unloading on on-site containers or vehicles.

In the event of a release, the following general steps will be followed:

1. **Ensure safety**. Determine the nature of the substance released (if not possible, assume dangerous), use appropriate Personal Protection Equipment (PPE), and ensure the safety of nearby personnel. Remove all ignition sources if substance is flammable or not able to be identified. ***If area is not safe, initiate evacuation***.

2. **Notify the supervisor and ERT**. These people will mobilize and manage the spill response. SRC to notify appropriate internal contacts and external agencies.
3. **Stop the flow** (if possible). Close valves, shut off pumps and plug holes or leaks (if safe to do so). Stop flow at the source.
4. **Secure the area**. Limit access to the spill area, and prevent unauthorized entry.
5. **Contain the release**. Block off and protect drains and culverts, prevent substances from entering drainage structures (except those designed for spill management), use dykes or other structures to prevent discharge from site, and use sorbet materials if appropriate.
6. **Clean-up**. Under direction of the Environmental Manager, or nominated supervisor, begin clean-up activities.
7. **Report the spill**. The SRC will report the spill (if reportable) any appropriate agencies, including the Yukon 24-hour spill report line.

Specific **Spill Response Procedures** will be developed for each of the hazardous substances used at the mine site and for each of the following three scenarios:

- Spills on land
- Spills on snow or ice
- Spills in water.

3.3 Fire or Explosion

In the event of a fire or explosion, the SRC will determine the best course of action and deployment of on-site equipment and personnel. On-site resources will be utilized immediately upon detection to reduce the need for external assistance. Fire suppression water will flow by gravity through a pressurized main to the process facilities. Fire protection for the mine site and facilities is provided by an on site fire truck and a standpipe outside and two 100 mm hose connections inside all of the heated buildings. The process offices, laboratory, and shop/warehouse will all be fitted with sprinkler systems. Portable fire extinguishers will also be provided in all buildings.

In the event of a power failure, three emergency diesel generation sets will be provided to ensure sufficient power and fuel for operation of critical equipment (fire water and fresh water distribution systems, and fire and other alarm systems).

3.4 Slope Failure (Open Pit and Waste Rock Storage Areas)

The design of the open pit will ensure that any slope failures result only in the movement of material into the pit itself, and no effects to environmental resources are anticipated due to potential slope failure. The major risk associated with a catastrophic failure of the pit high wall is worker safety. In the event of a slope failure, the SRC will assume immediate control of the response, until other agencies are available to assist.

3.5 Natural Disaster

In the event that a natural disaster or extreme weather causes damage to the facility and possibly requires evacuation, the SRC will coordinate the response in concert with other supervisors. All on-site personnel will follow the SRC's directions through the emergency broadcast system, or by other means. If an evacuation is deemed necessary, it will proceed according to the general evacuation plan (see Section 3.10).

3.6 Security Breach or Threat to Personnel or Facilities

The security system (as described in Section 1.7) will prevent accidental or intentional entry to the plant. The security system will be designed to prevent vandalism, theft, sabotage, or other improper or illegal use of facilities that could possibly result in an incident.

Mine management will delegate the responsibility of responding to security breaches to appropriate personnel. Assigned personnel will coordinate responses to any security breach.

Because of the nature of materials stored on-site—hazardous chemicals, fuels, and explosives—all threats to personnel or facilities will be treated seriously. Any threat will be considered genuine until conformed otherwise. Plans for dealing with specific threat scenarios will be developed by VIT, as deemed necessary by risk assessments.

3.7 Transportation Emergencies

The access road to the mine site will be used to transport personnel, as well as a range of hazardous materials. As with all road transport, there is some risk of collision and vehicle malfunction. During transport of hazardous materials, there is also the risk of spills, including into waterways.

To reduce the likelihood of transportation incidents, the access road will be designed and upgraded to provide a safe transport route. This includes road realignments, vegetation clearing where necessary to increase visibility, the improvement of road structure, and the construction of regular pull-outs along the road. The road will also be radio controlled to help monitor road use and decrease the likelihood of accidents.

Transporters will be carefully selected and will be required to have Department of Transport certification, training in spill response, hazardous materials safety and handling procedures (including MSDSs), as well as full knowledge of VIT's and the Project's safe driving standards. Each approved transporter will be periodically reviewed to assure that they continue to carry valid Department of Transport certification. Transporters will be required to follow all Federal Department of Transportation regulations for the transportation of dangerous goods, as defined in the *Transportation of Dangerous Goods Act*.

Spill potential will be minimized by scheduling deliveries to avoid any regular or temporary congestion that may occur along routes leading to the Project site.

In the event of a transportation emergency (e.g. spill) the transporter or other agency (RCMP) who is first made aware of the emergency will be required to notify the Territory Emergency Response Office. When VIT is informed of the incident, the SRC may direct the ERT to the scene (if requested), although VIT will assume no responsibility for the incident beyond their defined response area (as noted in Section 1). The transporter or contact carrier will be required to implement their own spill response plan for all points enroute to the mine site.

3.8 Medical Emergencies

The SSS and other available first aid personnel will initially respond to any on-site medical emergency. A first aid room with appropriate equipment and an ambulance will be located on-site. There will also be a number of first aid stations located around the site. These facilities will be outfitted in accordance with Yukon Workers' Compensation Health and Safety Board (WCB) regulations. The SSS will coordinate record keeping as required by the WCB.

A senior first aid attendant or emergency medical responder will be on site at all times, and will take over medical response from first aid personnel. If the senior first aid attendant, emergency medical responder or SSS determines that an injury or illness requires further medical attention, the patient will be transported by the on-site ambulance to Mayo. A helicopter landing area will be designated on site, in case emergency medical evacuation is necessary. If a large number of injuries take place, the senior first aid attendant or emergency medical responder will be responsible for triaging patients and directing the efforts of other first aid personnel.

In the event of a fatality, the RCMP will be notified and the scene secured to allow for proper investigation. The SRC will be responsible for coordinating this process, and ensuring that record keeping conforms to WCB and other jurisdictional requirements.

3.9 Missing Persons

Persons may become lost on the property and be reported as overdue and out-of-contact. Missing person situations may require the support and involvement of the RCMP or Search and Rescue agencies. In the event a person is determined to be missing, the supervisor should be notified immediately. The supervisor will then:

1. Assess the situation and determine the level of response required.
2. Gather all available information about the missing persons, including their last known location.
3. Advise the RCMP of the circumstances and request further assistance.
4. Designate other personnel to stand-by and assist the RCMP in search efforts as directed.

Radio check-ins and work plans will be used by personnel working alone in remote areas to reduce the potential for this situation to occur.

3.10 Site Evacuation

A general evacuation plan will be developed for situations where evacuation of personnel is deemed necessary. A site-wide notification and alarm system will be established. The need for a site evacuation could be signaled:

- Automatically by fire or gas detectors
- Manually by personnel
- Manually by the SRC during an emergency.

The site evacuation plan will provide for the rapid and safe evacuation of all personnel and will include a process for cross-checking the personnel present on-site, including visitors. Primary transportation as well as alternative or backup transportation options will be specified in the plan, and scoped to cope with the maximum number people on-site at any given time. The plan will account for increased personnel on-site during shift changes. The plan will also identify the locations of muster stations around the Project site. These will be pointed out to all personnel and visitors during their initial site orientation. Site-wide evacuation drills will be part of regular ERP testing.

4 REFERENCES

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APPENDIX A

Materials Safety Data Sheets (MSDSs)

MILLSPERSE 802 ANTISCALANT

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Material Identity
Product Name: MILLSPERSE 802 ANTISCALANT
Product Code:
General or Generic ID: ANTISCALANT

Company

Ashland
Ashland Distribution Co. &
Ashland Specialty Chemical Co.
P. O. Box 2219
Columbus, OH 43216
614-790-3333

Emergency Telephone Number:
1-800-ASHLAND (1-800-274-5263)
24 hours everyday

Regulatory Information Number:
1-800-325-3751

2. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient(s)	CAS Number	% (by weight)
POLY(MALEIC ACID)	26099-09-2	5.0- 15.0
ORGANIC ACID		1.0- 10.0

3. HAZARDS IDENTIFICATION

Potential Health Effects

Eye
Can cause permanent eye injury. Symptoms include stinging, tearing, redness, and swelling of eyes. Can injure the cornea and cause blindness.

Skin
Can cause permanent skin damage. Symptoms may include redness, burning, and swelling of skin, burns, and other skin damage.

Swallowing
Swallowing this material may be harmful or fatal. Symptoms may include severe stomach and intestinal irritation (nausea, vomiting, diarrhea), abdominal pain, and vomiting of blood. Swallowing this material may cause burns and destroy tissue in the mouth, throat, and digestive tract. Low blood pressure and shock may occur as a result of severe tissue injury.

Inhalation
Breathing this material may be harmful or fatal. Symptoms may include severe irritation and burns to the nose, throat, and respiratory tract.

Symptoms of Exposure
Signs and symptoms of exposure to this material through breathing, swallowing, and/or passage of the material through the skin may include: stomach or intestinal upset (nausea, vomiting, diarrhea), irritation (nose, throat, airways), lung edema (fluid buildup in the lung tissue).

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Target Organ Effects
No data

Developmental Information
Based on the available information, risk to the fetus from maternal exposure to this material cannot be assessed.

Cancer Information
This material is not expected to cause cancer in humans since it did not cause cancer in laboratory animals. This material is not listed as a carcinogen by the International Agency for Research on Cancer, the National Toxicology Program, or the Occupational Safety and Health Administration.

Other Health Effects
No data

Primary Route(s) of Entry
Inhalation, Skin contact, Eye contact, Ingestion - Industrial products are not meant to be swallowed.

4. FIRST AID MEASURES

Eyes
If material gets into the eyes, immediately flush eyes gently with water for at least 15 minutes while holding eyelids apart. If symptoms develop as a result of vapor exposure, immediately move individual away from exposure and into fresh air before flushing as recommended above. Seek immediate medical attention.

Skin
Immediately flush skin with water for at least 15 minutes while removing contaminated clothing and shoes. Seek immediate medical attention. Wash clothing before reuse and discard contaminated shoes.

Swallowing
Seek immediate medical attention. Do not induce vomiting. Vomiting will cause further damage to the mouth and throat. If individual is conscious and alert, immediately rinse mouth with water and give milk or water to drink. If possible, do not leave individual unattended.

Inhalation
If symptoms develop, immediately move individual away from exposure and into fresh air. Seek immediate medical attention; keep person warm and quiet. If person is not breathing, begin artificial respiration. If breathing is difficult, administer oxygen.

Note to Physicians
Preexisting disorders of the following organs (or organ systems) may be aggravated by exposure to this material: skin, lung (for example, asthma-like conditions), eye.

5. FIRE FIGHTING MEASURES

Flash Point
Not applicable

Continued on next page

Explosive Limit
Not applicable

Autoignition Temperature
No data

Hazardous Products of Combustion
May form: carbon dioxide and carbon monoxide.

Fire and Explosion Hazards
No special fire hazards are known to be associated with this product.

Extinguishing Media
Use an extinguishing media appropriate for surrounding fire.

Fire Fighting Instructions
Use water spray to cool fire exposed containers and structures until fire is out if it can be done with minimal risk. Avoid spreading burning liquid with water used for cooling purposes. Wear full firefighting turn-out gear (full Bunker gear), and respiratory protection (SCBA).

NFPA Rating
Health - 3, Flammability - 0, Reactivity - 1

6. ACCIDENTAL RELEASE MEASURES

Small Spill
Absorb liquid on vermiculite, floor absorbent or other absorbent material. Scoop or scrape up. Put in container for recovery or disposal. May be neutralized with soda ash, TSP, or bicarbonate of soda.

Large Spill
Persons not wearing protective equipment should be excluded from area of spill. Stop spill at source. Dike to prevent spreading. Carefully add lime or sodium carbonate to neutralize acid. Place residue in a container for disposal.

7. HANDLING AND STORAGE

Handling
Containers of this material may be hazardous when emptied. Since emptied containers retain product residues (vapor, liquid, and/or solid), all hazard precautions given in the data sheet must be observed.

Storage
Product solutions are corrosive to many commonly used materials of construction such as steel, galvanized iron, aluminum, tin and zinc. These solutions can be stored and handled in baked phenolic-lined steel, polyethylene, stainless steel, or reinforced epoxy-plastic equipment. Store in closed containers in a dry, well-ventilated area.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Eye Protection
Chemical splash goggles and face shield (8" min.) in compliance with OSHA regulations are advised; however, OSHA regulations also permit other type safety glasses. (Consult your industrial hygienist.)

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Skin Protection
Wear resistant gloves such as: nitrile rubber, polyvinyl chloride, To prevent repeated or prolonged skin contact, wear impervious clothing and boots. Wear acid-resistant apron, or in emergency conditions, acid-resistant clothing and boots.

Respiratory Protections
If overexposure has been determined or documented, a NIOSH/MSHA jointly approved air supplied respirator is advised in absence of proper environmental control. OSHA regulations also permit other NIOSH/MSHA respirators under specified conditions. (See your safety equipment supplier.) Engineering or administrative controls should be implemented to reduce exposure.

Engineering Controls
Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below level of overexposure (from known, suspected or apparent adverse effects).

Exposure Guidelines
Component

POLY(MALEIC ACID) (26099-09-2)
No exposure limits established

ORGANIC ACID
No exposure limits established

9. PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point
(for component) 212.0 F (100.0 C)

Vapor Pressure
(for component) 17.500 mmHg

Specific Vapor Density
< 1.000 @ AIR=1

Specific Gravity
1.040 @ 77.00 F

Liquid Density
8.654 lbs/gal @ 77.00 F
1.040 kg/l @ 25.00 C

Percent Volatiles
85.0 - 100.0 %

Evaporation Rate
SLOWER THAN ETHYL ETHER

Continued on next page

Appearance
CLEAR, STRAW YELLOW LIQUID

State
LIQUID

Physical Form
HOMOGENEOUS SOLUTION

Color
CLEAR, STRAW YELLOW

Odor
No data

pH
1.4 - 2.2

10. STABILITY AND REACTIVITY

Hazardous Polymerization
Product will not undergo hazardous polymerization.

Hazardous Decomposition
May form: carbon dioxide and carbon monoxide.

Chemical Stability
Stable.

Incompatibility
Avoid contact with: nitrites, strong alkalis, strong oxidizing agents, sulphites.

11. TOXICOLOGICAL INFORMATION

This mixture has not been specifically tested.

12. ECOLOGICAL INFORMATION

Ecotoxicological Information
This mixture has not been specifically tested.

13. DISPOSAL CONSIDERATION

Waste Management Information
Dispose of in accordance with all applicable local, state and federal regulations. For assistance with your waste management needs - including disposal, recycling and waste stream reduction, contact Ashland Distribution Company, IC&S Environmental Services Group at 800-531-7106.

Continued on next page

14. TRANSPORT INFORMATION

DOT Information - 49 CFR 172.101

DOT Description:
NON-REGULATED BY D.O.T.

Container/Mode:
55 GAL DRUM/TRUCK PACKAGE

NOS Component:
None

RQ (Reportable Quantity) - 49 CFR 172.101
Not applicable

Other Transportation Information
The Transport Information may vary with the container and mode of shipment.

15. REGULATORY INFORMATION

US Federal Regulations

TSCA (Toxic Substances Control Act) Status
TSCA (UNITED STATES) The intentional ingredients of this product are listed

CERCLA RQ - 40 CFR 302.4(a)
None

CERCLA RQ - 40 CFR 302.4(b)
This material has a RQ of 100 lbs as a D002 Corrosive unlisted hazardous substance.

SARA 302 Components - 40 CFR 355 Appendix A
None

Section 311/312 Hazard Class - 40 CFR 370.2
Immediate(X) Delayed( ) Fire( ) Reactive( ) Sudden Release of Pressure( )

SARA 313 Components - 40 CFR 372.65
None

OSHA Process Safety Management 29 CFR 1910
None listed

EPA Accidental Release Prevention 40 CFR 68
None listed

International Regulations

Inventory Status
DSL (CANADA) The intentional ingredients of this product are listed.

State and Local Regulations

California Proposition 65
None

Continued on next page

16. OTHER INFORMATION

The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances.

MATERIAL SAFETY DATA SHEET

PRODUCT

ENDUR 7814 SCALE CONTROL

EMERGENCY TELEPHONE NUMBER(S)
(800) 424-9300 (24 Hours) CHEMTREC

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME : **ENDUR 7814 SCALE CONTROL**

APPLICATION : SCALE CONTROL

COMPANY IDENTIFICATION : Nalco Company
1601 W. Diehl Road
Naperville, Illinois
60563-1198

EMERGENCY TELEPHONE NUMBER(S) : (800) 424-9300 (24 Hours) CHEMTREC

NFPA 704M/HMIS RATING
HEALTH : 2 / 2 FLAMMABILITY : 1 / 1 INSTABILITY : 0 / 0 OTHER :
0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme

2. COMPOSITION/INFORMATION ON INGREDIENTS

Our hazard evaluation has identified the following chemical substance(s) as hazardous. Consult Section 15 for the nature of the hazard(s).

Hazardous Substance(s)	CAS NO	% (w/w)
Tetrasodium EDTA	64-02-8	30.0 - 60.0
Sodium Hydroxide	1310-73-2	1.0 - 5.0

3. HAZARDS IDENTIFICATION

****EMERGENCY OVERVIEW****

WARNING
Irritating to eyes and skin.
Do not get in eyes, on skin, on clothing. Do not take internally. Keep container tightly closed. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of water. Protect product from freezing.
Wear suitable protective clothing, gloves and eye/face protection.
May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of nitrogen (NOx) under fire conditions. May evolve ammonia under fire conditions. Contact with reactive metals (e.g. aluminum) may result in the generation of flammable hydrogen gas.

PRIMARY ROUTES OF EXPOSURE :
Eye, Skin

HUMAN HEALTH HAZARDS - ACUTE :

EYE CONTACT :
Can cause severe irritation.

SKIN CONTACT :
May cause severe irritation or tissue damage depending on the length of exposure and the type of first aid administered.

INGESTION :
Not a likely route of exposure. May be harmful if swallowed.

INHALATION :
Not a likely route of exposure. Aerosols or product mist may irritate the upper respiratory tract.

SYMPTOMS OF EXPOSURE :
Acute :
A review of available data does not identify any symptoms from exposure not previously mentioned.
Chronic :
A review of available data does not identify any symptoms from exposure not previously mentioned.

AGGRAVATION OF EXISTING CONDITIONS :
A review of available data does not identify any worsening of existing conditions.

HUMAN HEALTH HAZARDS - CHRONIC :
EDTA may cause calcium deficiency in the blood.

4. FIRST AID MEASURES

EYE CONTACT :
Immediately flush eye with water for at least 15 minutes while holding eyelids open. If irritation persists, repeat flushing. Get medical attention.

SKIN CONTACT :
Immediately flush with plenty of water for at least 15 minutes. If symptoms develop, seek medical advice.

INGESTION :
Do not induce vomiting without medical advice. If conscious, washout mouth and give water to drink. Get medical attention.

INHALATION :
Remove to fresh air, treat symptomatically. If symptoms develop, seek medical advice.

NOTE TO PHYSICIAN :
Based on the individual reactions of the patient, the physician's judgement should be used to control symptoms and clinical condition.

5. FIRE FIGHTING MEASURES

FLASH POINT : None

EXTINGUISHING MEDIA :
This product would not be expected to burn unless all the water is boiled away. The remaining organics may be ignitable. Keep containers cool by spraying with water. Use extinguishing media appropriate for surrounding fire.

FIRE AND EXPLOSION HAZARD :
May evolve oxides of carbon (COx) under fire conditions. May evolve oxides of nitrogen (NOx) under fire conditions. May evolve ammonia under fire conditions. Contact with reactive metals (e.g. aluminum) may result in the generation of flammable hydrogen gas.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTING :
In case of fire, wear a full face positive-pressure self contained breathing apparatus and protective suit.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS :
Restrict access to area as appropriate until clean-up operations are complete. Ensure clean-up is conducted by trained personnel only. Ventilate spill area if possible. Do not touch spilled material. Stop or reduce any leaks if it is safe to do so. Use personal protective equipment recommended in Section 8 (Exposure Controls/Personal Protection). Notify appropriate government, occupational health and safety and environmental authorities.

METHODS FOR CLEANING UP :
SMALL SPILLS: Soak up spill with absorbent material. Place residues in a suitable, covered, properly labeled container. Wash affected area. LARGE SPILLS: Contain liquid using absorbent material, by digging trenches or by diking. Reclaim into recovery or salvage drums or tank truck for proper disposal. Wash site of spillage thoroughly with water. Contact an approved waste hauler for disposal of contaminated recovered material. Dispose of material in compliance with regulations indicated in Section 13 (Disposal Considerations).

ENVIRONMENTAL PRECAUTIONS :
Do not contaminate surface water.

7. HANDLING AND STORAGE

HANDLING :
Do not take internally. Do not get in eyes, on skin, on clothing. Have emergency equipment (for fires, spills, leaks, etc.) readily available. Ensure all containers are labeled. Keep the containers closed when not in use. Use with adequate ventilation.

STORAGE CONDITIONS :
Store the containers tightly closed. Store in suitable labeled containers. Store in suitable labeled containers. Store the containers tightly closed. Store separately from acids.

SUITABLE CONSTRUCTION MATERIAL :
Compatibility with Plastic Materials can vary; we therefore recommend that compatibility is tested prior to use.

UNSUITABLE CONSTRUCTION MATERIAL :
Do not use aluminum or mild steel., Copper, Zinc, Nickel, and their alloys

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS :
Exposure guidelines have not been established for this product. Available exposure limits for the substance(s) are shown below.

ACGIH/TLV :
Substance(s)
Sodium Hydroxide CEILING: 2 mg/m3

OSHA/PEL :
Substance(s)
Sodium Hydroxide CEILING: 2 mg/m3

ENGINEERING MEASURES :
The use of local exhaust ventilation is recommended to control emissions near the source. Laboratory samples should be handled in a fumehood. Provide mechanical ventilation of confined spaces.

RESPIRATORY PROTECTION :
Respiratory protection is not normally needed. Where concentrations in air may exceed the limits given in this section, the use of a half face filter mask or air supplied breathing apparatus is recommended. A suitable filter material depends on the amount and type of chemicals being handled. Consider the use of filter type: Multi-contaminant cartridge. with a Particulate pre-filter. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

HAND PROTECTION :
When handling this product, the use of chemical gauntlets is recommended., The choice of work glove depends on work conditions and what chemicals are handled, but we have positive experience under light handling conditions using gloves made from, PVC, Gloves should be replaced immediately if signs of degradation are observed., Breakthrough time not determined as preparation, consult PPE manufacturers.

