

Mackenzie Valley Land and Water Board
 7th Floor - 4910 50th Avenue
 P.O. Box 2130
 YELLOWKNIFE NT X1A 2P6
 Phone (867) 669-0506
 FAX (867) 873-6610

Mackenzie Valley Land & Water Board

Application for: TYPE A

New Land Use Permit

Amendment

File

JUN 02 2008

Application # m v 2008 00014

Copied To Tm/leg

1. Applicant's name and mailing address: Canadian Zinc Corporation 1710 -- 650 W. Georgia St. Vancouver, BC, V6B 4N9	Fax number: 604-688-2043 Telephone number: 604-688-2001
2. Head office address: As above Field supervisor: To Be Determined Satellite telephone: 1-600-700-2454 Satellite fax: 1-600-700-9209 VOIP telephone: 604 357 3513	Fax number: As above Telephone number: As above
3. Other personnel (subcontractor, contractors, company staff etc.) Approximately 220 full-time staff on rotation, 110 on site at any one time	
4. Eligibility: (Refer to section 18 of the <i>Mackenzie Valley Land Use Regulations</i>) a)(i) X a)(ii) a)(iii) b)(i) b)(ii)	
5. a) Summary of operation (Describe purpose, nature and location of all activities.) **See Attached Project Description** Underground mining of up to 1200 tonnes/day of lead-zinc mineralization using stick-type and/or ANFO explosives, followed by milling and flotation to produce mineral concentrates. b) Please indicate if a camp is to be set up. (Please provide details on a separate page, if necessary.) The land use operation will be based in and serviced from the existing facilities at the Prairie Creek Mine. Some facility upgrades will be undertaken to provide a new kitchen/diner, dormitories, power generators and incinerator.	

6. Summary of potential environmental and resource impacts (describe the effects of the proposed land-use operation on land, water, flora & fauna and related socio-economic impacts). (Use separate page if necessary.)

Mine water will be free of ammonia, but may contain metals. Mine water to be used in mill process, or treated for discharge (see companion Water License application for water management plan). A Waste Rock Pile will be located in a prepared site with runoff diversion and drainage collection.

7. Proposed restoration plan (please use a separate page if necessary).

The mine will be completely backfilled with a mill waste-cement mix. The Waste Rock Pile will be covered with an engineered cap. All infrastructure will be removed if no long term use is required, except for the airstrip which will be left.

8. Other rights, licences or permits related to this permit application (mineral rights, timber permits, water licences, etc.)

Mining Leases ML 2854, ML 2931, ML 2932, ML 2933, ML 3313, ML 3314, ML 3315, ML 3338; Mineral Claims F67134-F67137, K01365-K01370; Surface Leases 95F/10-5-5, 95F/10-7-4; Land Use Permits MV2003F0028, MV2001C0022, MV20010023 and MV2004C0030; and, Water Licenses MV2007L8-0026 and MV2001L2-0003.

Roads: Is this to be a pioneered road? N/A Has the route been laid out or ground truthed? N/A

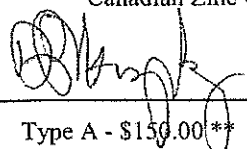
9. Proposed disposal methods.

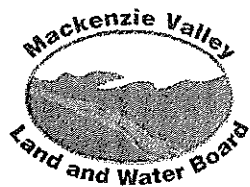
- a) Garbage:
Combustible refuse (excluding plastics) to be incinerated, including sewage plant sludge. Non-combustible refuse to be disposed of in Waste Rock Pile. Incinerator ash to be backfilled underground in a mill waste and cement mix. Inert waste will be landfilled in the Waste Rock Pile.
- b) Sewage (Sanitary & Grey Water):
Sewage treatment plant at the mine site. Sludge to be incinerated.
- c) Brush & trees:
N/A
- d) Overburden (Organic soils, waste material, etc.):
Alluvium below toe of Waste Rock Pile to be built over by Waste Rock Pile. All other construction in previously disturbed areas free of overburden.

10. Equipment (includes drills, pumps, etc.) (Please use separate page if necessary.)

This list is of the major mobile equipment, and is not intended to be exhaustive nor definitive, but rather an indication of the types of mobile equipment necessary to support the proposed development.

Type & number	Size	Proposed use
Scoops – 6		Mining
Ore trucks – 4, personnel trucks – 4		Mining
Locomotives – 2, cars – 8		Mining
Diamond drills - 2		Mining
Drill jumbos and bolters - 4		Mining
Cement trucks - 2		Camp Operations
Rock wagons (Volvos) - 3		Camp Operations
Dozers – 3	D6, D8	Camp Operations
Scrapers & compactors - 4		Camp Operations
Graders - 2		Camp Operations
Loaders & forklifts – 6		Camp Operations
Excavators – 2		Camp Operations
Trailers - 4	Flat deck, low boy	Camp Operations
Trucks and buses – 20	Tire, lube, 5t, 2t, ¾t, ½t	Camp Operations

11. Fuels	()	Number of containers	Capacity of containers	Location
Diesel		4	1.7 million litres	Tank Farm
		1	4,000 litres	Mill
		1	4,000 litres	Admin Building
		1	800 litres	Admin Building
		1	2,000 litres	870 m level portal
				1,000 litres
Gasoline		1	2,000 litres	Camp
Aviation fuel		Varies	200 litres	Airstrip
Propane		2	120,000 litres	930 m level portal
		2	120,000 litres	Camp
Other - oil		2	5,000 litres	Tank Farm
		1	20,000 litres	Machine Shop
12. Containment fuel spill contingency plans. (Please attach separate contingency plan if necessary).				
An approved spill contingency plan is in place for activity in and around the Prairie Creek Mine. The Plan was submitted in support of previous applications (LUP MV2004C0030, MV2007L8-0026).				
13. Methods of fuel transfer (to other tanks, vehicles, etc.)				
Manual or electric pump, gravity. Tidy tanks in pick-up trucks will be used to top up heavy equipment.				
14. Period of operation (includes time to cover all phases of project work applied for, including restoration) Currently projected mine life of 14 years, excluding pre-production construction and preparatory underground development, and post-production restoration and closure.				
15. Period of permit (up to five years, with maximum of two years of extension). Five years.				
16. Location of activities by map co-ordinates (attached maps and sketches)				
Minimum latitude (degree, minute) 61° 32' 45" N			Maximum latitude (degree, minute) 61° 34' 30" N	
Minimum longitude (degree, minute) 124° 48' W			Maximum longitude (degree, minute) 124° 49' 15" W	
Map Sheet no. 1:50,000 NTS Sheet 95 F/10				
17. Applicant	Canadian Zinc Corporation		Print name in full	David Harpley
Signature			Date	May 28 '08
18. Fees	Type A - \$150.00**	Type B - \$150.00**	(**Application Fees are Non-Refundable**)	
	Land use fee: 180	hectares @ \$50.00/hectare	\$ 9,000.00	
	Assignment fee	\$50.00	\$ 150.00	
	Total application and land use fees			\$ 9,150.00
Please make all cheques payable to "Receiver General of Canada"				



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June 12, 2008

File: MV2008D0014

Mr. David Harpley
VP Environmental and Permitting Affairs
Canadian Zinc Corporation
Suite 1710 - 650 West Georgia Street
VANCOUVER BC V6B 4N9

Fax: (604) 688-2043

Dear Mr. Harpley:

Incomplete Application – Mining – Prairie Creek Mine

The aforementioned application has been reviewed in accordance with Section 22 (1)(a) of the Mackenzie Valley Land Use Regulations, and has been found to be lacking sufficient information to conduct a preliminary screening. In order for this application to be considered complete and forwarded for review, the following information must be submitted to our office:

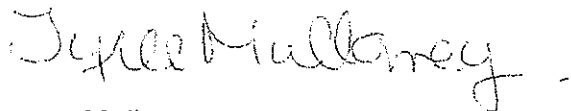
1. Please supply a Spill Contingency Plan.
2. Describe the contents of the Spill Kits that will be on site.
3. MSDS Sheets for reagents, fuels, other materials being stored on site.
4. Please provide a description of "Shrinkage Mining."
5. Please provide a copy of the original Land Use Permit and the supporting documents.
6. Please provide a map with the leases identified along with the location of all the activities applied for in this Land Use Permit application. Also a copy of the shape files compatible with arcGIS.

Upon receipt of this information, the application will be processed and the review period will begin. If you require further guidance, please refer to the document "GUIDE FOR COMPLETING LAND USE PERMIT APPLICATIONS TO THE MACKENZIE VALLEY LAND AND WATER BOARD" which can be found on our Website www.mvlwb.com.

If this supplementary information is not provided within 90 days, then it shall be assumed that you do not wish to continue with the processing of this application, and the application will be returned to you as per Section 25 of the Mackenzie Valley Land Use Regulations. Any land use fees that have been paid with submission of the application will be refunded to you by the Department of Indian Affairs and Northern Development.

Please contact me at (867) 669-0506 or email permits@mvlwb.com if further clarification is required.

Yours sincerely,

A handwritten signature in cursive script that reads "Tyree Mullaney".