SKIN PROTECTION :
When handling this product, the use of overalls, a chemical resistant apron and rubber boots is recommended. A full slicker suit is recommended if gross exposure is possible.

EYE PROTECTION :
Wear chemical splash goggles.

HYGIENE RECOMMENDATIONS :
If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse. Keep an eye wash fountain available. Keep a safety shower available. Always wash thoroughly after handling chemicals. When handling this product never eat, drink or smoke.

HUMAN EXPOSURE CHARACTERIZATION :
Based on our recommended product application and personal protective equipment, the potential human exposure is: Low

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	Liquid
APPEARANCE	Clear Light yellow
ODOR	Slight, Amine

SPECIFIC GRAVITY	1.26 - 1.29 @ 77 °F / 25 °C
DENSITY	10.5 - 10.7 lb/gal
SOLUBILITY IN WATER	Miscible
pH (1 %)	10.5 - 11.8
FREEZING POINT	-24 °F / -31 °C
BOILING POINT	219 °F / 104 °C
VAPOR PRESSURE	20 mm Hg @ 70 °F / 21.1 °C
VOC CONTENT	0.00 % EPA Method 24

Note: These physical properties are typical values for this product and are subject to change.

10. STABILITY AND REACTIVITY

STABILITY :
Stable under normal conditions.

HAZARDOUS POLYMERIZATION :
Hazardous polymerization will not occur.

CONDITIONS TO AVOID :
Freezing temperatures.
Keep at temperature not exceeding 120 °F

MATERIALS TO AVOID :
Contact with strong acids (e.g. sulfuric, phosphoric, nitric, hydrochloric, chromic, sulfonic) may generate heat, splattering or boiling and toxic vapors. Contact with reactive metals (e.g. aluminum) may result in the generation of flammable hydrogen gas.

HAZARDOUS DECOMPOSITION PRODUCTS :
Under fire conditions: Oxides of carbon, Oxides of nitrogen, ammonia

11. TOXICOLOGICAL INFORMATION

The following results are for the product.

ACUTE ORAL TOXICITY :

Species	LD50	Test Descriptor
Rat	3,030 mg/kg	Product

Rating : Non-Hazardous

ACUTE DERMAL TOXICITY :

Species	LD50	Test Descriptor
Rabbit	> 5,000 mg/kg	Product

Rating : Non-Hazardous

CARCINOGENICITY :
None of the substances in this product are listed as carcinogens by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

HUMAN HAZARD CHARACTERIZATION :
Based on our hazard characterization, the potential human hazard is: Moderate Low

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL EFFECTS :

The following results are for the product.

ACUTE FISH RESULTS :

Species	Exposure	LC50	Test Descriptor
Bluegill Sunfish	96 hrs	1,000 mg/l	Hazardous component (Tetrasodium EDTA)

ACUTE INVERTEBRATE RESULTS :

Species	Exposure	LC50	EC50	Test Descriptor
Daphnia magna	24 hrs		610 mg/l	Hazardous component (Tetrasodium EDTA)

MOBILITY :
The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	Water	Soil/Sediment
<5%	30 - 50%	50 - 70%

The portion in water is expected to be soluble or dispersible.

BIOACCUMULATION POTENTIAL
This preparation or material is not expected to bioaccumulate.

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Low Low
Based on our recommended product application and the product's characteristics, the potential environmental exposure is: High

If released into the environment, see CERCLA/SUPERFUND in Section 15.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it could meet the criteria of a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) 40 CFR 261. Before disposal, it should be determined if the waste meets the criteria of a hazardous waste.

Hazardous Waste: D002

Hazardous wastes must be transported by a licensed hazardous waste transporter and disposed of or treated in a properly licensed hazardous waste treatment, storage, disposal or recycling facility. Consult local, state, and federal regulations for specific requirements.

14. TRANSPORT INFORMATION

The information in this section is for reference only and should not take the place of a shipping paper (bill of lading) specific to an order. Please note that the proper Shipping Name / Hazard Class may vary by packaging, properties, and mode of transportation. Typical Proper Shipping Names for this product are as follows.

LAND TRANSPORT :

Proper Shipping Name :	NOT REGULATED DURING TRANSPORTATION IN THE U.S., PER 49CFR 173.154(D), IF TRANSPORTED IN PACKAGE COMPATIBLE WITH THIS MATERIAL.

AIR TRANSPORT (ICAO/IATA) :

Proper Shipping Name :	CORROSIVE LIQUID, BASIC, ORGANIC, N.O.S
Technical Name(s) :	TETRASODIUM SALT OF EDTA
UN/ID No :	UN 3267
Hazard Class - Primary :	8
Packing Group :	III
IATA Cargo Packing Instructions :	820
IATA Cargo Aircraft Limit :	60 L (Max net quantity per package)

MARINE TRANSPORT (IMDG/IMO) :

Proper Shipping Name :	CORROSIVE LIQUID, BASIC, ORGANIC, N.O.S
Technical Name(s) :	TETRASODIUM EDTA
UN/ID No :	UN 3267
Hazard Class - Primary :	8
Packing Group :	III

15. REGULATORY INFORMATION

This section contains additional information that may have relevance to regulatory compliance. The information in this section is for reference only. It is not exhaustive, and should not be relied upon to take the place of an individualized compliance or hazard assessment. Nalco accepts no liability for the use of this information.

NATIONAL REGULATIONS, USA :

OSHA HAZARD COMMUNICATION RULE, 29 CFR 1910.1200 :
Based on our hazard evaluation, the following substance(s) in this product is/are hazardous and the reason(s) is/are shown below.

Tetrasodium EDTA : Irritant
Sodium Hydroxide : Corrosive

CERCLA/SUPERFUND, 40 CFR 117, 302 :
Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312, AND 313 :

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355) :
This product does not contain substances listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370) :
Our hazard evaluation has found this product to be hazardous. The product should be reported under the following indicated EPA hazard categories:

X	Immediate (Acute) Health Hazard
-	Delayed (Chronic) Health Hazard
-	Fire Hazard
-	Sudden Release of Pressure Hazard
-	Reactive Hazard

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372) :
This product does not contain substances on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA) :
The substances in this preparation are included on or exempted from the TSCA 8(b) Inventory (40 CFR 710)

FOOD AND DRUG ADMINISTRATION (FDA) Federal Food, Drug and Cosmetic Act :
When use situations necessitate compliance with FDA regulations, this product is acceptable under : 21 CFR 176.170 Components of paper and paperboard in contact with aqueous and fatty foods and 21 CFR 176.180 Components of paper and paperboard in contact with dry foods.

Limitations: no more than required to produce intended technical effect.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 / formerly Sec. 307, 40 CFR 116.4 / formerly Sec. 311 :
This product contains the following substances listed in the regulation:

Substance(s)	Citations
• Sodium Hydroxide	Sec. 311

CLEAN AIR ACT, Sec. 112 (40 CFR 61, Hazardous Air Pollutants), Sec. 602 (40 CFR 82, Class I and II Ozone Depleting Substances) :
None of the substances are specifically listed in the regulation.

CALIFORNIA PROPOSITION 65 :
This product does not contain substances which require warning under California Proposition 65.

MICHIGAN CRITICAL MATERIALS :
None of the substances are specifically listed in the regulation.

STATE RIGHT TO KNOW LAWS :
The following substances are disclosed for compliance with State Right to Know Laws:

Sodium Hydroxide 1310-73-2

NATIONAL REGULATIONS, CANADA :

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS) :
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS CLASSIFICATION :
E - Corrosive Material

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) :
The substance(s) in this preparation are included in or exempted from the Domestic Substance List (DSL).

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

CHINA
All substances in this product comply with the Chemical Control Law and are listed on the Inventory of Existing Chemical Substances China (IECSC).

EUROPE
The substances in this preparation have been reviewed for compliance with the EINECS or ELINCS inventories.

JAPAN
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Ministry of International Trade & industry List (MITI).

KOREA
All substances in this product comply with the Toxic Chemical Control Law (TCCL) and are listed on the Existing Chemicals List (ECL)

PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippines Inventory of Chemicals & Chemical Substances (PICCS).

16. OTHER INFORMATION

Due to our commitment to Product Stewardship, we have evaluated the human and environmental hazards and exposures of this product. Based on our recommended use of this product, we have characterized the product's general risk. This information should provide assistance for your own risk management practices. We have evaluated our product's risk as follows:

* The human risk is: Low

* The environmental risk is: Moderate

Any use inconsistent with our recommendations may affect the risk characterization. Our sales representative will assist you to determine if your product application is consistent with our recommendations. Together we can implement an appropriate risk management process.

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to insure safe workplace operations. Please consult your local sales representative for any further information.

REFERENCES

Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists, OH., (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Title 29 Code of Federal Regulations, Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA), (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH, (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Ariel Insight# (An integrated guide to industrial chemicals covered under major regulatory and advisory programs), North American Module, Western European Module, Chemical Inventories Module and the Generics Module (Ariel Insight# CD-ROM Version), Ariel Research Corp., Bethesda, MD.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS# CD-ROM Version), Micromedex, Inc., Englewood, CO.

Prepared By : Product Safety Department
Date issued : 06/05/2008
Version Number : 1.10

SIGMA-ALDRICH

MATERIAL SAFETY DATA SHEET

Date Printed: 10/25/2005
Date Updated: 03/06/2004
Version 1.4

Borax, Anhydrous

Section 1 - Product and Company Information

Product Name	SODIUM TETRABORATE GRANULATED, DRY
Product Number	11648
Brand	RIEDEL
Company	Sigma-Aldrich
Street Address	3050 Spruce Street
City, State, Zip, Country	SAINT LOUIS MO 63103 US
Technical Phone:	314 771 5765
Emergency Phone:	414 273 3850 Ext. 5996
Fax:	800 325 5052

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
SODIUM TETRABORATE	1330-43-4	No

Formula: Na2B4O7

Synonyms: Anhydrous borax * Borates, tetra, sodium salt, anhydrous (ACGIH) * Borax glass * Disodium tetraborate * FR 28 * Fused borax * Rasorite 65 * Sodium biborate * Sodium boron oxide * Sodium tetraborate * Sodium tetraborate (Na2B4O7)

RTECS Number: ED4588000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Harmful.
Possible risk of impaired fertility. Possible risk of harm to the unborn child.
Possible teratogen. Possible reproductive hazard. Target organ(s): Kidneys. Central nervous system.

HMIS RATING

HEALTH: 0*
FLAMMABILITY: 0
REACTIVITY: 0

NFPA RATING

HEALTH: 0
FLAMMABILITY: 0
REACTIVITY: 0

*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE

If swallowed, wash out mouth with water provided person is

conscious. Call a physician immediately.

INHALATION EXPOSURE
If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

DERMAL EXPOSURE
In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

EYE EXPOSURE
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section 5 - Fire Fighting Measures

FLASH POINT
N/A

AUTOIGNITION TEMP
N/A

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: Water spray. Carbon dioxide, dry chemical powder, or appropriate foam.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s): Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL
Evacuate area.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves. Wear disposable coveralls and discard them after use.

METHODS FOR CLEANING UP
Sweep up, place in a bag and hold for waste disposal. Avoid raising dust. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

HANDLING
User Exposure: Do not breathe dust. Do not get in eyes, on skin, on clothing. Avoid prolonged or repeated exposure.

STORAGE
Suitable: Keep tightly closed.

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS
Use only in a chemical fume hood. Safety shower and eye bath.

PERSONAL PROTECTIVE EQUIPMENT
Respiratory: Government approved respirator.
Hand: Compatible chemical-resistant gloves.
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES
Wash contaminated clothing before reuse. Wash thoroughly after handling.

EXPOSURE LIMITS, RTECS

Country	Source	Type	Value
USA	ACGIH	TWA	1 MG/M3
New Zealand	OEL		

Remarks: check ACGIH TLV

Section 9 - Physical/Chemical Properties

Appearance: Physical State: Solid

Property	Value	At Temperature or Pressure
Molecular Weight	201.22 AMU	
pH	N/A	
BP/BP Range	N/A	
MP/MP Range	741 °C	
Freezing Point	N/A	
Vapor Pressure	N/A	
Vapor Density	N/A	
Saturated Vapor Conc.	N/A	
SG/Density	2.367 g/cm3	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Surface Tension	N/A	
Partition Coefficient	N/A	
Decomposition Temp.	N/A	
Flash Point	N/A	
Explosion Limits	N/A	
Flammability	N/A	
Autoignition Temp	N/A	
Refractive Index	N/A	
Optical Rotation	N/A	
Miscellaneous Data	N/A	
Solubility	N/A	

N/A = not available

Section 10 - Stability and Reactivity

STABILITY
Stable: Stable.
Materials to Avoid: Acid anhydrides, Potassium.

HAZARDOUS DECOMPOSITION PRODUCTS

Hazardous Decomposition Products: Boron oxides.

HAZARDOUS POLYMERIZATION
Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE
Skin Contact: May cause skin irritation.
Skin Absorption: May be harmful if absorbed through the skin.
Eye Contact: May cause eye irritation.
Inhalation: May be harmful if inhaled. Material may be irritating to mucous membranes and upper respiratory tract.
Ingestion: May be harmful if swallowed.

TARGET ORGAN(S) OR SYSTEM(S)
Testes. Kidneys. Central nervous system.

CHRONIC EXPOSURE - TERATOGEN
Result: Possible risk of congenital malformation in the fetus.

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD
Result: Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

Species: Rat
Dose: 16750 UG/KG
Route of Application: Oral
Exposure Time: (30D MALE)
Result: Paternal Effects: Testes, epididymis, sperm duct.
Paternal Effects: Prostate, seminal vessicle, Cowper's gland, accessory glands.

Section 12 - Ecological Information

ACUTE ECOTOXICITY TESTS

Species: Scenedesmus subspicatus
Time: 96 h
Value: 24 mg/l

Test Type: EC50 Daphnia
Species: Daphnia magna
Time: 24 h
Value: 242 mg/l

Test Type: LC50 Fish
Species: other fish
Time: 96 h
Value: 74 mg/l

Test Type: LC50 Fish
Species: Onchorhynchus mykiss (Rainbow trout)
Value: 88 mg/l

Test Type: LC50 Fish
Species: Onchorhynchus mykiss (Rainbow trout)
Value: 54 mg/l

Test Type: LC50 Fish
Species: Carassius auratus (Goldfish)
Value: 65 mg/l

Test Type: LC50 Fish
Species: Carassius auratus (Goldfish)
Value: 71 mg/l

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT
Proper Shipping Name: None
Non-Hazardous for Transport: This substance is considered to be non-hazardous for transport.

IATA
Non-Hazardous for Air Transport: Non-hazardous for air transport.

Section 15 - Regulatory Information

EU ADDITIONAL CLASSIFICATION
Symbol of Danger: Xn
Indication of Danger: Harmful.
R: 62-63
Risk Statements: Possible risk of impaired fertility. Possible risk of harm to the unborn child.
S: 36/37
Safety Statements: Wear suitable protective clothing and gloves.

US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Harmful.
Risk Statements: Possible risk of impaired fertility. Possible risk of harm to the unborn child.
Safety Statements: Wear suitable protective clothing and gloves.
US Statements: Possible teratogen. Possible reproductive hazard.
Target organ(s): Kidneys. Central nervous system.

UNITED STATES REGULATORY INFORMATION
SARA LISTED: No
TSCA INVENTORY ITEM: Yes

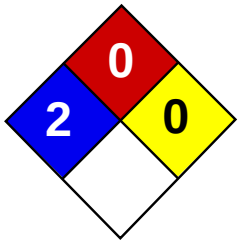
CANADA REGULATORY INFORMATION
WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: Yes
NDSL: No

Section 16 - Other Information

DISCLAIMER
For R&D use only. Not for drug, household or other uses.

WARRANTY
The above information is believed to be correct but does not

purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.



Health	2
Fire	0
Reactivity	0
Personal Protection	J

Material Safety Data Sheet
Calcium fluoride MSDS

Section 1: Chemical Product and Company Identification

Product Name: Calcium fluoride

Catalog Codes: SLC1366, SLC3157

CAS#: 7789-75-5

RTECS: EW1760000

TSCA: TSCA 8(b) inventory: Calcium fluoride

CI#: Not available.

Synonym: Fluorspar, Irtran; Calcium Difluoride

Chemical Name: Calcium Fluoride

Chemical Formula: CaF2

Contact Information:

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

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

Order Online: ScienceLab.com

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

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

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

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Calcium fluoride	7789-75-5	100

Toxicological Data on Ingredients: Calcium fluoride: ORAL (LD50): Acute: 4250 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Corrosive to eyes and skin. The amount of tissue damage depends on length of contact. Eye contact can result in corneal damage or blindness. Skin contact can produce inflammation and blistering. Inhalation of dust will produce irritation to gastro-intestinal or respiratory tract, characterized by burning, sneezing and coughing. Severe over-exposure can produce lung damage, choking, unconsciousness or death.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE]. The substance may be toxic to blood, kidneys, lungs, liver, cardiovascular system, skin, bones, central nervous system (CNS), teeth. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure of the eyes to a low level of dust can produce eye irritation. Repeated skin exposure can produce local skin destruction, or dermatitis. Repeated inhalation of dust can produce varying degree of respiratory irritation or lung damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

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

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

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

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

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: When heated to decomposition it emits toxic fumes of hydrogen fluoride

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

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

Large Spill:
Corrosive solid. Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep container dry. Do not ingest. Do not breathe dust. Never add water to this product. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes.

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

Section 8: Exposure Controls/Personal Protection

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

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

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

Exposure Limits:
TWA: 2.5 Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

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

Odor: Not available.

Taste: Not available.

Molecular Weight: 78.08 g/mole

Color: White. Off-white.

pH (1% soln/water): Not available.

Boiling Point: 2500°C (4532°F)

Melting Point: 1403°C (2557.4°F)

Critical Temperature: Not available.

Specific Gravity: 3.18 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Very slightly soluble in cold water. Insoluble in acetone. Solubility in water: 0.0015g/100 ml water @ 18 deg C. Slightly soluble in dilute mineral acids. Soluble in ammonium salts.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, dust generation

Incompatibility with various substances: Not available.

Corrosivity: Not available.

Special Remarks on Reactivity:
Hygroscopic; keep container tightly closed. Reacts with hot concentrated sulfuric acid to liberate hydrogen fluoride. There is a hazard of Hydrofluoric acid being formed.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 4250 mg/kg [Rat].

Chronic Effects on Humans:
DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE]. May cause damage to the following organs: blood, kidneys, lungs, liver, cardiovascular system, skin, bones, central nervous system (CNS), teeth.

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

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:
May affect genetic material (mutagenic). May cause adverse reproductive effects and birth defects (teratogenic) based on animal test data.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: May cause skin irritation. Eyes: May cause eye irritation. Inhalation: Causes respiratory tract irritation. Ingestion: May cause gastrointestinal irritaiton with nausea, vomiting and diarrhea, salivation, thirst, abdominal pain, fever, labored breathing (respiratory depression, apnea, dyspnea). Exposure to fluorides may also cause disturbed color vision, hypocalcemia, hyperkalemia, and hypomagnesemia, and may result in systemic toxic effects on the heart/ cardiovascular system (hypotension, tachycardia, arrhythmia, weak pulse, cardiovascular collapse), liver (hepatic enzymes increased), and kidneys (abnormal renal function, renal damage). It may also affect behavior/Central Nervous System (CNS depression - headache, dizziness, weakness, somnolence, ataxia, loss of conciousness). Other neurological symptoms of acute fluoride ingestion may include muscle weakness, difficulty speaking, fitfulness(hyperreflexia), tetany, numbness or tingling of the extremities. Chronic Potential Health Effects: Skin: Prolonged or repeated skin contact may cause dermatitis. Inhalation: Prolonged or repeated inhalation may cause bronchitis, asmtha, silicosis, increase in respiratory infections, pulmonary lesions. Ingestion: Prolonged or repeated ingestion cause diseases of the blood, teeth, bones and other organs (osteosclerosis, fluorosis). (Fluorisis is characterized by vomiting, diarrhea or constipation, weakness joint stiffness, loss of appetite, anemia).

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

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

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

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

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

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:
New Jersey: Calcium fluoride TSCA 8(b) inventory: Calcium fluoride

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

Other Classifications:

WHMIS (Canada): CLASS E: Corrosive solid.

DSCL (EEC):
R20/22- Harmful by inhalation and if swallowed. R36/37/38- Irritating to eyes, respiratory system and skin. S24/25- Avoid contact with skin and eyes. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S36- Wear suitable protective clothing.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: j

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

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

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

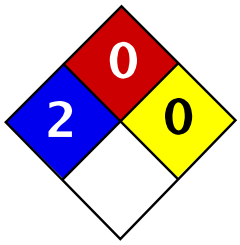
Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:15 PM

Last Updated: 11/06/2008 12:00 PM



Health	2
Fire	0
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Copper sulfate pentahydrate MSDS

Section 1: Chemical Product and Company Identification

Product Name: Copper sulfate pentahydrate

Catalog Codes: SLC3778, SLC4567, SLC3565, SLC5353

CAS#: 7758-99-8

RTECS: GL8900000

TSCA: TSCA 8(b) inventory: No products were found.

CI#: Not applicable.

Synonym: Blue vitriol; Copper (II) Sulfate Pentahydrate

Chemical Name: Cupric sulfate pentrahydrate

Chemical Formula: CuSO4.5H2O

Contact Information:

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

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

Order Online: ScienceLab.com

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

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

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

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Copper sulfate pentahydrate	7758-99-8	100

Toxicological Data on Ingredients: Copper sulfate pentahydrate: ORAL (LD50): Acute: 300 mg/kg [Rat.]. DERMAL (LD50): Acute: >2000 mg/kg [Rat].

Section 3: Hazards Identification

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

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance may be toxic to kidneys, liver.
Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used.Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

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

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

Serious Inhalation: Not available.

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

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

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

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards:
When heated to decomposition it emits toxic fumes.
Solutions are acidic and can react with magnesium to evolve flammable hydrogen gas

Special Remarks on Explosion Hazards: Nitromethanes and copper salts spontaneously form explosive materials

Section 6: Accidental Release Measures

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

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not

present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Do not ingest. Do not breathe dust. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as metals, alkalis.