Tyree Mullaney
Regulatory Officer

Copied to: Darnell McCurdy, South Mackenzie District, INAC



June 18, 2008

Tyree Mullaney, Regulatory Officer
Mackenzie Valley Land and Water Board
7th Floor-4910 50th Avenue,
Yellowknife, NT
X1A 2P6

Dear Ms. Mullaney

RE: MV2008D0014, Class A Land Use Permit Application, Prairie Creek Mine

We refer to your letter dated June 12, 2008 on the above noted subject. This letter is provided in response to the items listed. Responses are given to correlate with the numbered items in your letter.

1. Spill Contingency Plan

An existing, approved Spill Contingency Plan is currently in use at the site for Land Use Permit MV2004C0030. A revised plan is provided in an attached document for this application.

2. Spill Kits

The contents of spill kits are given in the Spill Contingency Plan.

3. MSDS Sheets

The requested MSDS sheets are provided in our June 18, 2008 response to your June 12, 2008 letter regarding our application for Water Licence MV2008L2-0002.

4. Shrinkage Mining

A description of shrinkage mining is given below. A figure is attached providing an illustration of the mining method.

“Typically, shrinkage-type mining has been employed as an efficient mining method on narrow, steeply dipping ore bodies with well defined and competent hanging wall and footwall. The shrinkage stope is developed in successive horizontal slices of ore, usually about 3 m (10 feet) high, taken along the length of a stope, in a manner similar to cut-and-fill. The ore is removed from the stope by scoop-trams through draw-points established at the bottom horizon and spaced about every 7.5 m (25 feet) along strike. The blasted ore is left in the place to provide a floor from which to work when taking the next lift.”

When the ore is blasted, it fills a space about 1.4 times the size of the space it filled as a solid mass. This is called 'swell' and is an important factor in determining how much ore to draw from the bottom of the stope in order to maintain adequate working room. The broken ore is drawn down from chutes below, thus "shrinking" the volume of broken ore in the stope. Since the broken ore is used as a base to drill and blast the next lift up the shrinkage stope, approximately 70% of the ore has to remain in the stope until it is fully mined out. This method can produce scheduling problems in providing a consistent ore feed to the mill. The drill and blasting process is continued upward until the stope either reaches the next level or is stopped at some predetermined elevation. Horizontal crown pillars are left behind at the top of the stope.

Shrinkage stoping depends on gravity to keep the broken ore moving to the draw points, so it works only in steeply-dipping orebodies. There is no provision for support, so the wall rocks must be strong and competent. The orebody must also be wide enough to allow a working width all the way up the stope, generally not less than two metres. The present existing underground levels, 930 and 880, contain a number of partially developed shrinkage stopes in the vein. These stopes would most likely be rehabilitated and continued as shrinkage stopes, but mechanized where possible since this type of mining is quite labour intensive and costly."

5. Original Land Use Permit and Supporting Documents

A copy of the original Land Use Permit (1980) was included in Appendix A of the Project Description Report. Canadian Zinc does not have any supporting documents associated with the 1980 Land Use Permit.

6. Map of Leases and Activities, GIS

Figure 1-4 in the PDR shows the location of all of the claims and leases associated with the Prairie Creek Mine. Figure 3-1 in the PDR provides a close-up of the existing surface leases and the locations of the existing mine facilities.

Another version of Figure 3-1 is attached to this letter and shows the same information in addition to the new facilities proposed for mine operations. Note that all facilities will be located within the existing surface leases. A digital version of this figure is also provided in an acceptable GIS format (an AutoCad .dwg file).

We trust the above is in order. If you have any questions or further requests, please contact us.

Yours truly,
CANADIAN ZINC CORPORATION



David P. Harpley, P. Geo.
Vice-President, Environment and Permitting Affairs



Prairie Creek Project

FUEL SPILL CONTINGENCY PLAN

**WATER LICENCE MV2008L2-0002
LAND USE PERMIT MV2008D0014**

June 17, 2008

FUEL SPILL CONTINGENCY PLAN

INITIAL RESPONSE ACTIONS

In the event of a spill or potential spill incident, the following steps should be taken by personnel at the spill site:

1. Be alert, ensure your safety and the safety of others first.
2. Isolate, remove or extinguish all ignition sources
3. Assess the hazard to persons and the environment in the vicinity of the spill or leak, identify escape routes, block spill drainage paths and implement measures at the pre-identified spill control points (see Section 5.1).
4. Before undertaking a response action proximal to the spill, ensure personnel have and don the appropriate personal protective equipment (PPE) (see Section 5.3 for details)
5. If possible without further assistance, control danger to human life and the environment.
6. Assess whether the spill, leak or system failure can be readily stopped or brought under control.
7. When safe to do so, stop the leak and/or flow of the spilled material.
8. Gather information on the event and the status of the situation, including the nature, extent and approximate amount of the liquid spilled.
9. Report the spill, leak or system failure without delay to the On-Scene Coordinator. Determine if the spill is a reportable event or quantity (refer to Section 3), and if so, report the spill to the **24 hour NWT/Nunavut Spill Line at (867) 920-8130.**
10. Resume any safe, effective action to contain, clean up, or stop the flow of the spilled product.