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

Section 8: Exposure Controls/Personal Protection

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

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

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

Exposure Limits:
TWA: 1 (mg/m3) from ACGIH (TLV) [United States] Inhalation
TWA: 0.1 (mg/m3) from OSHA (PEL) [United States] Inhalation
TWA: 1 (mg/m3) from NIOSH InhalationConsult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Crystalline granules solid. Powdered solid.)

Odor: Odorless.

Taste: Nauseous metallic.

Molecular Weight: 249.69 g/mole

Color: Blue. (Light.)

pH (1% soln/water): Not available.

Boiling Point: 150°C (302°F)

Melting Point: 110°C (230°F)

Critical Temperature: Not available.

Specific Gravity: 2.28 @ 15.6 deg. C(Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol.

Solubility:
Easily soluble in hot water.
Soluble in cold water, methanol.
Solubility in water: 31.6 g/100 ml @ 0 deg. C.; 203.3 g/100 ml @ 100 deg. C
Solubility in methanol: 15.6 g/100 ml @ 18 deg. C.
Insoluble in ethanol.
It readily forms alkaline complexes at sufficiently high concentrations of amines or alkali cyanides.
Practically insoluble in most organic solvents.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat (high temperatures), incompatible materials, exposure to air

Incompatibility with various substances: Reactive with metals, alkalis.

Corrosivity: Highly corrosive in presence of steel.

Special Remarks on Reactivity:
Air Sensitive. Slowly efforescent in air. Solutions of hyprobromite are decomposed by powerful catalytic action of cupric ions, even as impurities.
Incompatible with finely powdered metals.

Special Remarks on Corrosivity:
Corrosive to finely powdered metals.
Very corrosive to plain steel

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:
Acute oral toxicity (LD50): 300 mg/kg [Rat.].
Acute dermal toxicity (LD50): >2000 mg/kg [Rat].

Chronic Effects on Humans:
MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells.
May cause damage to the following organs: kidneys, liver.

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

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Dose:
LDL [Human] - Route: Oral; Dose: 1088 mg/kg

Special Remarks on Chronic Effects on Humans: May affect genetic material based on animal data

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects:
Skin: Causes skin irritation. May cause skin burns. It may cause and itching allergic eczema.
Eyes: Causes eye irritation. May cause eye burns. It may cause conjunctivitis, corneal discoloration, ulceration and turbidity of the cornea.
Inhalation: Causes respiratory tract (nose, throat, lung) irritation with coughing and wheezing. May cause ulceration and perforation of the nasal septum if inhaled in excessive quantities. Burning copper sulfate may result in irritating and poisonous gases which may irritate the respiratory tract and lungs, and may cause fume metal fever which is characterized by flu-like symptoms such as fever, chills, muscle aches.
Ingestion: Harmful if swallowed. May cause gastrointestinal tract irritation with nausea, vomiting, diarrhea, metallic taste, burning sensation in the stomach or epigastrum, abdominal pain, and possible gastrointestinal tract bleeding. May affect metabolism(metabolic acidosis), liver (liver damage, jaundice), blood (Methemoglobin, hemalytic anemia), urinary system (kidney damage, hematuria, hemoglobinuria, albuminuria), behavior/nervous systems (somnolence, tremor, psychosis, muscle weakness, coma), cardiovascular system (lowering of blood pressure, dysthrythmia). Oral mucosa, vomitus, stools, and saliva may be stained blue or green following ingestion. Aspiration pneumonia may develop following emesis and CNS depression.
Chronic Potential Health Effects:
Skin: Repeated or prolonged skin contact may cause thickening of the skin.

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 0.1 ppm 48 hours [Goldfish]. 0.1 mg/l 96 hours [Rainbow Trout]. 2.5 mg/l 96 hours [Rainbow Trout].

BOD5 and COD: Not available.

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

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation:
If released to soil, copper sulfate may leach to groundwater, be partly oxidized, or bind to humic materials, clay, or hydrous of iron and manganese. In water, it will bind to carbonates as well as humic materials, clay and hydrous oxides of iron and manganese. Copper is accumulated by plants and animals, but it does not appear to biomagnify from plants to animals. This lack of biomagnification appears common with heavy metals. In air, copper aerosols (in general) have a residence time of 2 to 10 days in an unpolluted atmosphere and 0.1 to >4 in a polluted, urban areas.

Section 13: Disposal Considerations

Waste Disposal:
Copper dusts or mist or copper compounds may be disposed of in Group III sealed containers in a secure sanitary landfill. Copper containing
soluble wastes can be concentrated through the use of ion exchange, reverse osmosis, or evaporators to the point where copper can be
electrolytically removed and sent to a reclaiming firm. If recovery is not feasible, the copper can be precipitated through the use of caustics and
the sludge depositied in a chemical waste landfill. Be sure to consult with authorities (waste regulators). Waste must be disposed of in
accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 9: Miscellaneous hazardous material.

Identification: : Environmentally hazardous substance, n.o.s. (Cupric Sulfate) UNNA: 3077 PG: III

Special Provisions for Transport:
additional markings "Marine Pollutant" - required for bulk shipments. The words "Marine Pollutant" must be entered on the shipping paper in association iwth the basic DOT description for bulk shipments.

Section 15: Other Regulatory Information

Federal and State Regulations:
SARA 313 toxic chemical notification and release reporting: Copper compounds
CERCLA: Hazardous substances.: Copper sulfate pentahydrate: 10 lbs. (4.536 kg)

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

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

DSCL (EEC):
R22- Harmful if swallowed.
R36/38- Irritating to eyes and skin.
R50/53- Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
S22- Do not breathe dust.
S60- This material and its container must be disposed of as hazardous waste.
S61- Avoid release to the environment. Refer to special instructions/Safety data sheets.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

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

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Dust respirator. Be sure to use an approved/certified respirator or equivalent.
Splash goggles.

Section 16: Other Information

References:
-The Sigma-Aldrich Library of Chemical Safety Data, Edition II.
-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987.

Other Special Considerations: Not available.

Created: 10/09/2005 05:01 PM

Last Updated: 11/06/2008 12:00 PM

Material Safety Data Sheet

DIESEL FUEL

1 . Product and company identification

Product name : DIESEL FUEL

Synonym : Seasonal Diesel, #1 Diesel, #2 Heating Oil, #1 Heating Oil, D50, D60, P40, P50, Arctic Diesel, Farm Diesel, Marine Diesel, Low Sulphur Diesel, LSD, Ultra Low Sulphur Diesel, ULSD, Mining Diesel, Naval Distillate, Dyed Diesel, Marked Diesel, Coloured Diesel, Furnace special

Code : W104, W293; SAP: 120, 121, 122, 129, 135, 287

Material uses : Diesel fuels are distillate fuels suitable for use in high and medium speed internal combustion engines of the compression ignition type. Mining Diesel has a higher flash point requirement, for safe use in underground mines.

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

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

2 . Hazards identification

Physical state : Bright oily liquid.

Odour : Mild petroleum oil like.

WHMIS (Canada) :

Class B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).
Class D-2B: Material causing other toxic effects (Toxic).

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

Emergency overview : WARNING!

COMBUSTIBLE LIQUID AND VAPOUR. CAUSES EYE AND SKIN IRRITATION.

Combustible liquid. Severely irritating to the skin. Irritating to eyes. Keep away from heat, sparks and flame. Do not get in eyes. Avoid breathing vapour or mist. Avoid contact with skin and clothing. Use only with adequate ventilation. Wash thoroughly after handling.

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

Potential acute health effects

Inhalation : Inhalation of this product may cause respiratory tract irritation and Central Nervous System (CNS) Depression, symptoms of which may include; weakness, dizziness, slurred speech, drowsiness, unconsciousness and in cases of severe overexposure; coma and death.

Ingestion : Ingestion of this product may cause gastro-intestinal irritation. Aspiration of this product may result in severe irritation or burns to the respiratory tract.

Skin : Severely irritating to the skin.

Eyes : Irritating to eyes.

Potential chronic health effects

Chronic effects : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

2 . Hazards identification

Fertility effects : No known significant effects or critical hazards.

Medical conditions aggravated by over-exposure : Repeated skin exposure can produce local skin destruction or dermatitis.

See toxicological information (section 11)

3 . Composition/information on ingredients

Name	CAS number	%
Kerosine (petroleum), hydrodesulfurized/Fuels, diesel/Fuel Oil No. 2	64742-81-0/68334-30-5/68476-30-2	100

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.

4 . First-aid measures

Eye contact : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

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

Inhalation : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Ingestion : Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

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

Notes to physician : No specific treatment. Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

5 . Fire-fighting measures

Flammability of the product : Combustible liquid

Extinguishing media

Suitable : Use dry chemical, CO_2, water spray (fog) or foam.

Not suitable : Do not use water jet.

Special exposure hazards : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Products of combustion : Carbon oxides (CO, CO2), nitrogen oxides (NOx), sulphur oxides (SOx), sulphur compounds (H2S), smoke and irritating vapours as products of incomplete combustion.

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

Special remarks on fire hazards : Flammable in presence of open flames, sparks, and heat. Vapours are heavier than air and may travel considerable distance to sources of ignition and flash back. This product can accumulate static charge and ignite.

Special remarks on explosion hazards : Do not pressurise, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Runoff to sewer may create fire or explosion hazard.

6 . Accidental release measures

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

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

Methods for cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble or absorb with an inert dry material and place in an appropriate waste disposal container. Use spark-proof tools and explosion-proof equipment. Dispose of via a licensed waste disposal contractor.

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

7 . Handling and storage

Handling : Put on appropriate personal protective equipment (see section 8). 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. Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapour or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use non-sparking tools. Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by earthing and bonding containers and equipment before transferring material. Empty containers retain product residue and can be hazardous. Do not reuse container.

Storage : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination. Ensure the storage containers are grounded/bonded.

8 . Exposure controls/personal protection

Ingredient	Exposure limits
Kerosine (petroleum), hydrodesulfurized	**ACGIH TLV (United States). Absorbed through skin.** TWA: 200 mg/m³ 8 hour(s).
Fuels, diesel	**ACGIH TLV (United States). Absorbed through skin.** TWA: 100 mg/m³, (Inhalable fraction and vapour) 8 hour(s).
Fuel oil No. 2	**ACGIH TLV (United States). Absorbed through skin.** TWA: 100 mg/m³, (Inhalable fraction and vapour) 8 hour(s).

Consult local authorities for acceptable exposure limits.

8 . Exposure controls/personal protection

Recommended monitoring procedures : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

Engineering measures : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapour or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

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

Personal protection

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. Recommended: organic vapour cartridge or canister may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits. Protection provided by air-purifying respirators is limited. Use a positive-pressure, air-supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstances where air-purifying respirators may not provide adequate protection.

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

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

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

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

9 . Physical and chemical properties

Physical state : Bright oily liquid.

Flash point : Diesel fuel: Closed cup: ≥40°C (≥104°F)
Marine Diesel Fuel: Closed Cup: ≥60ºC (≥140ºF)
Mining Diesel: Closed Cup: ≥52ºC (≥126ºF)

Auto-ignition temperature : 225°C (437°F)

Flammable limits : Lower: 0.7%
Upper: 6%

Colour : Clear to yellow (This product may be dyed red for taxation purposes).

Odour : Mild petroleum oil like.

Odour threshold : Not available.

pH : Not available.

Boiling/condensation point : 150 to 371°C (302 to 699.8°F)

9 . Physical and chemical properties

Melting/freezing point : Not available.

Relative density : 0.80 to 0.88 kg/L @ 15°C (59°F)

Vapour pressure : 1 kPa (7.5 mm Hg) @ 20°C (68ºF).

Vapour density : 4.5 [Air = 1]

Volatility : Semivolatile to volatile.

Evaporation rate : Not available.

Viscosity : Diesel fuel: 1.3 - 4.1 cSt @ 40ºC (104ºF)
Marine Diesel Fuel: 1.3 - 4.4 cSt @ 40ºC (104ºF)

Pour point : Not available.

Solubility : Insoluble in cold water, soluble in non-polar hydrocarbon solvents.

10 . Stability and reactivity

Chemical stability : The product is stable.

Hazardous polymerisation : Under normal conditions of storage and use, hazardous polymerisation will not occur.

Materials to avoid : Reactive with oxidising agents and acids.

Hazardous decomposition products : May release COx, NOx, SOx, H2S, smoke and irritating vapours when heated to decomposition.

11 . Toxicological information

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Kerosine (petroleum), hydrodesulfurized	LD50 Dermal	Rabbit	>2000 mg/kg	-
	LD50 Oral	Rat	>5000 mg/kg	-
	LC50 Inhalation Vapour	Rat	>5000 mg/m³	4 hours
Fuels, diesel	LD50 Dermal	Mouse	24500 mg/kg	-
	LD50 Oral	Rat	7500 mg/kg	-
Fuel oil No. 2	LD50 Oral	Rat	12000 mg/kg	-

Conclusion/Summary : Not available.

Chronic toxicity

Conclusion/Summary : Not available.

Irritation/Corrosion

Conclusion/Summary : Not available.

Sensitiser

Conclusion/Summary : Not available.

Carcinogenicity

Conclusion/Summary : Not available.

Classification

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA
Kerosine (petroleum), hydrodesulfurized	A3	-	-	-	-	-
Fuels, diesel	A3	3	-	-	-	-
Fuel oil No. 2	A3	3	-	-	-	-

Mutagenicity

Conclusion/Summary : Not available.

Teratogenicity

Conclusion/Summary : Not available.

Reproductive toxicity

Conclusion/Summary : Not available.

12 . Ecological information

Environmental effects : No known significant effects or critical hazards.

Aquatic ecotoxicity

Conclusion/Summary : Not available.

Biodegradability

Conclusion/Summary : Not available.

13 . Disposal considerations

Waste disposal : The generation of waste should be avoided or minimised wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

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

14 . Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG*	Label	Additional information
TDG Classification	UN1202	DIESEL FUEL	3	III		-
DOT Classification	Not available.	Not available.	Not available.	-		-

PG* : Packing group

15 . Regulatory information

United States

HCS Classification : Combustible liquid
Irritating material

Canada

WHMIS (Canada) : Class B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).
Class D-2B: Material causing other toxic effects (Toxic).

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

International regulations

Canada inventory : All components are listed or exempted.

United States inventory (TSCA 8b) : All components are listed or exempted.

Europe inventory : All components are listed or exempted.

16 . Other information

Label requirements : COMBUSTIBLE LIQUID AND VAPOUR. CAUSES EYE AND SKIN IRRITATION.

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

Health	2
Flammability	2
Physical hazards	0
Personal protection	H

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

References : Available upon request.
TM/MC Marque de commerce de Petro-Canada - Trademark

Date of printing : **12/17/2009.**

Date of issue : 3 July 2009

Date of previous issue : No previous validation.

Responsible name : **Product Safety - DSR**

Indicates information that has changed from previously issued version.

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: (905) 804-4752

Notice to reader

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

Seaforth Mineral & Ore Co., Inc.

3690 Orange Place, Suite 495, Cleveland, Ohio, 44122 USA U.S. Watts 1-800-292-9022
Phone: (216) 292-5820 Fax: (216) 292-1033

Date Prepared: 01/01/2009

FLUORSPAR
Material Safety Data Sheet

SECTION I – CHEMICAL PRODUCT

Product Name: Fluorspar
Chemical Name/Synonyms: Calcium Fluoride
Chemical Formula: CaF_2
CAS Registry Number: #7789-75-5

NFPA Classification:

Health	0
Flammability	0
Reactivity	0

SECTION II – HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

Hazardous Components: Fluorspar or Calcium Fluoride
OSHA Permissible Exposure Limit (PEL): 15mg. per cubic feet
ACGIH Threshold Limit Value (TLV): 2.5mg/m3

OVERVIEW:
Commercially available Fluorspar also contains about 0.8 to 1.5% Si02 plus minor trace impurities. The product is minimally hazardous when its delivered state combined with about 10% maximum water as a filtercake. Dust hazards exist when the product is either dried intentionally or through prolonged open storage.

SECTION III – PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point	N/A	**Specific Gravity (H20 = 1**	3.18
Vapor Pressure (mm Hg.)	None	**Melting Point**	2450
Vapor Density (AIR = 1)	N/A	**Evaporation Rate (Butyl Acetate = 1)**	N/A

Solubility in Water: 16 MG/L
Appearance and Odor: Mauve or Off-White, Odorless

SECTION IV – FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): N/A
Flammable Limits: N/A
LEL: N/A
LIEL: N/A
Extinguishing Media: N/A
Special Fire Fighting Procedures: N/A
Unusual Fire and Explosion Hazards: N/A

SECTION V – REACTIVITY DATA

Stability: Stable
Conditions to Avoid: Avoid presence of uncontrolled strong acid

Incompatibility (*Materials to Avoid):* Strong Acids

Hazardous Decomposition or Byproducts: No
Hazardous Polymerization: Will not occur
Conditions to Avoid: N/A

SECTION VI – HEALTH HAZARD DATA

Potential Health Effects: Overexposure when product is dry or dusty may result in eye, skin, or respiratory tract irritation.

Carcinogenicity:	**NTP**	**RC Monographs**	**OSHA Regulated**
	N/A	N/A	No

Signs and Symptoms of Exposure: Irritation to eyes, skin, or respiratory tract
Medical Conditions due to exposure: None known

Emergency/First Aid Procedures:

1. **Eye Contact –** Flush thoroughly with tepid water.
2. **Skin Contact –**Wash thoroughly with soap and water.
3. **Inhalation –** Remove to fresh air.
4. **Ingestion –** Give plenty of water.

SECTION VII – PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to Be Taken in Case Material is Released or Spilled: Sweep and scoop up and remove.
Waste Disposal Method: Restock or dispose of in a manner to avoid dusting. Should large volumes require disposal, check with waste disposal regulatory agencies.
Precautions to Be Taken in Handling and Storing: Avoid strong acids.
Other Precautions: If bulk material is to be handled, caution regarding dust hazard be employed**.**

SECTION VIII – PERTINENT INFORMATION

The information in this MSDS was obtained from sources which we believe are reliable but cannot guarantee. Additionally, your use of this information is beyond our control and may be beyond our knowledge. Therefore, the information is provided without any presentation or warranty expressed or implied.

Material Safety Data Sheet

Preparation Date: 31-Jul-2006 **Revision Date:** 24-Aug-2009 **Revision Number:** 1

SECTION 1 – PRODUCT AND COMPANY IDENTIFICATION

Supplier(s):

Orica Canada Inc.
Maple Street
Brownsburg, QC
For MSDS Requests: 1-450-533-4201

Orica USA Inc.
33101 E. Quincy Avenue
Watkins, CO 80137-9406
For MSDS Requests: 1-303-268-5000

Product Name: **Fortan™ Advantage, Fortis™ Advantage & Fortis™ Advantage ANE (USA)**
Product Code: 2310
Alternate Name(s): Apex™ Clear
UN-No: UN3139
Recommended Use: Can be sensitized to become a booster sensitive emulsion explosive.

Emergency Telephone Number: FOR CHEMICAL EMERGENCIES (24 HOUR) INVOLVING TRANSPORTATION, SPILL, LEAK, RELEASE, FIRE OR ACCIDENTS: **IN CANADA CALL:** THE ORICA TRANSPORTATION EMERGENCY RESPONSE SYSTEM AT **1-877-561-3636. IN THE U.S. CALL: CHEMTREC 1-800-424-9300. IN THE U.S.:** FOR LOST, STOLEN, OR MISPLACED EXPLOSIVES CALL: BATF **1-800-800-3855.** FORM ATF F 5400.0 MUST BE COMPLETED AND LOCAL AUTHORITIES (STATE/MUNICIPAL POLICE, ETC.) MUST BE ADVISED.

SECTION 2 – HAZARD IDENTIFICATION

Emergency Overview:
May cause skin irritation and/or dermatitis. Irritating to eyes. Harmful if swallowed. Oxidizing agent. May cause methemoglobinemia. May cause liver damage. May cause kidney damage.

Appearance:	**Physical State:**	**Odor:**
Opaque, viscous liquid	Viscous, liquid	Vinegar

SECTION 3 – COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	**CAS-No**	**Weight %**
Ammonium Nitrate	6484-52-2	60-75
Mineral Oil	64742-53-6	1-6
Diesel Fuel Oil	68476-34-6	1-6

SECTION 4 – FIRST AID MEASURES

General Advice: In case of accident or if you feel unwell, seek medical advice IMMEDIATELY (show the product label where possible).

Eye Contact: Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Immediate medical attention is required.

Skin Contact: Wash off immediately with soap and plenty of water, removing all contaminated clothes and shoes. If skin irritation persists, call a physician.

Inhalation: Move victim to fresh air. Give artificial respiration ONLY if breathing has stopped. Give cardiopulmonary resuscitation (CPR) if there is no breathing AND no pulse. Obtain medical advice IMMEDIATELY.

Ingestion: Immediate medical attention is required. Do no induce vomiting. Clean mouth with water and afterwards drink plenty of water. If spontaneous vomiting occurs, have victim lean forward with head positioned to avoid breathing in of vomitus, rinse mouth and administer more water. Never give anything by mouth to and unconscious person.

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

SECTION 5 – FIRE-FIGHTING MEASURES

Flammable properties: Not itself combustible but assists fire in burning materials. The product does not flash. Rate of burning: attempts to smother a fire involving this product will be ineffective as it is its own oxygen source.

Suitable extinguishing media: Use Water only, in as much volume as possible to cool the burning mass quickly. Chemical extinguishers will not work. Fire-fighters should wear positive pressure self-containing breathing apparatus (SCBA) and full turnout gear. Water may be applied through fixed extinguishing system (sprinklers) as long as people need not be present for the system to operate.

Unsuitable extinguishing media: Chemical extinguishers will not work. Attempts to smother a fire involving this product will be ineffective as it is its own oxygen source. Smother this product could lead to decomposition and explosion. This product is more sensitive to detonation if contaminated with organic or oxidisable material or if heated while confined. Unless the mass of product on fire is flooded with water, re-ignition is possible.

Specific hazards arising from the chemical: Toxic gases and vapours will be released by the thermal decomposition of this material. At higher temperatures, decomposition may be explosive, especially if confined. Immediately evacuate all personnel from the area to a safe distance. Guard against re-entry.

Protective equipment and precautions for firefighters: As in any fire, wear self-contained breathing apparatus pressure-demand, NIOSH approved (or equivalent) and full protective gear.

SECTION 6 – ACCIDENTAL RELEASE MEASURES

Methods for containment: Contain or absorb leaking liquid with sand or earth or other suitable substance.

Methods for cleaning up: Avoid the use of metal tools containing iron and/or copper. Be careful to avoid shock, friction, and contact with grit. Collect product for recovery or disposal. For release to land, contain discharge by constructing dykes or applying inert absorbent; for release to water, utilize damming and/or water diversion to minimize the spread of contamination. Collect contaminated soil and water, and absorbent for proper disposal. Notify applicable government authority if release is reportable or could adversely affect the environment.

Other information: Deactivating chemicals: Detergents will break up emulsions if mixed in.

SECTION 7 – HANDLING AND STORAGE

Handling: Avoid contact with eyes or skin. Wash thoroughly with soap and water after handling. Wash clothing before re-use. Locate safety shower and eyewash station closest to chemical handling area. The use of coveralls is recommended. Use good industrial hygiene and housekeeping practices. Keep away from open flames, hot surfaces and sources of ignition

Storage: Store in a cool, well-ventilated area. Keep away from heat, sparks, and flames. Keep storage containers closed. Store at 10-27℃ (50-80℉). Do not expose closed containers to temperatures above 40℃ (104℉). Product is mildly corrosive to concrete and steel. Stainless steel and aluminium are adequate. Avoid materials made of copper, iron, or bronze.

SECTION 8 – EXPOSURE CONTROLS/PERSONAL PROTECTION

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Mineral oil	5 mg/m³	5 mg/ m³	
Diesel Fuel	TWA: 100 mg/m³ Skin		

Other exposure guidelines: Ammonium Nitrate: ORICA Guideline 5 mg/m^3 (internal TWA)

Engineering Measures: No information available.

Personal Protective Equipment

Eye/Face Protection: Tightly fitting safety goggles.

Skin Protection: User should verify impermeability under normal conditions of use prior to general use. Impervious butyl rubber gloves.

Respiratory Protection: In case of insufficient ventilation wear suitable respiratory equipment. A NIOSH-approved respirator, if required.

Hygiene Measures: Handle in accordance with good industrial hygiene and safety practice. Recommendations listed in this section indicate the type of equipment, which will provide protection against over

exposure to this product. Conditions of use, adequacy of engineering or other control measures, and actual exposures will dictate the need for specific protective devices at your workplace.

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Opaque, viscous liquid	**Odor:**	Vinegar
Physical State:	Viscous, liquid	**Viscosity:**	No information available
pH:	3 - 6	**Flash Point:**	Not applicable
Autoignition Temperature:	230-265°C/ 446-509°F	**Boiling Point/Range:**	None
Melting Point/Range:	Not available	**Flammable Limits (Upper):**	Not applicable
Flammable Limits (Lower):	Not applicable	**Explosion Power:**	No data available
Specific Gravity:	1.20 – 1.35 g/cc	**Water Solubility:**	Slightly soluble
Other Solubility:	Slightly soluble in standard organic solvents.	**Vapor Pressure:**	0 mmHg @ 20°C
Oxidizing Properties:	Oxidizer	**Partition Coefficient (n-octanol/water):**	No data available

SECTION 10 – STABILITY AND REACTIVITY

Stability: Stable under normal conditions. Decomposition Temperature: Ammonium Nitrate will spontaneously decompose at 210°C (410°F).

Conditions to avoid: Keep away from open flames, hot surfaces and sources of ignition. Not expected to be sensitive to static discharge. Not expected to be sensitive to mechanical impact.

Incompatible materials: Avoid oxidizable materials, metal powder, bronze & copper alloys, fuels (e.g. lubricants, machine oils), fluorocarbon lubricants, acids, corrosive liquids, chlorate, sulphur, sodium nitrite, charcoal, coke and other finely divided combustibles. Strong oxidizing and reducing agents.

Hazardous decomposition products: The following toxic decomposition products may be released. At temperatures above 210°C (410°F), decomposition may be explosive, especially if confined. Nitrogen oxides (NOx). Carbon oxide. Hydrocarbons.

Hazardous Polymerization: None under normal processing. Hazardous polymerization does not occur. Explosive material under shock conditions.

SECTION 11 – TOXICOLOGICAL INFORMATION

Acute Toxicity

Product Information: Irritating to eyes. May cause skin irritation. Harmful if swallowed.

Chemical name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Ammonium Nitrate	2217 mg/kg Rat	3000 mg/kg Rabbit	88.8 mg/L Rat 4 h
Mineral Oil	4300 mg/kg Rat		
Diesel Fuel	>5000 mg/kg (rabbit)		

Subchronic Toxicity (28 Days): Ammonium Nitrate: Ingestion may cause methemoglobinemia. Initial manifestation of methemoglobinemia is cyanosis, characterized by navy lips, tongue and mucous membranes, with skin color being slate grey. Further manifestation is characterized by headache, weakness, dyspnea, dizziness, stupor, respiratory distress and death due to anoxia. If ingested, nitrates may be reduced to nitrites by bacteria in the digestive tract. Signs and symptoms of nitrite poisoning include methemoglobinemia, nausea, dizziness, increased heart rate, hypotension, fainting and, possibly shock.

Chronic Toxicity: May cause methemoglobinemia.

Carcinogenicity: The table below indicates whether each agency has listed any ingredient as a carcinogen.

Chemical name	ACGIH	IARC	NTP	OSHA
Diesel Fuel	A3			

Legend: A3: Confirmed as an animal carcinogen.

Mutagenic effects: There is no evidence of mutagenic potential.

Irritation: Irritating to eyes. May cause irritation of respiratory tract. May cause skin irritation in susceptible persons.

Reproductive effects: No information is available and no adverse reproductive effects are anticipated.

Developmental effects: No information is available and no adverse developmental effects are anticipated.

Target Organ: Eyes, skin, respiratory system, blood, liver, urinary tract, gastrointestinal tract (GI), endocrine system, & immune system.

SECTION 12 – ECOLOGICAL INFORMATION

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

Persistence/Degradability: Some water resistance but soluble with extended time periods.

Mobility in Environmental media: Dissolves slowly in water.

SECTION 13 – DISPOSAL CONSIDERATIONS

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

SECTION 14 – TRANSPORT INFORMATION

DOT Proper Shipping Name: Oxidizing substance, liquid, N.O.S. (Ammonium Nitrate)
Hazard Class: 5.1
UN-No: UN3139
Packing group: II

Transportation Emergency Telephone Number: 1-877-561-3636 or CHEMTREC: 1-800-424-9300

SECTION 15 – REGULATORY INFORMATION

USA CLASSIFICATION:
SARA Regulations Sections 313 and 40 CFR 372: This product contains the following toxic chemical(s) subject to reporting requirements, Ammonium Nitrate (6484-52-2).
SARA 311/312 Hazardous Categorization
Acute Heath Hazard: Yes
Chronic Health Hazard: Yes
Fire Hazard: Yes
Reactive Hazard: No
Sudden Release of Pressure Hazard: Yes
Ozone Protection and 40 CFR 42: No reportable quantities of ozone depleting agents
Other Regulations/Legislations which apply to this product: New Jersey Right-to-Know, Pennsylvania Right-to-Know, Massachusetts Right-to-Know, Rhode Island Right-to-Know, Florida, New Jersey Special Health Hazard Substance List, Minnesota Hazardous Substance List, California Director's List of Hazardous Substances, California Proposition 65.

TSCA: Complies **DSL:** Complies **NDSL:** Complies

The components in the product are on the following international inventory lists:

Chemical Name	TSCA	DSL	NDSL	ENCS	EINECS	ELINCS	CHINA	KECL	PICCS	AICS
Ammonium Nitrate	X	X	-	X	X	-	X	X	X	X
Mineral Oil	X	X	-	-	X	-	X	X	X	X
Diesel Fuel	X	X	-	-	X	-	X	X	X	X

Legend: X – Listed

SECTION 16 – OTHER INFORMATION

Prepared by: **Safety Health & Environment**
303-268-5000

Preparation Date: 31-Jul-2006
Revision Date: 24-Aug-2009

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

End of MSDS

Shell Canada Limited

Material Safety Data Sheet

Effective Date: 2007-05-25
Supersedes: 2005-07-26

Class B2 Flammable Liquid

Class D2A Carcinogenicity

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT:	**REGULAR UNLEADED GASOLINE**
SYNONYMS:	Automotive Fuel Petrol
PRODUCT USE:	Fuel
MSDS Number:	211-001

SUPPLIER	**TELEPHONE NUMBERS**	
Shell Canada Limited (SCL)	**Shell Emergency Number**	1-800-661-7378
P.O. Box 100, Station M	**CANUTEC 24 HOUR EMERGENCY NUMBER**	613-996-6666
400-4th Ave. S.W.		
Calgary, AB Canada	For general information:	1-800-661-1600
T2P 2H5	For MSDS information:	403-691-3982
	(From 7:30 to 4:30 Mountain Time)	

This MSDS was prepared by the Toxicology and Product Stewardship Section of Shell Canada Limited.

*An asterisk in the product name designates a trade-mark(s) of Shell Canada Limited, used under license by Shell Canada Products.

2. COMPOSITION/INFORMATION ON INGREDIENTS

Component Name	CAS Number	% Range	WHMIS Controlled
Gasoline	86290-81-5	> 90	Yes
Benzene	71-43-2	< 1.5	Yes

See Section 8 for Occupational Exposure Guidelines.

3. HAZARDS IDENTIFICATION

Physical Description: Volatile Liquid Colourless Typical Gasoline Odour

Routes of Exposure: Exposure will most likely occur through skin contact or inhalation.
Hazards:

Vapour concentrations above the recommended exposure level are irritating to the eyes and respiratory tract, may cause headaches and dizziness, are anesthetic and may have other central nervous system effects.
Flammable Liquid.
Contains Benzene.
May cause cancer.
Ingestion may result in vomiting. Avoid aspiration of vomitus into lungs as small quantities may result in aspiration pneumonitis.
May be absorbed by skin contact.
In rare cases may sensitize heart muscle causing heart arrythmia.

Handling: Eliminate all ignition sources.
Wear suitable gloves and eye protection.
Bond and ground transfer containers and equipment to avoid static accumulation.
Avoid prolonged exposure to vapours.
Empty containers are hazardous, may contain flammable / explosive dusts, liquid residue or vapours. Keep away from sparks and open flames.

For further information on health effects, see Section 11.

4. FIRST AID

Eyes: Flush eyes with water for at least 15 minutes while holding eyelids open. If irritation occurs and persists, obtain medical attention.

Skin: Wash contaminated skin with mild soap and water for at least 15 minutes. If irritation occurs and persists, obtain medical attention.

Ingestion: DO NOT INDUCE VOMITING! OBTAIN MEDICAL ATTENTION IMMEDIATELY. Guard against aspiration into lungs by having the individual turn on to their left side. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into the lungs. Do not give anything by mouth to an unconscious person.

Inhalation: Remove victim from further exposure and restore breathing, if required. Obtain medical attention.

Notes to Physician: The main hazard following accidental ingestion is aspiration of the liquid into the lungs producing chemical pneumonitis. If more than 2.0 mL/kg has been ingested, vomiting should be induced with supervision. If symptoms such as loss of gag reflex, convulsions or unconsciousness occur before vomiting, gastric lavage with a cuffed endotracheal tube should be considered.

5. FIRE FIGHTING MEASURES

Extinguishing Media: Dry Chemical
Carbon Dioxide
Foam
Water Fog

Firefighting Instructions:	Flammable. Clear area of unprotected personnel. Do not use a direct stream of water as it may spread fire. Product will float and can be reignited on surface of water. Vapour forms a flammable/explosive mixture with air between upper and lower flammable limits. Avoid breathing vapours. Avoid inhalation of smoke. Vapours may travel along ground and flashback along vapour trail may occur. Do not enter confined fire space without adequate protective clothing and an approved positive pressure self-contained breathing apparatus. Delayed lung damage can be experienced after exposure to combustion products, sometimes hours after the exposure.
Hazardous Combustion Products:	Carbon dioxide, carbon monoxide and unidentified organic compounds may be formed upon combustion.

6. ACCIDENTAL RELEASE MEASURES

Issue warning "Flammable". Eliminate all ignition sources. Isolate hazard area and restrict access. Handling equipment must be grounded. Work upwind of spill if it is safe to do so. Avoid direct contact with material. Wear appropriate breathing apparatus (if applicable) and protective clothing. Stop leak only if safe to do so. Dike and contain land spills; contain spills to water by booming. Use water fog to knock down vapours; contain runoff. Absorb residue or small spills with absorbent material and remove to non-leaking containers for disposal. Notify appropriate environmental agency(ies). After area has been cleaned up to the satisfaction of regulatory authorities, flush area with water to remove trace residue. Dispose of recovered material as noted under Disposal Considerations.

7. HANDLING AND STORAGE

Handling:	Flammable. Fixed equipment as well as transfer containers and equipment should be grounded to prevent accumulation of static charge. Avoid breathing vapours and prolonged or repeated contact with skin. Vapours may accumulate and travel to distant ignition sources and flashback. Empty containers are hazardous, may contain flammable/explosive dusts, residues or vapours. Do not cut, drill, grind, weld or perform similar operations on or near containers. Provide adequate ventilation. Launder contaminated clothing prior to reuse. Wash with soap and water prior to eating, drinking, smoking, applying cosmetics or using toilet facilities.
Storage:	Store in a cool, dry, well ventilated area, away from heat and ignition sources. Use explosion-proof ventilation to prevent vapour accumulation.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

THE FOLLOWING INFORMATION, WHILE APPROPRIATE FOR THIS PRODUCT, IS GENERAL IN NATURE. THE SELECTION OF PERSONAL PROTECTIVE EQUIPMENT WILL VARY DEPENDING ON THE CONDITIONS OF USE.

OCCUPATIONAL EXPOSURE LIMITS (Current ACGIH TLV/TWA unless otherwise noted):

Gasoline: 300 ppm (STEL: 500 ppm)
Benzene (skin) : 0.5 ppm (STEL: 2.5 ppm)
Skin Notation: Absorption through skin, eyes and mucous membranes may contribute significantly to the total exposure.

Mechanical Ventilation:	Concentrations in air should be maintained below the occupational exposure limit if unprotected personnel are involved. Use explosion-proof ventilation as required to control vapour concentrations. Local ventilation recommended where mechanical ventilation is ineffective in controlling airborne concentrations below the recommended occupational exposure limit. Make up air should always be supplied to balance air exhausted (either generally or locally). For personnel entry into confined spaces (i.e. bulk storage tanks) a proper confined space entry procedure must be followed including ventilation and testing of tank atmosphere.

PERSONAL PROTECTIVE EQUIPMENT:

Eye Protection:	Chemical safety goggles and/or full face shield to protect eyes and face, if product is handled such that it could be splashed into eyes. Provide an eyewash station in the area.
Skin Protection:	Avoid contact with skin. Use protective clothing and gloves manufactured from nitrile. Safety showers should be available for emergency use.
Respiratory Protection:	Avoid breathing vapour or mists. If exposure has the potential to exceed occupational exposure limits, use an appropriate NIOSH-approved respirator. For high airborne concentrations, use a NIOSH-approved supplied-air respirator, either self-contained or airline breathing apparatus, operated in positive pressure mode.

9. PHYSICAL DATA

Physical State:	Volatile Liquid
Appearance:	Colourless
Odour:	Typical Gasoline Odour
Odour Threshold:	< 0.25 ppm
Freezing/Pour Point:	Not available
Boiling Point:	35 - 220 °C
Density:	720 - 760 kg/m3 @ 15 °C
Vapour Density (Air = 1):	3.5
Vapour Pressure (absolute):	< 107 kPa @ 38 °C
Specific Gravity (Water = 1):	0.74
pH:	Not applicable
Flash Point:	Tag Closed Cup -30 °C
Lower Flammable Limit:	1.4 % (vol.)
Upper Flammable Limit:	7.6 % (vol.)
Autoignition Temperature:	280 °C
Viscosity:	< 1 cSt @ 38 °C
Evaporation Rate (n-BuAc = 1):	Not available
Partition Coefficient (log K_{ow}):	2.3
Water Solubility:	Insoluble
Other Solvents:	Hydrocarbon Solvents
Formula:	C4 - C11

10. STABILITY AND REACTIVITY

Chemically Stable:	Yes
Hazardous Polymerization:	No
Sensitive to Mechanical Impact:	No
Sensitive to Static Discharge:	Yes
Incompatible Materials:	Avoid contact with strong oxidizing agents and acids.
Conditions of Reactivity:	Avoid excessive heat, open flames and all ignition sources.

11. TOXICOLOGICAL INFORMATION

Ingredient (or Product if not specified)	Toxicological Data
Gasoline	LD50 Dermal Rabbit > 5 mL/kg LD50 Oral Rat > 18 mL/kg
Benzene	LD50 Dermal Rabbit > 8260 mg/kg LC50 Inhalation Rat 13700 ppm for 4 hours LD50 Oral Rat 690 - 3400 mg/kg

Routes of Exposure: Exposure will most likely occur through skin contact or inhalation.

Formulation: No data is specifically available for this product and therefore this toxicological information is based on testing completed with the ingredients.

Irritancy: Based on testing with similar materials, this product is not expected to be a primary skin irritant after exposure of short duration, would not be a skin sensitizer and would not be irritating to the eye.

Acute Toxicity: Vapour concentrations above the recommended exposure level are irritating to the eyes and respiratory tract, may cause headaches and dizziness, are anesthetic and may have other central nervous system effects.

Chronic Effects: Prolonged and repeated contact with skin can cause defatting and drying of the skin resulting in skin irritation and dermatitis. Prolonged exposure to high vapour concentration can cause headache, dizziness, nausea, blurred vision and central nervous system depression. Prolonged and repeated exposure may cause serious injury to blood forming organs, resulting in anemia and similar conditions. Myelodysplastic syndrome (MDS) has been observed in people exposed to very high levels (50 to 300 ppm) of benzene over a long period of time in the workplace. The relevance of these results to lower levels of exposure is not known.

Carcinogenicity and Mutagenicity: According to the International Agency for Research on Cancer (IARC) this product is considered to be possibly carcinogenic to humans. This product contains benzene. Carcinogenic hazard. Repeated exposure to benzene concentrations greater than the recommended TLV/TWA may reduce the cellular components of peripheral blood and bone marrow. Epidemiological studies indicate that long term inhalation of benzene vapour can cause leukaemia in man. Benzene has also produced chromosomal aberrations in peripheral blood lymphocytes.

12. ECOLOGICAL INFORMATION

Do not allow product or runoff from fire control to enter storm or sanitary sewers, lakes, rivers, streams, or public waterways. Block off drains and ditches. Provincial regulations require and federal regulations may require that environmental and/or other agencies be notified of a spill incident. Spill area must be cleaned and restored to original condition or to the satisfaction of authorities.

Biodegradability: Inherently biodegradable.
Rapid volatilization.

Bioaccumulation: Potential for bioaccumulation.

Partition Coefficient (log K_{ow}): 2.3

Aquatic Toxicity

Product is expected to be toxic to aquatic organisms.

Ingredient:	Toxicological Data

Gasoline	EL50 - growth rate (WAF method) Algae (72hr) 1 - 10 mg/L. EL50 (WAF method) Daphnia Magna (48hr) 1 - 10 mg/L. LL50 (WAF method) Rainbow Trout (96hr) 1 - 10 mg/L.
Benzene	EL50 - growth rate Algae (72hr) 10 - 100 mg/L. EL50 Daphnia Magna (48hr) 10 - 100 mg/L. LL50 Rainbow Trout (96hr) 1 - 10 mg/L.

Definition(s): LL and EL are the lethal loading concentration and effective loading concentration respectively. The concentration represents the amount of substance added to the system to obtain a toxic concentration. They replace the traditional LC and EC for low solubility substances.
WAF is the water accommodated fraction. A slightly soluble hydrocarbon is stirred into water and the insoluble portions are removed. The remaining solution is the water accommodated fraction.

13. DISPOSAL CONSIDERATIONS

Waste management priorities (depending on volumes and concentration of waste) are: 1. recycle (reprocess), 2. energy recovery 3. incineration, 4. disposal at a licenced waste disposal facility. Do not attempt to combust waste on-site. Incinerate at a licenced waste disposal site with approval of environmental authority.

14. TRANSPORTATION INFORMATION

Canadian Road and Rail Shipping Classification:

UN Number	UN1203
Proper Shipping Name	GASOLINE
Hazard Class	Class 3 Flammable Liquids
Packing Group	PG II
Additional Information	Marine Pollutant
Shipping Description	GASOLINE Class 3 UN1203 PG II Marine Pollutant

15. REGULATORY INFORMATION

This product has been classified in accordance with the hazard criteria of the *Controlled Products Regulations (*CPR*)* and the MSDS contains all the information required by the CPR.

WHMIS Class:	Class B2 Flammable Liquid Class D2A Carcinogenicity
DSL/NDSL Status:	This product, or all components, are listed on the Domestic Substances List, as required under the Canadian Environmental Protection Act. This product and/or all components are listed on the U.S. EPA TSCA Inventory.
Other Regulatory Status:	No Canadian federal standards.

16. ADDITIONAL INFORMATION

LABEL STATEMENTS

Hazard Statement :	Flammable Liquid. Contains Benzene. May cause cancer.
Handling Statement:	Eliminate all ignition sources. Wear suitable gloves and eye protection. Bond and ground transfer containers and equipment to avoid static accumulation. Avoid prolonged exposure to vapours. Empty containers are hazardous, may contain flammable / explosive dusts, liquid residue or vapours. Keep away from sparks and open flames.
First Aid Statement :	Wash contaminated skin with soap and water. Flush eyes with water. If overcome by vapours remove to fresh air. Do not induce vomiting. Obtain medical attention.
Revisions:	This MSDS has been reviewed and updated. Section 1 Section 2 Section 3 Section 4 Section 5 Section 6 Section 7 Section 8 Section 11 Section 12

Material Safety Data Sheet

Hydrochloric acid 32-38% solution

MSDS# 11155

Section 1 - Chemical Product and Company Identification

MSDS Name:	Hydrochloric acid 32-38% solution
Catalog Numbers:	A142-212, A142P-20, A144-212, A144-212LC, A144-500, A144-500LB, A144-612GAL, A144C-212, A144C-212EA, A144P-20, A144S-212, A144S-212EA, A144S-212LC, A144S-500, A144SI-212, A466-1, A466-2, A466-250, A466-2LC, A466-500, A481-212, A481-212LC, A508-212, A508-212LC, A508-4, A508-500, A508SK-212, NC9373124, S71942SC, S71942SCND, S71943, S71943ND, S80038, SA49
Synonyms:	Muriatic acid; Chlorohydric acid; Hydrogen chloride in aqueous solution.

Company Identification:	Fisher Scientific One Reagent Lane Fair Lawn, NJ 07410
For information in the US, call:	201-796-7100
Emergency Number US:	201-796-7100
CHEMTREC Phone Number, US:	800-424-9300

Section 2 - Composition, Information on Ingredients

Risk Phrases: 34 37

CAS#:	7647-01-0
Chemical Name:	Hydrogen chloride
%:	32-38
EINECS#:	231-595-7
Hazard Symbols:	C

Risk Phrases:

CAS#:	7732-18-5
Chemical Name:	Water
%:	62-68
EINECS#:	231-791-2
Hazard Symbols:	

Text for R-phrases: see Section 16

Hazard Symbols: C

Risk Phrases: 34 37

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Danger! Causes eye and skin burns. Causes digestive and respiratory tract burns. Corrosive to metal. Repeated or prolonged exposure may cause erosion of exposed teeth. May be fatal if inhaled or swallowed. Target Organs: Respiratory system, gastrointestinal system, teeth, eyes, skin.

Potential Health Effects

Eye:	May cause irreversible eye injury. Vapor or mist may cause irritation and severe burns. Contact with liquid is corrosive to the eyes and causes severe burns.
Skin:	Contact with liquid is corrosive and causes severe burns and ulceration. The severity of injury depends on the concentration of the solution and the duration of exposure.
Ingestion:	Causes severe digestive tract burns with abdominal pain, vomiting, and possible death. May cause corrosion and permanent tissue destruction of the esophagus and digestive tract.
Inhalation:	May be fatal if inhaled. May cause severe irritation of the respiratory tract with sore throat, coughing, shortness of breath and delayed lung edema. Causes chemical burns to the respiratory tract. Causes corrosive action on the mucous membranes.
Chronic:	Prolonged or repeated skin contact may cause dermatitis. Repeated exposure may cause erosion of teeth. Repeated exposure to low concentrations of HCl vapor or mist may cause bleeding of nose and gums. Chronic bronchitis and gastritis have also been reported.

Section 4 - First Aid Measures

Eyes:	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid immediately.
Skin:	In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.
Ingestion:	If swallowed, do NOT induce vomiting. Get medical aid immediately. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person.
Inhalation:	POISON material. If inhaled, get medical aid immediately. Remove victim to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Notes to Physician:	Do NOT use sodium bicarbonate in an attempt to neutralize the acid.

Section 5 - Fire Fighting Measures

General Information:	As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. Not flammable, but reacts with most metals to form flammable hydrogen gas. Use water spray to keep fire-exposed containers cool. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Containers may explode when heated.
Extinguishing Media:	Substance is noncombustible; use agent most appropriate to extinguish surrounding fire.
Autoignition Temperature:	Not applicable.
Flash Point:	Not applicable.
Explosion Limits: Lower:	Not available
Explosion Limits: Upper:	Not available
NFPA Rating:	health: 3; flammability: 0; instability: 1;

Section 6 - Accidental Release Measures

General Information:	Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks:	Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Isolate area and deny entry. Provide ventilation. Spill may be carefully neutralized with lime (calcium oxide, CaO). A vapor suppressing foam may be used to reduce vapors. Approach spill from upwind.

Section 7 - Handling and Storage

Handling:	Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Contents may develop pressure upon prolonged storage. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Discard contaminated shoes. Keep away from strong bases and metals. Use caution when opening. Do not use with metal spatula or other metal items. Do not breathe vapor or mist. Use only with adequate ventilation or respiratory protection.

Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Corrosives area. Do not store in metal containers. Store away from alkalies. Separate from oxidizing materials.

Section 8 - Exposure Controls, Personal Protection

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Hydrogen chloride	2 ppm Ceiling	50 ppm IDLH	5 ppm Ceiling; 7 mg/m3 Ceiling
Water	none listed	none listed	none listed

OSHA Vacated PELs: Hydrogen chloride: None listed Water: None listed

Engineering Controls:

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

Exposure Limits

Personal Protective Equipment

Eyes: Wear chemical splash goggles and face shield.

Skin: Wear appropriate gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid

Color: clear, colorless to pale yellow

Odor: strong, pungent

pH: 0.01

Vapor Pressure: 84 mm Hg @ 20 deg C

Vapor Density: 1.27 (air=1)

Evaporation Rate: > 1.00 (N-butyl acetate)

Viscosity: Not available

Boiling Point: 83 deg C @ 760 mmHg (181.40°F)

Freezing/Melting Point: -66 deg C (-86.80°F)

Decomposition Temperature: Not available

Solubility in water: Soluble

Specific Gravity/Density: 1.19 (38%)

Molecular Formula: HCl.H2O

Molecular Weight: 36.46

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.

Conditions to Avoid: Excess heat.

Incompatibilities with Other Materials: Metals, strong oxidizing agents, strong reducing agents, bases, acetic anhydride, alcohols, amines, sulfuric acid, vinyl acetate, epoxides (e.g. butyl glycidyl ether), chlorosulfonic acid, carbides, beta-propiolactone, ethyleneimine, propylene oxide, lithium silicides, 2-aminoethanol, 1,1-difluoroethylene, magnesium boride, mercuric sulfate, aldehydes, cyanides, sulfides, phosphides.

Hazardous Decomposition Products: Hydrogen chloride, chlorine, hydrogen gas.

Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#: CAS# 7647-01-0: MW4025000 MW4031000
CAS# 7732-18-5: ZC0110000

LD50/LC50:
RTECS:
CAS# 7647-01-0: Inhalation, mouse: LC50 = 1108 ppm/1H;
Inhalation, mouse: LC50 = 20487 mg/m3/5M;
Inhalation, mouse: LC50 = 3940 mg/m3/30M;
Inhalation, mouse: LC50 = 8300 mg/m3/30M;
Inhalation, rat: LC50 = 3124 ppm/1H;
Inhalation, rat: LC50 = 60938 mg/m3/5M;
Inhalation, rat: LC50 = 7004 mg/m3/30M;
Inhalation, rat: LC50 = 45000 mg/m3/5M;
Inhalation, rat: LC50 = 8300 mg/m3/30M;
Oral, rabbit: LD50 = 900 mg/kg;
.
RTECS:
CAS# 7732-18-5: Oral, rat: LD50 = >90 mL/kg;
.
Other: Inhalation LC50 (aerosol) rat: 8300mg/m3/30M; Oral LDLo Man: 2857 ug/kg; Oral LDLo Woman: 420 uL/kg; Inhalation LCLo Human: 1300 ppm/30M.

Carcinogenicity: Hydrogen chloride - IARC: Group 3 (not classifiable)
Water - Not listed as a carcinogen by ACGIH, IARC, NTP, or CA Prop 65.

Other: See actual entry in RTECS for complete information.

Section 12 - Ecological Information

Ecotoxicity: Fish: Bluegill/Sunfish: 3.6 mg/L; 48Hr; Lethal (unspecified)
Fish: Bluegill/Sunfish: LC50; 96 Hr; pH 3.0-3.5

Section 13 - Disposal Considerations

Dispose of in a manner consistent with federal, state, and local regulations.

Section 14 - Transport Information

US DOT
Shipping Name: HYDROCHLORIC ACID
Hazard Class: 8
UN Number: UN1789
Packing Group: II
Canada TDG
Shipping Name: HYDROCHLORIC ACID
Hazard Class: 8
UN Number: UN1789
Packing Group: II

USA RQ: CAS# 7647-01-0: 5000 lb final RQ; 2270 kg final RQ

Section 15 - Regulatory Information

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: C

Risk Phrases:

R 34 Causes burns.

R 37 Irritating to respiratory system.

Safety Phrases:

S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)

CAS# 7647-01-0: 1

CAS# 7732-18-5: Not available

Canada

CAS# 7647-01-0 is listed on Canada's DSL List

CAS# 7732-18-5 is listed on Canada's DSL List

Canadian WHMIS Classifications: E, D1A

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

CAS# 7647-01-0 is listed on Canada's Ingredient Disclosure List

CAS# 7732-18-5 is not listed on Canada's Ingredient Disclosure List.

US Federal

TSCA

CAS# 7647-01-0 is listed on the TSCA Inventory.

CAS# 7732-18-5 is listed on the TSCA Inventory.

Section 16 - Other Information

MSDS Creation Date: 7/06/1999

Revision #21 Date 7/20/2009

Material Safety Data Sheet
Hydrogen Peroxide, 50 wt% Solution in Water

ACC# 97775

Section 1 - Chemical Product and Company Identification

MSDS Name: Hydrogen Peroxide, 50 wt% Solution in Water
Catalog Numbers: AC302860000, AC302860065, AC302865000, H341-500
Synonyms: Carbamide peroxide; Hydrogen dioxide; Peroxide; Hydroperoxide; Urea peroxide; Hydrogen peroxide 100 volumes;
Company Identification:

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

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

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
7722-84-1	Hydrogen peroxide	50	231-765-0
7732-18-5	Water	50	231-791-2

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid.
Danger! Strong oxidizer. Contact with other material may cause a fire. Eye contact may result in permanent eye damage. Corrosive. Causes eye and skin irritation and possible burns. May be harmful if swallowed. May cause severe respiratory tract irritation with possible burns. May cause severe digestive tract irritation with possible burns. May cause blood abnormalities. Light sensitive. May cause central nervous system effects.
Target Organs: Blood, central nervous system.

Potential Health Effects
Eye: Contact with liquid is corrosive to the eyes and causes severe burns. Contact with the eyes may cause corneal damage.
Skin: Causes severe skin irritation and possible burns. May cause discoloration, erythema (redness), swelling, and the formation of papules and vesicles (blisters).
Ingestion: Causes gastrointestinal irritation with nausea, vomiting and diarrhea. Causes gastrointestinal tract burns. May cause vascular collapse and damage. May cause damage to the red blood cells. May cause difficulty in swallowing, stomach distension, possible cerebral swelling and death. Ingestion may result in irritation of the esophagus, bleeding of the stomach and ulcer formation.
Inhalation: Causes chemical burns to the respiratory tract. May cause ulceration of nasal tissue, insomnia, nervous tremors with numb extremities, chemical pneumonia, unconsciousness, and death. At high concentrations, respiratory effects may include acute lung damage and delayed pulmonary edema.
Chronic: Prolonged or repeated skin contact may cause dermatitis. Laboratory experiments have resulted in mutagenic effects. Repeated contact may cause corneal damage.

Section 4 - First Aid Measures

Eyes: Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).
Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.
Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately. Wash mouth out with water. Vomiting may occur spontaneously. If vomiting occurs and the victim is conscious, give water to further dilute the chemical.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.
Notes to Physician: Treat symptomatically and supportively. Attempts at evacuating the stomach via emesis induction or gastric lavage should be avoided. In the event of severe distension of the stomach or esophagus due to gas formation, insertion of a gastric tube may be required. To treat corneal damage, careful ophthalmologic evaluation is recommended and the possibility of local corticosteroid therapy should be considered.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. Strong oxidizer. Contact with other material may cause fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Substance is noncombustible. Use water with caution and in flooding amounts. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Some oxidizers may react explosively with hydrocarbons(fuel). May decompose explosively when heated or involved in a fire. May accelerate burning if involved in a fire.
Extinguishing Media: Use water only! Do NOT use carbon dioxide. Do NOT use dry chemical. Do NOT get water inside containers. Contact professional fire-fighters immediately. Cool containers with flooding quantities of water until well after fire is out. For large fires, flood fire area with large quantities of water, while knocking down vapors with water fog.
Flash Point: Noncombustible
Autoignition Temperature: Noncombustible
Explosion Limits, Lower:40 vol %
Upper: 100 vol %
NFPA Rating: (estimated) Health: 2; Flammability: 0; Instability: 1; Special Hazard: OX

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Use water spray to disperse the gas/vapor. Remove all sources of ignition. Absorb spill using an absorbent, non-combustible material such as earth, sand, or vermiculite. Do not use combustible materials such as sawdust. Flush spill area with water. Provide ventilation. Keep combustibles (wood, paper, oil, etc.,) away from spilled material.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Contents may develop pressure upon prolonged storage. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Avoid contact with clothing and other combustible materials. Do not ingest or inhale. Store protected from light. Discard contaminated shoes. Unused chemicals should not be returned to the container. Rinse empty drums and containers thoroughly with water before discarding.
Storage: Keep away from heat, sparks, and flame. Do not store near combustible materials. Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Store protected from light. Keep away form alkalies, oxidizable materials, finely divided metals, alcohols, and permanganates. Store only in light-resistent containers fitted with a safety vent.

Section 8 - Exposure Controls, Personal Protection

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

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Hydrogen peroxide	1 ppm TWA	1 ppm TWA; 1.4 mg/m3 TWA 75 ppm IDLH	1 ppm TWA; 1.4 mg/m3 TWA
Water	none listed	none listed	none listed

OSHA Vacated PELs: Hydrogen peroxide: 1 ppm TWA; 1.4 mg/m3 TWA Water: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear chemical splash goggles.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear, colorless
Odor: slight acid odor
pH: 3.3 (30% solution)
Vapor Pressure: 23 mm Hg @ 30C
Vapor Density: 1.10
Evaporation Rate:>1.0 (Butyl acetate=1)
Viscosity: 1.25 cP
Boiling Point: 108 deg C @ 760 mmHg
Freezing/Melting Point:-33 deg C
Decomposition Temperature: Not available.
Solubility: Miscible in water.
Specific Gravity/Density:1.1-1.2 (30-50%)
Molecular Formula:H2O2
Molecular Weight:34.0128

Section 10 - Stability and Reactivity

Chemical Stability: Decomposes slowly to release oxygen. Unstable when heated or contaminated with heavy metals, reducing agents, rust, dirt or organic materials. Stability is reduced when pH is above 4.0.
Conditions to Avoid: Mechanical shock, incompatible materials, light, ignition sources, dust generation, excess heat, combustible materials, reducing agents, alkaline materials, strong oxidants, rust, dust, pH > 4.0.
Incompatibilities with Other Materials: Strong oxidizing agents, strong reducing agents, acetic acid, acetic anhydride, alcohols, brass, copper, copper alloys, finely powdered metals, galvanized iron, hydrazine, iron, magnesium, nitric acid, sodium carbonate, potassium permanganate, cyanides (e.g. potassium cyanide, sodium cyanide), ethers (e.g. dioxane, furfuran, tetrahydrofuran (THF)), urea, chlorosulfonic acid, alkalies, lead, nitrogen compounds, triethylamine, silver, nickel, palladium, organic matter, charcoal, sodium borate, aniline, platinum, formic acid, cyclopentadiene, activated carbon, tert-butyl alcohol, hydrogen selenide, manganese dioxide, mercurous chloride, rust, ketones, carboxylic acids, glycerine, sodium fluoride, sodium pyrophosphate, soluble fuels (acetone, ethanol, glycerol), wood, wood, asbestos, hexavalent chromium compounds, salts of iron, copper, chromium, vanadium, tungsten, molybdeum, and platinum.
Hazardous Decomposition Products: Oxygen, hydrogen gas, water, heat, steam.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 7722-84-1: MX0887000; MX0888000; MX0890000; MX0899000; MX0899500; MX0900000
CAS# 7732-18-5: ZC0110000
LD50/LC50:
CAS# 7722-84-1:

Draize test, rabbit, eye: 1 mg Severe;
Inhalation, rat: LC50 = 2 gm/m3/4H;
Inhalation, rat: LC50 = 2000 mg/m3;
Oral, mouse: LD50 = 2000 mg/kg;
Oral, rabbit: LD50 = 820 mg/kg;
Oral, rat: LD50 = 1518 mg/kg;
Oral, rat: LD50 = 910 mg/kg;
Oral, rat: LD50 = 376 mg/kg;
Oral, rat: LD50 = 4050 mg/kg;
Skin, rat: LD50 = 3 gm/kg;
Skin, rat: LD50 = 4060 mg/kg;

.

CAS# 7732-18-5:

Oral, rat: LD50 = >90 mL/kg;

.
Oral, rat: LD50 = 1232 mg/kg (35% H_2O_2); Oral, rat: LD50 = 841 mg/kg (60 %
Carcinogenicity:
CAS# 7722-84-1:

- **ACGIH:** A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans
- **California:** Not listed.
- **NTP:** Not listed.
- **IARC:** Not listed.

CAS# 7732-18-5: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information found
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: CAS#: 7722-84-1 Mutation in Microorganisms: Salmonella typhimurium = 100 ug/plate.; Hyman, embryo = 50 umol/L.; Cytogenetic Analysis: Human, embryo = 20 umol/L. Mutation in Mammalian Somatic Cells: Hamster, lung = 1mmol/L.
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Carp: LC50 = 42 mg/L; 48 Hr; UnspecifiedFish: Fathead Minnow: LC50 = 16.4 mg/L; 96 Hr; Fresh waterFish: Fathead Minnow: NOEC = 5 mg/L; 96 Hr; Fresh waterWater flea Daphnia: EC50 = 2.4 mg/L; 48 Hr; Fresh waterFish: Channel catfish: LC50 = 37.4 mg/L; 96 Hr; Fresh water No data available.
Environmental: Rain washout is expected due to condensation of hydrogen peroxide on contact with water droplets. In the atmosphere, indirect photooxidation is perdicted with a half-life of 10 to 20 hours. Non-significant evaporation and adsorption from water surfaces and soil/sediments is expected. Rapid and cosiderable aerobic biodegradation was determined with a half-life < 1 minute (biological treatment sludge) and 0.3 to 2 days (fresh water). Hydrogen peroxide is non-bioaccumulable.
Physical: No information available.
Other: No information available.

Section 13 - Disposal Considerations

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

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	HYDROGEN PEROXIDE, AQUEOUS SOLUTIONS	HYDROGEN PEROXIDE AQUEOUS SOLN
Hazard Class:	5.1	5.1(8)
UN Number:	UN2014	UN2014
Packing Group:	II	II

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 7722-84-1 is listed on the TSCA inventory.
CAS# 7732-18-5 is listed on the TSCA inventory.

Health & Safety Reporting List

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

Chemical Test Rules

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

Section 12b

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

TSCA Significant New Use Rule

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

CERCLA Hazardous Substances and corresponding RQs

None of the chemicals in this material have an RQ.

SARA Section 302 Extremely Hazardous Substances

CAS# 7722-84-1: 1000 lb TPQ (concentration >52%)

SARA Codes

CAS # 7722-84-1: immediate, fire.

Section 313 No chemicals are reportable under Section 313.

Clean Air Act:

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

Clean Water Act:

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

OSHA:

CAS# 7722-84-1 is considered highly hazardous by OSHA.

STATE

CAS# 7722-84-1 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California Prop 65

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

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

O C

Risk Phrases:

R 34 Causes burns.
R 8 Contact with combustible material may cause fire.

Safety Phrases:

S 28 After contact with skin, wash immediately with...
S 3 Keep in a cool place.
S 36/39 Wear suitable protective clothing and eye/face protection.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)

CAS# 7722-84-1: 0
CAS# 7732-18-5: No information available.

Canada - DSL/NDSL

CAS# 7722-84-1 is listed on Canada's DSL List.
CAS# 7732-18-5 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of C, D2A, E.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 7722-84-1 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 7/08/1999
Revision #5 Date: 10/22/2008

Material Safety Data Sheet
May be used to comply with
OSHA's Hazard Communication Standard
29 CFR 1910.1200. Standard must be
consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY Quicklime, CaO, Lime
Calcium oxide (all sizes including granular) (UN1910)

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name and Address
Chemical Lime Company
3724 Hulen Street
Fort Worth, Texas 76107

Emergency Telephone Number
Chemtrec 800-424-9300

Information Phone Number
817-732-8164

Date Prepared
3/30/2006

Section II - Hazardous Ingredients/Identity Information

Hazardous Components	CAS	Common Name	OSHA PEL	ACGIH TLV	Other Limits	% (optional)
Calcium oxide	1305-78-8	Quicklime	5 mg/m3	2 mg/m3	5 mg/m3	>90%
Magnesium oxide	1309-48-4	Periclase	10 mg/m3	10 mg/m3	6 mg/m3	<5%
Calcium carbonate	1317-65-3	Limestone	15 mg/m3	10 mg/m3	6450 mg/kg	<3%
Silicon dioxide	14808-60-7	Quartz	*see note below	0.025 mg/m3	4 mg/m3	<2%

**SiO2 OSHA PEL: 10 mg/m3 divided by (the percentage of silica in the dust plus 2) (respirable)*

Section III - Physical/Chemical Characteristics

Boiling Point	2850 °C	**Melting Point**	2570 °C	**Specific Gravity**	1.6 - 2.8 g/cc
Vapor Pressure (mm Hg)	N.A.	**Vapor Density**	N.A.	**Evaporation Rate**	N.A.

Solubility in Water Reactive with water to produce $Ca(OH)_2$ with large amounts of heat. pH = 12.4@25°C

Appearance and Odor White or gray lumps or powder, odorless

Section IV - Fire and Explosion Hazard Data

Flash Point	LEL/UEL	Flammable Limits	Extinguishing Media
N.A.	N.A.	N.A.	Not Combustible -- Use extinguishing agent for surrounding fire

Special Firefighting Procedures/Unusual Fire and Explosion Hazards

In large amounts, calcium oxide will react with water to produce heat and possibly steam.
Flood with excess water to remove heat.

Section V - Reactivity Data

Stability	Conditions to Avoid (stability - related)
Unstable	Reacts with water to form $Ca(OH)_2$ and large amounts of heat. Reacts with CO_2 to form $CaCO_3$.

Incompatibility (Materials to Avoid)

Acids: Reacts vigorously and produces heat. Maleic Anhydride: May react explosively. Nitro Organic Compounds: May react to form explosive salts. Phosphorous: May form flammable products when heated. Aluminum: May react in presence of water to form hydrogen gas.

Hazardous Polymerization/Hazardous Decomposition of Byproducts Will not occur (none)

Section VI - Health Hazard Data

Route(s) of Entry: Inhalation, Ingestion

Health Hazards (Acute and Chronic)

Avoid skin and eye contact as irritation will occur. Contact lenses should not be worn when working with lime products. Inhalation can cause coughing, sneezing or breathing problems. Material in contact with wet skin could cause severe irritation and/or burning.

Carcinogenicity: **OSHA?** SiO_2 **NTP/IARC Monographs?** SiO_2

Respirable crystalline silica from occupational sources is classified by IARC as a Group I Carcinogen.
California Proposition 65: Silica is on the Governor's Proposition 65 list. Components used in this product may contain trace amounts of inherent naturally occurring elements (such as, but not limited to arsenic, cadmium) that are on the Governor's Proposition 65 list.

Section VI - Health Hazard Data (continued)

Signs and Symptoms of Exposure

Skin or eye irritation; coughing or breathing problems.

Medical Conditions Generally Aggravated by Exposure

Respiratory problems, asthma, dermatitis or skin or eye sensitivity.

Emergency and First Aid Procedure

Flush contaminated area with excess water. If eye contact , rinse eye with eye wash solution or excess water and seek medical attention immediately.

Section VII - Precautions for Safe Handling and Use

Steps to be Taken in Case Material is Released or Spilled

Protect skin and eyes from contact and avoid inhalation of dust. If material is dry pick up and keep away from acids or organic materials. Place in steel drums. If wet add excess water to remove heat and place in steel drums.

Waste Disposal Method

Carefully add water in excess of 20 parts water to 1 part lime and flush to sewer. Consult local, state, or federal regulations.

Precautions to be Taken in Handling and Storage

Store in tightly closed containers and keep dry and away from acids or other incompatible substances.
Do not store or ship in aluminum containers.

Shipping and Handling Restrictions for Quicklime

When being transported by air, calcium oxide is classified in the Department of Transportation (DOT) regulations as a hazardous material. Because express carriers (for example, Federal Express, Airborne Express, and United Parcel Service) ship by air, quicklime presented to these carriers for shipment should be packaged, marked, and labeled accordingly, and be accompanied by the appropriate shipping documentation. Only personnel trained and certified under applicable DOT Hazardous Materials Regulations (contained in Title 49 of the Code of Federal Regulations) may prepare quicklime for air transport. For additional information, contact the DOT website, www.text-trieve.com/dotrspa, or the Research and Development Department of Chemical Lime Company at (817)732-8164.

Other Precautions

Keep material dry. If material gets wet, flood with excess water to remove heat. Avoid eye contact and breathing dust.

NFPA Rating:	HEALTH: 3	FLAMMABILITY: 0	REACTIVITY: 1
HMIS Rating:	HEALTH: 2	FLAMMABILITY: 0	REACTIVITY: 1
WHMIS Rating:	D2A, E		

Section VIII - Control Measures

Respiratory Protection (Specify Type)

Dust masks meeting the NIOSH N95 rating are sufficient for casual exposure. (42 CFR)

Ventilation	**Local Exhaust** Vent to dust collector	**Special**	Do not dispose of dust with combustible materials.
	Mechanical (General) Vent to meet TLV requirements	**Other**	

Protective Gloves	**Other Protective Clothing or Equipment**
Dry cloth or leather gloves	Full clothing to cover arms and legs, safety glasses or face shield.

Work/Hygienic Practices

Eye wash and shower station should be readily available.

Chemical Lime Company provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person. Individuals receiving this information must consult their own technical and legal advisors and/ or exercise their own judgment in determining its appropriateness for a particular purpose. Chemical Lime Company makes no representations or warranties, either express or implied, including without limitation and warranties of merchantability or fitness for a particular purpose with respect to the information set forth herein or the product(s) to which the information refers. Accordingly, Chemical Lime Company will not be responsible or liable for any claims, losses or damages resulting from the use of or reliance upon or failure to use this information.

References: Sax, N.I. & R.J. Lewis Sr. (1989) "Dangerous Properties of Industrial Materials", New York: Van Nostrand Reinhold Co. Ltd.
Lewis, R.J. (1997) "Hazardous Chemicals Desk Reference", New York: Van Nostrand Reinhold Co. Ltd. KSA

MATERIAL SAFETY DATA SHEET

Date Printed: 07/18/2006
Date Updated: 02/02/2006
Version 1.11

Section 1 - Product and Company Information

Product Name	SODIUM HYDROXIDE ANHYDROUS PELLETS SIGMAULTRA
Product Number	S8045
Brand	SIAL
Company	Sigma-Aldrich
Address	3050 Spruce Street SAINT LOUIS MO 63103 US
Technical Phone:	800-325-5832
Fax:	800-325-5052
Emergency Phone:	314-776-6555

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
SODIUM HYDROXIDE	1310-73-2	No

Formula	NaOH
Synonyms	Caustic soda * Hydroxyde de sodium (French) * Lewis-red devil lye * Natriumhydroxid (German) * Natriumhydroxyde (Dutch) * Soda lye * Sodio(idrossido di) (Italian) * Sodium hydrate * Sodium hydroxide (ACGIH:OSHA) * Sodium(hydroxyde de) (French) * White caustic
RTECS Number:	WB4900000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Corrosive.
Causes severe burns.
Exothermic in contact with water

HMIS RATING

HEALTH: 3
FLAMMABILITY: 0
REACTIVITY: 2
SPECIAL HAZARD(S): Water reactive

NFPA RATING

HEALTH: 3
FLAMMABILITY: 0
REACTIVITY: 2
SPECIAL HAZARD(S): Water reactive

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE

If swallowed, wash out mouth with water provided person is

conscious. Call a physician immediately.

INHALATION EXPOSURE
If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

DERMAL EXPOSURE
In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

EYE EXPOSURE
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section 5 - Fire Fighting Measures

EXPLOSION DATA
Sensitivity to Mechanical Impact: Contact with aluminum, tin and zinc liberates hydrogen gas. Contact with nitromethane and other similar nitro compounds causes formation of shock-sensitive salts.

FLASH POINT
N/A

AUTOIGNITION TEMP
N/A

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: Use extinguishing media appropriate to surrounding fire conditions.
Unsuitable: Do not use water.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s): Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL
Evacuate area.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP
Sweep up, place in a bag and hold for waste disposal. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

HANDLING
User Exposure: Do not breathe dust. Do not get in eyes, on skin, on clothing. Avoid prolonged or repeated exposure.

STORAGE
Suitable: Keep tightly closed. Store in a cool dry place.
Incompatible Materials: Do not allow contact with water

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS
Safety shower and eye bath. Use only in a chemical fume hood.

PERSONAL PROTECTIVE EQUIPMENT
Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator.
Hand: Compatible chemical-resistant gloves.
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES
Wash contaminated clothing before reuse. Discard contaminated shoes. Wash thoroughly after handling.

EXPOSURE LIMITS, RTECS

Country	Source	Type	Value
USA	ACGIH	Ceiling co2	MG/M3
USA	MSHA Standard	Ceiling co2	MG/M3
USA	OSHA.	PEL	8H TWA 2 MG/M3
New Zealand	OEL		
Remarks: check ACGIH TLV			
USA	NIOSH	Ceiling co2	MG/M3/15M

EXPOSURE LIMITS

Country	Source	Type	Value
Poland USA	OSHA.	NDS PEL	2 mg/m3
Poland USA	ACGIH	NDSCh TLV	0.5 MG/M3
			2 mg/m3
Poland		NDSP	1 MG/M3

Section 9 - Physical/Chemical Properties

Appearance
Physical State: Solid
Color: White
Form: Pellets

Property	Value	At Temperature or Pressure
Molecular Weight	40 AMU	
pH	13.0 - 14.0	
BP/BP Range	1,390 ˚C	
MP/MP Range	318 ˚C	
Freezing Point	N/A	
Vapor Pressure	< 18 mmHg	20 ˚C
Vapor Density	> 1 g/l	
Saturated Vapor Conc.	N/A	
SG/Density	2.13 g/cm3	
Bulk Density	2.13 kg/l	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	

Solvent Content	N/A
Evaporation Rate	N/A
Viscosity	N/A
Surface Tension	N/A
Partition Coefficient	N/A
Decomposition Temp.	N/A
Flash Point	N/A
Explosion Limits	N/A
Flammability	N/A
Autoignition Temp	N/A
Refractive Index	N/A
Optical Rotation	N/A
Miscellaneous Data	N/A
Solubility	N/A

N/A = not available

Section 10 - Stability and Reactivity

STABILITY

Stable: Stable.
Conditions of Instability: Heat of solution is very high, and with limited amounts of water, violent boiling may occur Absorbs carbon dioxide from air. Never add water to this material, always add this material to water
Conditions to Avoid: Do not allow water to enter container because of violent reaction.
Materials to Avoid: Strong oxidizing agents, Strong acids, Organic materials.

HAZARDOUS DECOMPOSITION PRODUCTS

Hazardous Decomposition Products: Sodium/sodium oxides.

HAZARDOUS POLYMERIZATION

Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE

Skin Contact: Causes burns.
Skin Absorption: May be harmful if absorbed through the skin.
Eye Contact: Causes burns.
Inhalation: May be harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
Ingestion: May be harmful if swallowed.

SIGNS AND SYMPTOMS OF EXPOSURE

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting. Inhalation may result in spasm, inflammation and edema of the larynxand bronchi, chemical pneumonitis, and pulmonary edema.

TOXICITY DATA

Intraperitoneal
Mouse
40 MG/KG

LD50

IRRITATION DATA
Skin
Rabbit
500 mg
24 HR
Remarks: Severe irritation effect
Eyes
Rabbit
0.5 mg
24 HR
Remarks: Severe irritation effect

Eyes
Monkey
1 %
24H
Remarks: Severe irritation effect

Skin
Rabbit
500 mg
24H
Remarks: Severe irritation effect

Eyes
Rabbit
0.4 mg
Remarks: Mild irritation effect

Eyes
Rabbit
1 %
Remarks: Severe irritation effect

Eyes
Rabbit
0.05 mg
24H
Remarks: Severe irritation effect

Eyes
Rabbit
1 mg
24H
Remarks: Severe irritation effect

Eyes
Rabbit
1 mg
30S
Remarks: Rinsed

CHRONIC EXPOSURE - MUTAGEN

Species: Hamster
Dose: 10 MMOL/L
Cell Type: lung
Mutation test: Cytogenetic analysis

Species: Hamster

Dose: 16 MMOL/L
Cell Type: ovary
Mutation test: Cytogenetic analysis

Section 12 - Ecological Information

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
Contact a licensed professional waste disposal service to dispose of this material. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT
Proper Shipping Name: Sodium hydroxide, solid
UN#: 1823
Class: 8
Packing Group: Packing Group II
Hazard Label: Corrosive
PIH: Not PIH

IATA
Proper Shipping Name: Sodium hydroxide, solid
IATA UN Number: 1823
Hazard Class: 8
Packing Group: II

Section 15 - Regulatory Information

EU DIRECTIVES CLASSIFICATION
Symbol of Danger: C
Indication of Danger: Corrosive.
R: 35
Risk Statements: Causes severe burns.
S: 26-37/39-45
Safety Statements: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable gloves and eye/face protection. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Corrosive.
Risk Statements: Causes severe burns.
Safety Statements: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing, gloves, and eye/face protection. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
US Statements: Exothermic in contact with water

UNITED STATES REGULATORY INFORMATION
SARA LISTED: No
TSCA INVENTORY ITEM: Yes

CANADA REGULATORY INFORMATION
WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.

DSL: Yes
NDSL: No

Section 16 - Other Information

DISCLAIMER

For R&D use only. Not for drug, household or other uses.

WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

MSDS Number: **P5950** * * * * * *Effective Date:* ***08/20/08*** * * * * * *Supercedes:* ***10/19/05***

MSDS Material Safety Data Sheet

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

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone 908-859-2151
CHEMTREC 1-800-424-9300
National Response in Canada
CANUTEC 613-996-6666
Outside U.S. and Canada
Chemtrec 703-527-3887
NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals

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

POTASSIUM NITRATE

1. Product Identification

Synonyms: Saltpeter; niter; Nitric acid, potassium salt
CAS No.: 7757-79-1
Molecular Weight: 101.1
Chemical Formula: KNO3
Product Codes:
J.T. Baker: 3190, 3192, 3193
Mallinckrodt: 3651, 6370, 6390, 6715, 7028

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Potassium Nitrate	7757-79-1	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

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

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

Health Rating: 2 - Moderate
Flammability Rating: 0 - None
Reactivity Rating: 3 - Severe (Oxidizer)
Contact Rating: 2 - Moderate (Life)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: Yellow (Reactive)

Potential Health Effects

Inhalation:
Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath.
Ingestion:
Causes irritation to the gastrointestinal tract. Symptoms may include nausea, vomiting and diarrhea. May cause gastroenteritis and abdominal pains. Purging and diuresis can be expected. Rare cases of nitrates being converted to the more toxic nitrites have been reported, mostly with infants.
Skin Contact:
Causes irritation to skin. Symptoms include redness, itching, and pain.
Eye Contact:
Causes irritation, redness, and pain.
Chronic Exposure:
Under some circumstances methemoglobinemia occurs in individuals when the nitrate is converted by bacteria in the stomach to nitrite. Nausea, vomiting, dizziness, rapid heart beat, irregular breathing, convulsions, coma, and death can occur should this conversion take place. Chronic exposure to nitrites may cause anemia and adverse effects to kidney.
Aggravation of Pre-existing Conditions:
No information found.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition.
Explosion:
Some nitrates may explode when shocked, exposed to heat or flame, or by spontaneous chemical reaction. Sealed containers may rupture when heated. Sensitive to mechanical impact.
Fire Extinguishing Media:
Dry chemical, carbon dioxide, Halon, water spray, or fog. If water is used, apply from as far a distance as possible. Water spray may be used to keep fire exposed containers cool. Do not allow water runoff to enter sewers or waterways.
Special Information:
Wear full protective clothing and breathing equipment for high-intensity fire or potential explosion conditions. This oxidizing material can increase the flammability of adjacent combustible materials.

6. Accidental Release Measures

Remove all sources of ignition. Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Clean up spills in a manner that does not disperse dust into the air. Use non-sparking tools and equipment. Reduce airborne dust and prevent scattering by moistening with water. Pick up spill for recovery or disposal and place in a closed container.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage and moisture. Isolate from any source of heat or ignition. Avoid storage on wood floors. Separate from incompatibles, combustibles, organic or other readily oxidizable materials. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

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

9. Physical and Chemical Properties

Appearance:
White crystals.
Odor:
Odorless.
Solubility:
36 gm/100 ml water
Specific Gravity:
2.1
pH:
ca. 7
% Volatiles by volume @ 21C (70F):
0

Boiling Point:
400C (752F)
Melting Point:
333C (631F)
Vapor Density (Air=1):
3.00
Vapor Pressure (mm Hg):
Negligible @ 20C
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Oxides of nitrogen and toxic metal fumes may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Heavy metals, phosphites, organic compounds, carbonaceous materials, strong acids, and many other substances.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Oral rat LD50: 3750 mg/kg. Investigated as a mutagen, reproductive effector.

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

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Potassium Nitrate (7757-79-1)	No	No	None

12. Ecological Information

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

13. Disposal Considerations

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

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: POTASSIUM NITRATE
Hazard Class: 5.1
UN/NA: UN1486
Packing Group: III
Information reported for product/size: 50KG

International (Water, I.M.O.)

Proper Shipping Name: POTASSIUM NITRATE
Hazard Class: 5.1
UN/NA: UN1486
Packing Group: III
Information reported for product/size: 50KG

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

Proper Shipping Name: POTASSIUM NITRATE
Hazard Class: 5.1
UN/NA: UN1486
Packing Group: III
Information reported for product/size: 50KG

15. Regulatory Information

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

Ingredient	TSCA	EC	Japan	Australia
Potassium Nitrate (7757-79-1)	Yes	Yes	Yes	Yes

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

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Potassium Nitrate (7757-79-1)	Yes	Yes	No	Yes

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

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Potassium Nitrate (7757-79-1)	No	No	No	Nitrate Cmpd

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

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Potassium Nitrate (7757-79-1)	No	No	No

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

Australian Hazchem Code: 1[T]
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **1** Flammability: **0** Reactivity: **0** Other: **Oxidizer**
Label Hazard Warning:
DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.
Label Precautions:
Keep from contact with clothing and other combustible materials.
Store in a tightly closed container.
Do not store near combustible materials.
Remove and wash contaminated clothing promptly.
Avoid contact with eyes, skin and clothing.
Avoid breathing dust.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
****
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****
Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Material Safety Data Sheet (MSDS)

Revised October 8, 1999 For additional copies call 1-800-237-SAN

I. Product Identification

Trade Name:	Silica Sand - All Grades
Manufacturer's Name:	Manley Bros. of Indiana, Inc.
Manufacturer's Address:	P.O. Box 80, Vermillion Road Troy Grove, IL 61372
Manufacturer's Telephone:	(815) 539-7486
Date Revised:	10/99

II. Hazardous Ingredients

Chemical Names	CAS Number	14808-60-7	
Silica, Quartz, SiO_2	Exposure Limits in Air	ACGIH-TLV	0.1 mg/cubic meter
Percentage >95		OSHA-PEL	0.1 mg/cubic meter
		NIOSH *	0.05 mg/cubic meter
		(* Recommended Standard)	

Exposure Limits refer to the respirable fraction

III. Physical Properties

Vapor Density:	Not Applicable
Specific Gravity:	2.65 Crystalline
Solubility in Water:	Insoluble
Vapor Pressure, mmHg at 20' C:	Essentially Zero
Melting Point or Range, °F:	Above 2000 °F
Boiling Point or Range, °F:	Above 3500 °F
Evaporation Rate:	None
Appearance and Odor:	Light Buff to White Sand, No Odor
How to Detect This Substance:	Detect sand by appearance. The dangerous respirable dust may only be detected using special measuring equipment. It should be assumed that wherever silica sand is re-handled some dust will be generated and routine measuring performed to detect and determine the level.

IV. Fire and Explosion

Flash Point:	None
Auto Ignition Temperature:	None
Flammable Limits in Air:	Not Combustible
Special Fire Fighting Procedures:	None, may be used to extinguish fire
Unusual Fire and Explosion Hazards:	None

V. Health Hazard Information

Health Effects or Risks from Exposure

Silicosis — PROLONGED INHALATION OF RESPIRABLE SILICA (DUST) WILL RESULT IN PERMANENT LUNG DAMAGE. A Condition known as Silicosis. To prevent its occurrence, dust levels must be monitored and personnel exposed to respirable silica at or above the Permitted Exposure Level, MUST wear OSHA approved respirators.

Cancer Agent: YES NTP: Yes IARC: Yes Federal OSHA: No

NTP: Respirable crystalline silica has been listed by The National Toxicology Program in the 6th Annual Report on Carcinogens to Humans (1992) as an anticipated carcinogen. IARC: The International Agency for Research on Cancer Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Humans, in Vol. 68, concludes that there is sufficient evidence of the carcenogenicity of inhaled crystalline silica to humans.

EXPOSURE TO RESPIRABLE SILICA CAN CAUSE CANCER. Personnel exposed to respirable silica MUST wear OSHA approved respirators.

Symptoms of Overexposure

Inhaled:	Coughing, shortness of breath, reduced pulmonary function. Effects may be delayed, the disease usually being contracted over an extended period of exposure.
Contact with Skin or Eyes:	Irritation
Absorbed through Skin:	Not Applicable
Swallowed:	May Cause Nausea

First Aid - Emergency Procedures

Eye Contact:	Flush with water for 15 minutes. Seek medical attention.
Skin Contact:	Wash with soap and water. If irritation persists seek medical attention.
Inhaled:	Remove to fresh air at once. Apply artificial respiration if breathing has stopped. Seek immediate medical attention.
Swallowed:	If discomfort persists seek medical attention.

All other pulmonary medical conditions are aggravated by exposure to respirable quartz.

VI. Reactivity Data

Stability:	Stable
Incompatibility (materials to avoid):	Strong Oxidizing Agents
Hazardous Decomposition Products (Including combustion products):	None
Hazardous Polymerization:	Will not occur

VII. Spill, Leak and Disposal Procedures

Spill Response Procedures:	Clean up using approved dustless methods (flush with water, or vacuum) to minimize generation of airborne respirable dust.
Waste Disposal:	Dispose of all waste in accordance with federal, state and local regulations in a facility approved for silica disposal.

VIII. Special Handling Information

Ventilation and Engineering Controls:	Local mechanical ventilation where necessary to keep below safe levels (PEL) Use NIOSH approved respiratory equipment for respirable quartz (supplied air types are strongly recommended)
Eye Protection:	Safety goggles
Gloves:	Not normally necessary
Other Clothing and Equipment:	Provide eye wash
Work Practices, Hygienic Practices:	Minimize dust generation. Clean up spills promptly. Monitor respirable quartz in workplace on a frequent regular basis.
Other Handling and Storage Requirements:	Avoid dust generation during handling. Clean up spills. Practice good housekeeping. No special storage requirements. Train all employees in all aspects of this MSDS *before* they work with this product.

See OSHA Hazard Communication Rule CFR 1910.1200, 1915.99, 1917.28, 1918.90, 1926.59, 1928.21, state and local worker or community "right to know" laws and regulations. Familiarize and train your employees with the requirements of the MSDS. WARN YOUR EMPLOYEES, AND YOUR CUSTOMERS IF YOU MERCHANT OR RE-SELL THE PRODUCTS, OF THE HAZARD AND THE OSHA PRECAUTIONS TO BE USED.

IX. Other Information

H.M.I.S. Rating:	
Health Hazard Rating:	1 Chronic exposure to respirable silica will result in silicosis exposure to respirable silica can cause cancer
Flammability Hazard Rating:	0
Reactivity Hazard Rating:	0
Personal Protective Equipment	E Comply with special OSHA respiratory protection if sandblasting
D.O.T.	Not Regulated
SARA Title III.	Not Listed

CAUTION!

PROLONGED INHALATION OF RESPIRABLE QUARTZ WILL CAUSE LUNG DAMAGE. A CONDITION KNOWN AS SILICOSIS.

Silica sands may generate respirable dust during use. Examples of conditions which promote the generation of respirable dust include, thermal shock, sandblasting, grinding, machining or operations were abrasion with silica takes place.

Monitor work area on a frequent regular basis for respirable quartz (silica). Use appropriate ventilation and/or respiratory protection unless exposure levels are known to be below permitted exposure levels.

INHALATION OF RESPIRABLE QUARTZ CAN CAUSE CANCER!

The International Agency for Research on Cancer (IARC) has determined that there is evidence for the carcinogenicity of crystalline silica to humans.

The department of Health and Human Services' National Toxicology Program (NTP), in its Sixth Annual Report on Carcinogens, has listed respirable crystalline silica in a category of substances which may 'reasonably be anticipate d to be carcinogenous.' Such substances are defined as those for which there is limited evidence of carcinogenicity in experimental animals.

Monitor work area on a frequent regular basis for respirable quartz (silica). Use appropriate ventilation and/or respiratory protection unless exposure levels are known to be below permitted exposure levels.

It is extremely important that your company follow OSHA standards for respiratory protection as they exist or are hereafter modified or amended. As part of your training program, please distribute this information to all employees

Manley Bros. of Indiana, Inc.
300 South Vermillion Street, Troy Grove, IL 61372
Phone: (800) 237-SAND Fax: (815) 539-7741

MSDS Number: **S3242** * * * * * *Effective Date:* ***05/26/09*** * * * * * *Supercedes:* ***08/17/06***

SODIUM CARBONATE ANHYDROUS

1. Product Identification

Synonyms: Carbonic acid, disodium salt; disodium carbonate; soda ash
CAS No.: 497-19-8
Molecular Weight: 105.99
Chemical Formula: Na2CO3
Product Codes:
J.T. Baker: 3602, 3604, 3605, 3606, 4502, 4923, 5198
Mallinckrodt: 1338, 3604, 7468, 7472, 7521, 7527, 7528, 7698

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Sodium Carbonate	497-19-8	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! MAY CAUSE EYE BURNS. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN AND RESPIRATORY TRACT.

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

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

Potential Health Effects

Inhalation:
Inhalation of dust may cause irritation to the respiratory tract. Symptoms from excessive inhalation of dust may include coughing and difficult breathing. Excessive contact is known to cause damage to the nasal septum.
Ingestion:
Sodium carbonate is only slightly toxic, but large doses may be corrosive to the gastro-intestinal tract where symptoms may include severe abdominal pain, vomiting, diarrhea, collapse and death.
Skin Contact:
Excessive contact may cause irritation with blistering and redness. Solutions may cause severe irritation or burns.
Eye Contact:
Contact may be corrosive to eyes and cause conjuctival edema and corneal destruction. Risk of serious injury increases if eyes are kept tightly closed. Other symptoms may appear from absorption of sodium carbonate into the bloodstream via the eyes.
Chronic Exposure:
Prolonged or repeated skin exposure may cause sensitization.
Aggravation of Pre-existing Conditions:
No information found.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Immediately flush skin with plenty of soap and water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:
Consider endoscopy in all suspected cases of sodium carbonate poisoning. Perform blood analysis to determine if dehydration, acidosis, or other electrolyte imbalances occurred.

5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard.
Explosion:
Not considered an explosion hazard, but sodium carbonate may explode when applied to red-hot aluminum.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire.
Special Information:
Use protective clothing and breathing equipment appropriate for the surrounding fire.

6. Accidental Release Measures

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

7. Handling and Storage

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

8. Exposure Controls/Personal Protection

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

9. Physical and Chemical Properties

Appearance:
White powder or granules.
Odor:
Odorless.
Solubility:
45.5 g/100 ml water @ 100C (212F)
Specific Gravity:
2.53
pH:
11.6 Aqueous solution
% Volatiles by volume @ 21C (70F):
0

Boiling Point:
Decomposes.
Melting Point:
851C (1564F)
Vapor Density (Air=1):
No information found.
Vapor Pressure (mm Hg):
No information found.
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Hygroscopic. Readily absorbs moisture from the air. Solutions are strong bases.
Hazardous Decomposition Products:
Oxides of carbon and sodium oxide.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Fluorine, aluminum, phosphorous pentoxide, sulfuric acid, zinc, lithium, moisture, calcium hydroxide and 2,4,6-trinitrotoluene. Reacts violently with acids to form carbon dioxide.
Conditions to Avoid:
Moisture, heat, dusting and incompatibles.

11. Toxicological Information

For Sodium Carbonate:
Oral rat LD50: 4090 mg/kg; inhalation rat LC50: 2300 mg/m3/2H; irritation eye rabbit: 50 mg severe; investigated as a mutagen, reproductive effector.

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

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Sodium Carbonate (497-19-8)	No	No	None

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
96 Hr LC50 Lepomis macrochirus: 300 mg/L [static];
48 Hr EC50 Daphnia magna: 265 mg/L

13. Disposal Considerations

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

14. Transport Information

Not regulated.

15. Regulatory Information

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

Ingredient	TSCA	EC	Japan	Australia
Sodium Carbonate (497-19-8)	Yes	Yes	Yes	Yes

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

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Sodium Carbonate (497-19-8)	Yes	Yes	No	Yes

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

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Sodium Carbonate (497-19-8)	No	No	No	No

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

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Sodium Carbonate (497-19-8)	No	No	No

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

Australian Hazchem Code: None allocated.
Poison Schedule: S5
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **2** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
DANGER! MAY CAUSE EYE BURNS. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN AND RESPIRATORY TRACT.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Avoid breathing dust.
Keep container closed.
Use with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. Get medical attention for any breathing difficulty. In all cases, get medical attention.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
****
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****
Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MATERIAL SAFETY DATA SHEET
SODIUM CARBONATE, ANHYDROUS
SODIUM CARBONATE, MONOHYDRATE
SODIUM CARBONATE, DECAHYDRATE

TANGRAM COMPANY, LLC. 125 CORPORATE DRIVE, HOLTSVILLE NY 11742
PHONE: 631-758-0460 FAX: 631-758-0471

Emergency Response (24 Hrs)
Chemtrec 1-800/424-9300

Date Prepared 12/04/01

Supersedes 05/31/01

SECTION 1. **PRODUCT IDENTIFICATION**

Synonym (s):

Chemical Name(s) of Primary Component(s)	CAS Number(s)	Chemical Formula
Sodium Carbonate Anhydrous	497-19-8	Na_3CO_3
Sodium Carbonate Monohydrate	5968-11-6	$Na_2CO_3H_2O$
Sodium Carbonate Decahydrate	631-61-8	$Na_2CO_310H_2O$

SECTION 2. **INGREDIENTS/SUMMARY OF HAZARDS**

Ingredient(s)	CAS Number(s)	OSHA Hazardous (H)/ Non-Hazardous (NH)	Percent
Sodium Carbonate Anhydrous	497-19-8	No applicable information found	
Sodium Carbonate Monohydrate	5968-11-6	No applicable information found	

Sara Title III Hazard Classification:

( ) Immediate (acute Health Hazard
( ) Delayed (chronic) Health Hazard
( ) Fire Hazard
( ) Sudden Release of Pressure Hazard
( ) Reactive Hazard

Warning Statements:

SECTION 3. **PHYSICAL DATA**

Melting Point (F): N/A
Boiling Point (F): N/A
Vapor Pressure (mmHg): N/A
Vapor Density (air = 1): N/A
Solubility in Water: 1 : 3.5
Specific Gravity: 2.53
Evaporation Rate (Butyl Acetate = 1): N/A
pH of 1% solution: 11.4
% Volatile by Volume:
Appearance/Odor: Odorless, white powder or crystals

SECTION 4. **FIRE AND EXPLOSION HAZARD DATA**

Flash Point (F)/Method: N/A

Flammable Limits: LFL N/A UFL N/A

Extinguishing Media:
( ) Water Fog ( ) Foam
( ) Dry Chemical ( ) CO2
(X) Other (Specify): Appropriate agent for surrounding fire.

SECTION 4. **FIRE AND EXPLOSION HAZARD DATA (CONT'D)**

TANGRAM COMPANY, LLC. 125 CORPORATE DRIVE, HOLTSVILLE NY 11742
PHONE: 631-758-0460 FAX: 631-758-0471

Special Fire Fighting Procedures: Sodium oxide, a thermal decomposition product existing at temperatures about 1564°F is a respiratory, eye & skin irritant. Avoid inhalation, eye & skin contact with sodium oxide dusts. Use a self-contained breathing apparatus (SCBA) and full protective equipment (Bunker Gear).

Unusual Fire and Explosion Hazards: None known

SECTION 5. REACTIVITY DATA

Stability ( ) Unstable (X) Stable

Conditions to avoid:

Incompatibility (materials to avoid):

( ) Water
( ) Reducing Agents
( ) Strong Bases
( ) Other (specify):

(X) Strong Acids
( ) Strong Oxidizing Materials
( ) Combustible Materials

Hazardous Decomposition Products of By-products: Carbon dioxide liberation upon contact with acids. Yields sodium oxide if exposed to temperatures about 1564°F.

Hazardous polymerization: ( ) May Occur (X) Will not Occur

Conditions to Avoid: None known

SECTION 6. HEALTH HAZARD DATA/FIRST AID PROCEDURES

Exposure Limits in Air

Chemical Name(s)	ACGIH (TWA)	OSHA (TWA)	Other
Sodium Carbonate	No applicable information was found		

Effects of Single Overexposure:

Swallowing: Ingestion of this material may induce corrosion of the G.I. tract, vomiting, diarrhea, circulatory collapse and death.

Inhalation: Irritant

Skin Absorption: None identified

Skin Contact: Topical Sensitivity, irritant

Eye Contact: Irritant

Effects of Repeated Overexposure: None identified.

Carcinogenicity: None known

Significant Laboratory Data with Possible Relevance to Man: None known

Medical Conditions Aggravated by Overexposure: None identified.

First Aid Procedures:

Eyes: Flood with clean luke-warm (not hot) water, low pressure for 15 minutes. Remove contacts. Occasionally lift eyelids while flooding the eyes. Get medical attention immediately.

Skin: Wash area with large amounts of water. Seek medical attention.

SECTION 6. HEALTH HAZARD DATA/FIRST AID PROCEDURES (CONT'D)

Inhalation: Remove from exposure area to fresh air. If breathing has stopped, perform artificial respiration.

TANGRAM COMPANY, LLC. 125 CORPORATE DRIVE, HOLTSVILLE NY 11742
PHONE: 631-758-0460 FAX: 631-758-0471

Ingestion: DO NOT INDUCE vomiting. If patient is conscious and can swallow, administer milk or water

Note to Physician: Large doses may produce systemic alkalosis and expansion in extracellular fluid volume with edema.

Section 7. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be taken if Material is Released or Spilled: Sweep up and dispose of in an environmentally sound manner.

Waste Disposal Method: In accordance appropriate Federal, State & Local regulations.

Handling & Storage: Store in cool, dry areas and away from incompatible substances. Avoid contact with acids.

Other Precautions: Sodium Carbonate Monohydrate reacts with acids to yield carbon dioxide gas that can accumulate in confined spaces. Do not enter confined spaces until they have been well ventilated and carbon dioxide levels have been determined to be safe.

Section 8. CONTROL MEASURES AND WORKER PROTECTION INFORMATION

Respiratory Protection (specify type): Dust mask recommended. Dust mask is required if total dust level exceeds 10 mg/m^3.

Ventilation: Mechanical

Protective Clothing: Uniform (coveralls), apron where splashing may occur when working with solutions.

Eye Protection:
(X) Safety Glasses with Side Shields
( ) Chemical Workers Dust-Proof Goggles
( ) Gas-Tight Goggles or Equivalent
(X) Other (specify): Do not wear contact lenses

Other Protective Equipment: Protective gloves; Impervious gloves when working with solutions

Section 9. REGULATORY STATUS

TSCA Inventory Status: Listed

Transportation Status: Non-hazardous

Reportable Quantity (RQ), under U.S. EPA CERCLA: None

Miscellaneous Regulatory Status:

NTP Annual report: No
IARC Group I or II: No
OSHA 29CFR, Part 1910, Subpart 2: No
ACGIH Appendix A: No

Section 9. REGULATORY STATUS (CONT'D)

State/International Right-to-Know Regulations:

California:
Connecticut:
Florida:
Illinois:
Louisiana:

TANGRAM COMPANY, LLC. 125 CORPORATE DRIVE, HOLTSVILLE NY 11742
PHONE: 631-758-0460 FAX: 631-758-0471

Massachusetts:
New Jersey:
New York:
Pennsylvania:
Rhode Island:
Canada:

Section 9. **REGULATORY STATUS (CONT'D)**

NFPA and HMIS Ratings:

	NFPA	HMIS
Health	2	2
Fire	0	0
Reactivity	0	0
Other	0	0

Key: NFPA/HMIS
0 = Minimal Hazard
1 = Slight Hazard
2 = Moderate Hazard
3 = High/Serious Hazard
4 = Extreme/Severe Hazard

Section 10. **REFERENCES**

THE INFORMATION HEREIN IS GIVEN IN GOOD FAITH, BUT NO WARRANTY, EXPRESSED OR IMPLIED, IS MADE. TANGRAM CO., LLC. SHALL NOT BE HELD LIABLE FOR ANY DAMAGE RESULTING FROM HANDLING OR FROM CONTACT WITH THE ABOVE PRODUCT.

The MSDS format adheres to the standards and regulatory requirements of the United States and may not meet regulatory requirements in other countries.

SODIUM CYANIDE
41310669 Revised 23-JAN-2006

CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Material Identification

Corporate MSDS Number	: DU000290
CAS Number	: 143-33-9
Formula	: NaCN
CAS Name	: SODIUM CYANIDE
Grade	: "CYANOBRIK"; "CYANOGRAN"

Company Identification

MANUFACTURER/DISTRIBUTOR
DuPont Chemical Solutions Enterprise
1007 Market Street
Wilmington, DE 19898
DuPont Cyanide Hotline
(For Transportation Emergencies ONLY)
1-901-357-1546

PHONE NUMBERS

Product Information	: 1-800-441-7515
Transport Emergency	: CHEMTREC 1-800-424-9300
Medical Emergency	: 1-800-441-3637

COMPOSITION/INFORMATION ON INGREDIENTS

Components

Material	CAS Number	%
*SODIUM CYANIDE	143-33-9	>96
OTHER SODIUM SALTS		<4

CONTACT WITH WATER LIBERATES:

*HYDROGEN CYANIDE GAS	74-90-8

* Disclosure as a toxic chemical is required under Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372.

Components (Remarks)

Sodium Cyanide in contact with water liberates small amounts of Hydrogen Cyanide (HCN) gas.

HAZARDS IDENTIFICATION

Potential Health Effects

May be fatal if inhaled, swallowed, or absorbed through the skin or eyes. Contact with acids or weak alkalies liberates poisonous gas. May cause eye burns and skin irritation and rashes. May cause rapid respirations and pulse, reddened eyes, flushed skin, weakness, headache, dizziness, confusion, nausea and vomiting. These may be followed by unconsciousness, convulsions, cessation of breathing, loss of blood pressure, heart beat irregularities, dilation of pupils and death. The lungs may fill with liquid.

SODIUM CYANIDE:

Skin contact with Sodium cyanide may cause skin irritation with discomfort or rash; strong solutions may cause skin burns or ulceration. Evidence suggests that significant skin permeation can occur in amounts capable of producing systemic toxicity. There are no reports of human sensitization.

Eye contact with Sodium cyanide may cause eye irritation with discomfort, tearing, or blurring of vision. Prolonged exposure may cause eye corrosion with corneal or conjunctival ulceration.

Inhalation, ingestion or skin contact of Sodium cyanide may cause nonspecific discomfort such as:

Reddening of the eyes	Nausea
Irritation of the throat	Headache
Palpitation	Weakness of arms and legs
Difficulty in breathing	Giddiness
Salivation	Collapse
Numbness	Convulsions

Central nervous system stimulation followed by central nervous system depression may occur with hypoxic convulsions and death due to respiratory arrest.

Higher exposures may lead to rapid respiration and pulse, flushing, cyanosis, acidosis, thyroid effects sometimes observed in individuals with nutritional deficiencies, symptoms associated with Parkinsonian Syndrome, pulmonary edema, and fatality from gross overexposure. In the few cases of disturbance of vision or damage to the optic nerve or retina attributable to cyanide poisoning, the poisoning has been acute and severe, and lethal or near lethal. There are reports of increased incidence of insomnia, agitated sleep, tremors, dermatitis and nose bleed in electroplating workers.

Individuals with preexisting diseases of the central nervous

(HAZARDS IDENTIFICATION - Continued)

system may have increased susceptibility to the toxicity of excessive exposures.

Carcinogenicity Information

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

FIRST AID MEASURES

Compound-Specific First Aid & Notes to Physicians

A step-wise procedure of "First Aid" and "Medical Treatment" is recommended for any cyanide poisoning. Treatment requires immediate action to prevent harm or death. First Aid is given initially, and experience shows that when given promptly it is usually the only treatment needed for typical accidental poisonings. Medical treatment may be needed for more severe poisoning.

First aid treatment uses oxygen and amyl nitrite and can be given by a first responder before medical help arrives.

Medical treatment is given if the patient does not respond to First Aid. Medical Treatment is a more aggressive treatment requiring intravenous injections of sodium nitrite and sodium thiosulfate, and must be administered by qualified medical personnel. It provides a larger quantity of antidote which helps eliminate cyanide from the body. Even if a doctor or nurse is present, the need for fast treatment dictates using the First Aid procedure with oxygen and amyl nitrite while Medical Treatment materials for intravenous injection are being prepared. When antidotal treatment is necessary, it should be started immediately.

IN CASE OF CYANIDE POISONING, START FIRST AID TREATMENT IMMEDIATELY, THEN CALL A PHYSICIAN.

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

(FIRST AID MEASURES - Continued)

All persons with the potential for cyanide poisoning should be trained to provide immediate First Aid using oxygen and amyl nitrite. Always have on hand the materials listed below in the FIRST AID and MEDICAL TREATMENT Sections. Actions to be taken in case of cyanide poisoning should be planned and practiced before beginning work with cyanides. Identification of community hospital resources and emergency medical squads in order to equip and train them on handling of cyanide emergencies is essential.

FIRST AID SUPPLIES

Adequate First Aid supplies for cyanide poisoning should be conveniently placed throughout the cyanide areas and should be immediately accessible at all times, but secured against tampering or theft. Supplies should be routinely inspected (typically daily) by people who would use them in an emergency. The total number of each item listed below should be adequate to handle the largest number of exposure cases reasonably anticipated, taking into account that some supplies may be wasted, destroyed, or inaccessible in the emergency.

1. Oxygen Resuscitators - Any positive pressure resuscitator capable of giving oxygen in conjunction with amyl nitrite can be used.

2. Amyl Nitrite Ampoules (antidote) - One box of one dozen ampoules per station is usually satisfactory. Locate stations throughout the cyanide area.

CAUTION: Amyl nitrite is not stable and must be replaced every 1-2 years, or earlier depending on storage conditions. Store in the original dated box away from heat and freezing temperatures. Do not store amyl nitrite or Medical Treatment Kits (see below) in enclosed areas where temperatures can exceed 60-66 deg C (140-150 deg F) or where freezing may occur. Storage in high temperature climates may require replacement before the expiration date, unless cool storage is provided. Avoid excessive cold storage which will reduce the vapor pressure of amyl nitrite and, hence, its effectiveness. A common DuPont practice is to use the resuscitator as the storage point for the amyl nitrite ampoules.

3. A set of cyanide first aid instructions should be located at each amyl nitrite storage location. Workers should be fully trained since in a real emergency there will be insufficient time to "read the book".

Amyl Nitrite Notes:

1. Amyl nitrite is highly volatile and flammable; do not smoke or use around a source of ignition.

(FIRST AID MEASURES - Continued)

2. If treating a patient in a windy or drafty area, provide something--a rag, shirt, wall, drum, cupped hand, etc.--to prevent the amyl nitrite vapors from being blown away. Keep the ampoule upwind from the nose. The objective is to get amyl nitrite into the patient's lungs.

3. Rescuers should avoid amyl nitrite inhalation to avoid becoming dizzy and losing competence.

4. Lay the patient down. Since amyl nitrite dilates blood vessels and lowers blood pressure, laying the patient down will help prevent unconsciousness.

5. Do not overuse. Monitor the patient for shock which would indicate excessive use. This has not occurred in practice at DuPont plants, and we are not aware of any serious after effects from treatment with amyl nitrite.

6. Review and adhere to proper storage, inspection and replacement requirements given above.

FIRST AID PROCEDURE

The exposed person should be removed from the contaminated area, contaminated clothing removed and the individual washed off. The rescuer and/or person providing first aid is subject to exposure if the affected person's clothing is wetted with cyanide. For HYDROGEN CYANIDE, rescue of a wetted person should be done wearing self-contained breathing air (SCBA), rubber gloves, and other personal protective equipment as necessary. For SODIUM CYANIDE or POTASSIUM CYANIDE dusts or solutions, SCBA is normally not needed. Contact with HYDROGEN CYANIDE must be avoided by rescuers, but short contact from solid cyanide or solutions is normally not a problem if skin washing is prompt. As soon as possible, even while clothing is being removed or washing is taking place, First Aid should be started.

1. If no symptoms are evident, no treatment is necessary; decontaminate patient.

2. If conscious but symptoms (nausea, difficult breathing, dizziness, etc.) are evident, give oxygen.

3. If consciousness is impaired (non-responsiveness, slurred speech, confusion, drowsiness) or the patient is unconscious but breathing, give oxygen and amyl nitrite by means of a resuscitator.

To give amyl nitrite, break an ampoule in a gauze pad and insert into lip of the resuscitator mask for 15 seconds, then take away for fifteen seconds. Repeat 5-6 times. If necessary, use a fresh ampoule every 3 minutes until the patient regains consciousness (usually 1-4 ampoules). Administer oxygen continuously. Guard against the ampoule entering the patient's mouth.

(FIRST AID MEASURES - Continued)

4. If not breathing, give oxygen and amyl nitrite immediately by means of a positive pressure resuscitator (artificial respiration).

Administer amyl nitrite as discussed in #3 and continue to give oxygen simultaneously to aid recovery. If massive exposure occurred, consider keeping the first one or two ampoules in the lip of the resuscitator mask continuously. Guard against the ampoule entering the patient's mouth.

INHALATION

If consciousness is impaired, oxygen and amyl nitrite should be administered as indicated under First Aid Procedure. Carry the patient to an uncontaminated atmosphere. Keep the patient warm and calm. Call a physician.

SKIN CONTACT

If consciousness is impaired, oxygen and amyl nitrite should be administered as indicated under First Aid Procedure. Immediately flush with large quantities of water for up to 5 minutes after contact or suspected contact, and completely remove all contaminated clothing (including shoes or boots). Flushing with water for up to 5 minutes is generally sufficient to effectively remove cyanide from the patient's skin. Call a physician.

EYE CONTACT

Immediately flush the eyes with large quantities of water for up to 5 minutes while holding the eyelids apart. Do not try to neutralize with "acids" or "alkalis". Eye contact will require further evaluation and possibly treatment. Continue rinsing the eye during transport to the hospital. See a physician. Oxygen and amyl nitrite should be used as indicated above.

INGESTION

If the patient is conscious, immediately have patient spit and rinse mouth with water then give patient activated charcoal slurry. If consciousness is impaired, or the patient is unconscious, immediately administer oxygen and amyl nitrite as discussed in the First Aid Procedure Section. Never give anything by mouth to an unconscious person. Give patient activated charcoal slurry ONLY when consciousness is regained. DO NOT give Syrup of Ipecac or other emetics since they will induce vomiting which could interfere with resuscitator use. Continue to give oxygen. Call a physician.

NOTE: To prepare activated charcoal slurry, mix 50 grams of activated charcoal in 400 mL (about 2 cups) water and mix thoroughly. Give 5 mL/kg, or 350 mL for an average adult.

MEDICAL TREATMENT

(FIRST AID MEASURES - Continued)

EXPERIENCE SHOWS THAT FIRST AID GIVEN PROMPTLY IS USUALLY THE ONLY TREATMENT NEEDED FOR TYPICAL INDUSTRIAL CYANIDE POISONING. LARGER CYANIDE POISONINGS INCREASE THE NEED FOR MEDICAL TREATMENT.

Do not over-react. Although prompt action is essential when poisoning has occurred, a lucid, conscious person who can communicate may not have significant cyanide poisoning and Medical Treatment will rarely be necessary. "Treat what you see" is a good rule of thumb. Mildly symptomatic patients who remain alert may be managed by supportive care only.

The half-life of cyanide in the body is about 20-90 minutes. In diagnosis and monitoring of patients, the critical period for treatment is short. Normally the effects from cyanide poisoning occur in the first few minutes and will indicate the degree of poisoning.

"Preventive" use of cyanide antidote in the absence of impaired consciousness is not normally warranted. Keep the patient calm by assurance over the next 30 minutes, and closely monitor the patient's condition. If skin contact with cyanide has been prolonged and/or extensive cyanide has been ingested, watch the individual closely for at least 30 minutes to assure there are no effects from delayed absorption of cyanide into the blood stream.

Consider assuring intravenous access in cases where significant toxicity is possible. Establishment of IV access with normal saline, Ringer's lactate, or other available IV fluid will facilitate administration of the antidote if necessary.

MEDICAL TREATMENT KITS

Medical Treatment Kits for cyanide poisoning should be conveniently located for easy access. Materials for intravenous injection are intended for use only by a physician or fully qualified medical personnel. The location of kits should be carefully planned as part of the emergency program. Kits should always be taken with patient during transport to medical facilities to ensure availability. Suggested locations for kits include:

- **in or near the cyanide area**
- **plant medical station**
- **guard house entrance**
- **local hospital**
- **doctor's office and residence**

(FIRST AID MEASURES - Continued)

CAUTION: Avoid storing amyl nitrite or Medical Treatment Kits in areas subject to extreme heat or freezing conditions. Kits and amyl nitrite should be accessible but secured against tampering. They should be inspected regularly and the amyl nitrite ampoules replaced every 1-2 years (See First Aid Supplies Section). Medical Treatment Kits should contain the following:

1. One box containing one dozen (12) amyl nitrite ampoules.

2. Two sterile ampoules of sodium nitrite solution (10 mL of a 3% solution in each).

3. Two sterile ampoules of sodium thiosulfate solution (50 mL of a 25% solution in each).

4. One 10 mL sterile syringe. One 50 mL sterile syringe. Two sterile intravenous needles. One tourniquet.

5. One dozen gauze pads.

6. Latex gloves.

7. A "Biohazard" bag for disposal of bloody/contaminated equipment.

8. A set of cyanide instructions on first aid and medical treatment.

NOTE: Amyl nitrite ampoules and Medical Treatment Supplies can be purchased through local pharmacies with a physician’s prescription.

MEDICAL TREATMENT PROCEDURE

1. Sodium nitrite: Adult - 10 mL of 3% solution (300 mg) Draw solution from the ampoule and inject slowly over 4-5 minutes (2 to 2.5 mL/minute). As soon as practical, monitor blood pressure and continue checking pulse. Slow the rate of injection if hypotension (low blood pressure) occurs.

2. Sodium thiosulfate: Adult - 50 mL of 25% solution (12.5 grams) Follow sodium nitrite with sodium thiosulfate injected at a rate of 2.5 mL/minute (10-20 minutes).

The total time for injection of these initial doses of both components at the recommended rates is lengthy, approximately 20-25 minutes.

Consider the body weight and condition of the patient when treating a cyanide exposed patient with sodium nitrite. Both amyl nitrite and sodium nitrite produce methemoglobin, which reduces the oxygen carrying capacity of the blood. Methemoglobinemia is potentially harmful when methemoglobin levels exceed 20-30% (See Antidotal Effects Section).

(FIRST AID MEASURES - Continued)

If symptoms persist or recur after the initial treatment, repeat the antidote at one half the original doses one hour after the original administration. Monitor methemoglobin levels when practical in every patient treated with the intravenous antidote.

AVOID OVER-TREATMENT.

The above sodium nitrite injection discussed in the Medical Treatment Procedure Section is about one-third the lethal dose, so care should be taken to avoid excessive use. It is not essential that full quantities of antidote be given just because treatment was started. Should injection be stopped for any reason, keep track of the amount administered in case treatment needs to be restarted.

ANTIDOTAL EFFECTS

Nitrites can produce hypotension through peripheral vasodilatation (widening of the blood vessels). Methemoglobin formation, although considered a therapeutic effect, may cause symptoms if levels exceed 20-30%. Recommended intravenous doses of sodium nitrite discussed in the Medical Treatment Procedure Section usually produce methemoglobin levels under 20%. Headache, nausea, vomiting, and syncope (fainting) may follow nitrite administration, and syncope may occur if the patient is not lying down. While it is important to be aware of the effects from nitrite therapy, there have been no long-lasting effects associated with this treatment regimen for cyanide exposure in DuPont’s experience and knowledge.

RECOVERY AND DISPOSITION

For most accidental poisonings, patients can be revived in a few minutes using oxygen and amyl nitrite with complete recovery within a few hours.

If necessary, the patient should be monitored for 24-48 hours. Any patient whose symptoms require the use of IV antidote should be considered for admittance to an intensive care unit.

Observe for return of symptoms. Monitor methemoglobin levels, blood pH and oxygenation through arterial blood gas analysis. Calculate anion gap from serum electrolytes. Cyanide poisoning causes lactate accumulation and an anion gap metabolic acidosis.

Delayed neurotoxic effects are not expected consequences of cyanide exposure although neurotoxic effects may occur if hypoxia (oxygen deficiency) was prolonged or occurred following massive cyanide exposure.

(FIRST AID MEASURES - Continued)

In the presence of smoke inhalation that can occur during fires, withholding amyl nitrite or sodium nitrite administration should be considered because of the potential for high carboxyhemoglobin levels. However, administration of oxygen and possibly sodium thiosulfate should be continued.

FIRE FIGHTING MEASURES

Flammable Properties

Will not burn.

Follow appropriate National Fire Protection Association (NFPA) codes.

Sodium Cyanide may not be completely destroyed in an ordinary fire involving combustible materials such as paper or wood. While sodium cyanide does not support combustion, it can oxidize in a fire.

Extinguishing Media

Water can be used on fires near sodium cyanide, but judgment should be used in light of runoff problems, especially if containers are opened or burned (See "Incompatibility with Other Materials" and "Fire Fighting Instructions"). In some cases it may be desirable to let a fire burn out by itself. DO NOT use carbon dioxide (CO2) which reacts with sodium cyanide to produce hydrogen cyanide in the presence of moisture.

Fire Fighting Instructions

Sodium Cyanide dissolves readily in water; therefore, cyanide solution runoff may occur if containers are opened or burned. Runoff should be contained to avoid environmental or safety problems. Contained cyanide solution can be detoxified with hypochlorite. In some cases it may be desirable to let a fire burn out by itself since sodium cyanide will not normally be affected by the fire.

ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

(ACCIDENTAL RELEASE MEASURES - Continued)

Spill Clean Up

Shovel and sweep up spilled material into a covered container or plastic bag pending transfer. Cover and keep spillage dry. Flush spill area with a dilute solution of sodium hypochlorite or calcium hypochlorite to destroy the cyanide. Call DuPont for guidance. Comply with Federal, State, and local regulations reporting releases. The EPA Reportable Quantity (RQ) is 10 pounds.

HANDLING AND STORAGE

Handling (Personnel)

Emergency pre-planning and training are needed before beginning to work with sodium cyanide since prompt treatment is essential in cases of cyanide poisoning. Always have Cyanide Antidote on hand.

Do not breathe dust, mist, or hydrogen cyanide gas. Do not get in eyes. Avoid contact with skin and clothing. Do not carry foodstuffs, beverages, or tobacco where contamination with cyanide is possible. Wash thoroughly after handling. Wash contaminated clothing before reuse.

Storage

Store in properly labeled containers in dry, ventilated, secured areas. Keep containers closed and contents dry. Do not store with acids or acid salts, containers with water or weak alkalis, or oxidizing agents. Do not handle or store food, beverages, or tobacco in cyanide areas. Do not store near combustibles or flammables because subsequent fire fighting with water could lead to cyanide solution runoff. If legal, do not store under sprinkler systems.

EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls

Use sufficient ventilation to keep employee exposure below recommended limits.

Personal Protective Equipment

Recommended minimum protection: Chemical splash goggles and rubber gloves (butyl preferred or neoprene).

Where there is potential for airborne exposures in excess of applicable limits, wear NIOSH approved respiratory protection including self-contained breathing air supply as appropriate.

(EXPOSURE CONTROLS/PERSONAL PROTECTION - Continued)

Have available and use as appropriate: face shield; rubber suits, aprons, and boots; hydrogen cyanide detector; First Aid and Medical Treatment supplies, including oxygen resuscitators.

Exposure Guidelines

Exposure Limits

SODIUM CYANIDE

PEL	(OSHA)	: 5 mg/m3, as CN, 8 Hr. TWA, Skin
TLV	(ACGIH)	: Ceiling 5 mg/m3, as CN, Skin
AEL *	(DuPont)	: 5 mg/m3, 15 minute TWA, as CN, Skin

Other Applicable Exposure Limits

HYDROGEN CYANIDE GAS

PEL	(OSHA)	: 10 ppm, 11 mg/m3, Skin
TLV	(ACGIH)	: Ceiling 4.7 ppm, 5 mg/m3, as CN, Skin
AEL *	(DuPont)	: 5 mg/m3, 15 minute TWA, as CN, Skin

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

Exposure Guideline Comments

The "Skin" notation in the Exposure Limits Section indicates that liquid or vapor may penetrate the skin (especially if the skin is broken). Control of vapor, dust, and mist inhalation alone may not be sufficient to prevent an excessive dose.

PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Boiling Point:	1496 C (2725 F) @ 760 mm Hg
Vapor Pressure:	Negligible
Vapor Density:	Not Volatile
Melting Point:	564 C (1047 F)
Solubility in Water:	37 WT% @ 20 C (68 F)
pH:	11-12*
Form:	Solid, Granular, Briquettes
Color:	White
Specific Gravity:	1.6
Bulk Density (Packed):	50-55 lb/cu ft

Solid cyanide has no odor, but it can have a slight ammonia and/or hydrogen cyanide odor if damp.

*The pH listed above is typical for 5-25% solutions with no pH adjustment.

STABILITY AND REACTIVITY

Chemical Stability

Very stable when dry.

Incompatibility with Other Materials

Large amounts of poisonous, flammable hydrogen cyanide (HCN) gas will be evolved from contact with acids. Reacts violently with strong oxidizing agents when heated. Water or weak alkaline solutions can produce dangerous amounts of hydrogen cyanide in confined areas.

Decomposition

Moisture will cause slow decomposition, releasing poisonous hydrogen cyanide and ammonia gases.

Polymerization

Polymerization will not occur.

TOXICOLOGICAL INFORMATION

Animal Data

Sodium Cyanide

Oral LD50: 15 mg/kg in rats
Dermal LD50: 11.28-14.63 mg/kg in rabbits
Inhalation LC50: no information found but considered to be highly toxic as CN by inhalation

Sodium cyanide has not been tested for skin and eye irritation, or for skin sensitization.

NOTE: Administration of Sodium cyanide to rats, cats, or dogs by the intravenous or intraperitoneal routes resulted in rapid respiration, confusion, unconsciousness, vomiting, decreased blood pressure, cardiac rate changes, seizures and respiratory failure.

Eye: As with other routes of exposure, systemic toxicity and death is possible from contamination of the eye; LD50 dose in rabbits is approximately 5 mg/kg.

Sodium cyanide applied to the skin of rabbits produced tremors, retrocolic spasms, convulsions, abnormal breathing patterns, and prostration.

Ingestion: Repeated administration of cassava diets containing unspecified cyanide ion caused decreased thyroid activity and kidney changes. Long-term administration of

(TOXICOLOGICAL INFORMATION - Continued)

0.5, 1.0, or 2.0 mg/kg/day to dogs produced unspecified acute intoxication symptoms and increased numbers of red blood cells and decreased proteins were observed at doses greater than 1.0 mg/kg/day. Central nervous system changes occurred in all treated dogs.

No animal test reports are available to define carcinogenic hazards of Sodium cyanide. Limited reproductive studies do not suggest effects. Some tests have shown the potential for developmental toxicity but only at exposure levels producing toxic effects in the adult animal.

Sodium cyanide does not produce genetic damage in bacterial cell cultures, and has not been tested in animals.

ECOLOGICAL INFORMATION

Ecotoxicological Information

Aquatic Toxicity:

Sodium Cyanide:

96 hour LC50 - fathead minnows: 0.43-0.66 mg/L
96 hour LC50 - rainbow trout: .046-.075 mg/L
96 hour LC50 - bluegill sunfish: 0.28 mg/L

DISPOSAL CONSIDERATIONS

Waste Disposal

This material may be a RCRA Hazardous waste. Do not flush cyanide into sewers which may contain an acid. Detoxify with dilute sodium hypochlorite, hydrogen peroxide, or calcium hypochlorite. Comply with Federal, State, and local regulations on disposal methods used to achieve the constituent based treatment standard, if permitted; or transfer to a licensed disposal contractor.

TRANSPORTATION INFORMATION

Shipping Information

DOT/IMO/IATA

Proper Shipping Name	: Sodium Cyanide, Solid
Hazard Class	: 6.1
UN No.	: 1689
Packing Group	: I
Reportable quantity	: 10 lbs.
Marine Pollutant	: Yes
Label(s)	: Toxic

(TRANSPORTATION INFORMATION - Continued)

Shipping Containers:

Steel Drums: 50 kg, 100 kg
Excel I and Excel II Trucks
Hopper Railcars
"FLO-BINS" (3,000 lb. net; 3,600 lbs. gross)
"FLO-BINS" (3,300 lb. net; 3,900 lbs. gross)
Bag in a Box (1,000 kg/2,205 lbs.)
Tuff Paks: 48, 20 kg bags in a box (960 kg or 2,117 lbs.)

REGULATORY INFORMATION

U.S. Federal Regulations

TSCA Inventory Status : Reported/Included.

TITLE III HAZARD CLASSIFICATIONS SECTIONS 311, 312

Acute : Yes
Chronic : No
Fire : No
Reactivity : Yes
Pressure : No

HAZARDOUS CHEMICAL LISTS

SARA Extremely Hazardous Substance: Yes
CERCLA Hazardous Substance : Yes
SARA Toxic Chemical : Yes

Canadian Regulations

CLASS D Division 1 Subdivision A - Very Toxic Material/Acute Lethality.

CLASS D Division 2 Subdivision B - Toxic Material. Skin or Eye Irritant.

OTHER INFORMATION

NFPA, NPCA-HMIS

NFPA Rating
Health : 3
Flammability : 0
Reactivity : 1

NPCA-HMIS Rating
Health : 3
Flammability : 0
Reactivity : 1

(Continued)

Personal Protection rating to be supplied by user depending on use conditions.

Additional Information

For further information, see DuPont Cyanide Storage and Handling Bulletin.

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

Responsible for MSDS : MSDS Coordinator
> : DuPont Chemical Solutions Enterprise
Address : Wilmington, DE 19898
Telephone : (800) 441-7515

# Indicates updated section.

This information is based upon technical information believed to be reliable. It is subject to revision as additional knowledge and experience is gained.

End of MSDS

Material Safety Data Sheet

Version 4.0
Revision Date 06/02/2010
Print Date 08/12/2010

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Sodium nitrate
Product Number	:	S5506
Brand	:	Sigma-Aldrich
Company	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+18003255832
Fax	:	+18003255052
Emergency Phone #	:	(314) 776-6555

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards
Oxidizer, Harmful by ingestion.

Target Organs

Blood, Central nervous systemBlood, Central nervous system

GHS Label elements, including precautionary statements

Pictogram

Signal word Warning

Hazard statement(s)

H272	May intensify fire; oxidiser.
H302	Harmful if swallowed.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.

Precautionary statement(s)

P220	Keep/Store away from clothing/ combustible materials.
P261	Avoid breathing dust/fume/gas/mist/vapours/spray.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

HMIS Classification

Health hazard:	1
Flammability:	0
Physical hazards:	1

NFPA Rating

Health hazard:	1
Fire:	0
Reactivity Hazard:	1
Special hazard.:	OX

Potential Health Effects

Inhalation May be harmful if inhaled. May cause respiratory tract irritation.

Skin	Harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.
Ingestion	Harmful if swallowed.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : NaNO3
Molecular Weight : 84.99 g/mol

CAS-No.	EC-No.	Index-No.	Concentration
Sodium nitrate			
7631-99-4	231-554-3	-	-

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Special protective equipment for fire-fighters
Wear self contained breathing apparatus for fire fighting if necessary.

Further information
Use water spray to cool unopened containers.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

Environmental precautions
Do not let product enter drains.

Methods and materials for containment and cleaning up
Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Keep in suitable, closed containers for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed. Keep away from sources of ignition - No smoking. Keep away from heat and sources of ignition. Normal measures for preventive fire protection.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Eye protection
Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	solid

Safety data

pH	9 at 100 g/l at 20 °C (68 °F)
Melting point	306 °C (583 °F)
Boiling point	380 °C (716 °F)
Flash point	no data available
Ignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Density	2.261 g/cm3
Water solubility	874 g/l at 20 °C (68 °F)
Partition coefficient: n-octanol/water	log Pow: -3.8 at 25 °C (77 °F)

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Conditions to avoid
Fusion of mixtures of metal cyanides, including lead thiocyanate, with metal chlorates, perchlorates, nitrates or nitrites causes a violent explosion. Addition of one solid component (even as a residue in small amount) to another molten component is also highly dangerous. Heat.

Materials to avoid
Strong acids, Strong reducing agents, Powdered metals, Organic materials, Alkali metals, Alkaline earth metals, Cyanides, thiocyanates

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Sodium oxides, nitrogen oxides (NOx)
Hazardous decomposition products formed under fire conditions. - Nature of decomposition products not known.

11. TOXICOLOGICAL INFORMATION

Acute toxicity
LD50 Oral - rat - 1,267 mg/kg

LD50 Oral - rabbit - 2,680 mg/kg

LDLO Oral - Child - 22.5 mg/kg

LD50 Intravenous - mouse - 175 mg/kg

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation
no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity

Genotoxicity in vitro - Hamster - fibroblast
Cytogenetic analysis

Genotoxicity in vitro - Hamster - Embryo
Host-mediated assay

Genotoxicity in vitro - Human - HeLa cell
Unscheduled DNA synthesis

Genotoxicity in vivo - mouse - Oral
Micronucleus test

Genotoxicity in vivo - mouse - Oral
Cytogenetic analysis

Genotoxicity in vivo - mouse - Oral
sperm

Carcinogenicity

Carcinogenicity - rat - Oral
Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Liver:Tumors.

Carcinogenicity - rat - Oral
Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Skin and Appendages: Other: Tumors. Tumorigenic Effects: Testicular tumors.

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

Reproductive toxicity

Reproductive toxicity - mouse - male - Oral
Paternal Effects: Spermatogenesis (including genetic material, sperm morphology,motility, and count).

Specific target organ toxicity - single exposure (GHS)
Inhalation - May cause respiratory irritation.

Specific target organ toxicity - repeated exposure (GHS)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion	Harmful if swallowed.
Skin	Harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.

Signs and Symptoms of Exposure
Absorption into the body leads to the formation of methemoglobin which in sufficient concentration causes cyanosis. Onset may be delayed 2 to 4 hours or longer.

Additional Information
RTECS: WC5600000

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	static test LC50 - Gambusia affinis (Mosquito fish) - 6,650 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates.	EC50 - Daphnia magna (Water flea) - 6,000 mg/l - 24 h

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

no data available

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN-Number: 1498 Class: 5.1 Packing group: III
Proper shipping name: Sodium nitrate
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN-Number: 1498 Class: 5.1 Packing group: III EMS-No: F-A, S-Q
Proper shipping name: SODIUM NITRATE

Marine pollutant: No

IATA
UN-Number: 1498 Class: 5.1 Packing group: III
Proper shipping name: Sodium nitrate

15. REGULATORY INFORMATION

OSHA Hazards
Oxidizer, Harmful by ingestion.

DSL Status
This product contains the following components that are not on the Canadian DSL nor NDSL lists.

	CAS-No.
Sodium nitrate	7631-99-4

SARA 302 Components
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
SARA 313: 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.

SARA 311/312 Hazards
Reactivity Hazard, Acute Health Hazard

Massachusetts Right To Know Components
No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Sodium nitrate	7631-99-4	

New Jersey Right To Know Components

	CAS-No.	Revision Date
Sodium nitrate	7631-99-4	

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

APPENDIX B

Contact Information

EMERGENCY CONTACT INFORMATION

Contact information will be completed and continuously updated as the ERP is developed. The following provides an example of possible emergency contact information for the Project. This list will be developed for the comprehensive Emergency Response Plan as required for permit applications.

Table 1: Serious Incident Contact List for Site Personnel

Position	Contact Personnel	Office Contact Number	Radio Channel	Home Contact Number
Site Response Coordinator (SRC)				
Environmental Manager				
Site Construction Supervisor (SCS)				
Site Safety Supervisor (SSS)				
Operations General Manager				
Safety Coordinator				
Mine Manager				
Project/Construction Manager				
Remediation Manager				
Operations General Manager				
Chief Operating Officer				
Chief Executive Officer				

Table 2: External Resource Contact List

Assistance Required	Agency	Contact Number
Ambulance/Air Medivac	Mayo Nursing Station	867-996-4444
Poisonous Substance Ingestion	Poison Control Centre	867-633-8477
Fire (building)/Rescue Assistance	Mayo Fire Department	867-996-2222
Forest Fire		888-798-FIRE
Spill	Yukon Spill Report Line	867-667-7244
Spill Fax		867-393-6266
Wildlife Management	YTG Ren. Res. – Mayo	867-996-2162
Crime – Related Incidents	RCMP – Mayo	867-996-5555
Fatality	Coroner or RCMP	867-996-5555