Preamble

This *Fuel Spill Contingency Plan* is effective from June 17, 2008 and applies to all projects and operations of Canadian Zinc Corporation at the Prairie Creek Property.

The following formal distribution has been made of this plan:

Mackenzie Valley Land and Water Board

Canadian Zinc Corporation - Prairie Creek Site Office

Canadian Zinc Corporation - Vancouver Office

Additional copies and updates of this Plan may be obtained by writing to:

Canadian Zinc Corporation
Suite 1710-650 West Georgia Street,
Vancouver, British Columbia
V6B 4N9
Phone: 604-688-2001
Fax: 604-688-2043
Email: alan@canadianzinc.com

Prairie Creek Mine Site Address:

Canadian Zinc Corporation
Prairie Creek Minesite
C/O Villers Air Service,
P.O. Box 328,
Fort Nelson,
British Columbia
V0C 1R0
Satellite phone: 1-600-700-2454
Satellite fax: 1-600-700-9209
VoIP phone: 604-357-3513

FUEL SPILL CONTINGENCY PLAN

1.0 Introduction and Plan Purpose

Canadian Zinc Corporation (CZN) recognizes the ecological importance and sensitivity of the area in and around the Prairie Creek Mine, and the mine's location upstream from the Nahanni National Park Reserve. The purpose of CZN's Fuel Spill Contingency Plan is to provide a plan of action for every foreseeable fuel spill event at the Prairie Creek Property.

It is the policy of Canadian Zinc Corporation (CZN) to initiate clean up activity when, in the opinion of its management, the company is clearly associated, or likely associated, with a spill. It is also the policy of the company to comply with existing regulations, ensure protection of the environment, and to keep employees, government officials, Parks Canada and the public, informed.

2.0 Response Team

The members of the fuel spill response team, and their designations, are listed below:

On-Site:

On-scene Coordinator: Mr. Rick Lofstrom, Site Manager
Canadian Zinc Corporation

On-scene Coordinator: Mr. Ted Boychuk & Mr. Chris Hercun, Asst. Site Managers
(Alternates) Canadian Zinc Corporation

On-scene Resource: Mr. Alan Taylor, COO
(When on site) Canadian Zinc Corporation

Off-Site:

Response Manager: Mr. Alan Taylor, COO
Canadian Zinc Corporation

Environmental Advisor: Mr. David Harpley,
Vice-President, Environment and Permitting Affairs
Canadian Zinc Corporation

Additional Information or Assistance

Additional resources and assistance are available from the following sources:

Shell Bulk Petroleum
Phone (Ft. Nelson):
Fax:

Mr. Bill Streeper
(250) 774-7247

Environmental Protection Section,
Environment Division, Government of NWT
Phone (Yellowknife):

(867) 873-7654

Dept. of Indian & Northern
Affairs (Fort Simpson)

Randy Lang/Laurie Ozmun
Resource Management Officers
Ph: (867) 695-2626
Fax: (867) 695-2615

Indian & Northern Affairs Canada
Contaminants Phone Hot Line:

Ph: 1-800-661-0827

RCMP Phone (Yellowknife):

Ph: (867) 920-8311

For large or complicated spills, Shell Bulk Petroleum can be contacted who have a spill response team available for deployment. This could be facilitated by aircraft normally operated into the site by Villiers Air Service.

For advice on contaminated material management, the environmental consulting resources and INAC contacts listed can be consulted.

3.0 Reporting Procedures

The Fuel Spill Response Team must be notified immediately about the occurrence of any spill. The following chain of command must be followed in the reporting process.

Immediately Contact:

On-Scene Coordinator

Contact Person:	Rick Lofstrom, Site Manager
Phone: (Prairie Creek Camp):	1-600-700-2454
Fax:	1-600-700-9209
VoIP:	604-357-3513

Or if the On-Scene Coordinator cannot be immediately contacted:

On-Scene Coordinator (Alternates)

Contact Person:	Ted Boychuk & Chris Hercun, Asst. Site Managers
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The on-scene coordinator is responsible for determining if the spill is reportable, based on the INAC Spill Reporting Protocol for Mining Operations dated July 27, 2004 (see Appendix A), reporting the spill if it is reportable, and for notifying CZN management and the Parks Canada office in Fort Simpson. In addition, the on-scene coordinator is responsible for recording all spills on the Canadian Zinc Spill Report Form (see the end of this document), and the INAC Monthly Spill Reporting Form (attached to the INAC Protocol in Appendix A). The on-scene coordinator is also responsible for submitting the latter form to the INAC District Inspector if spills have occurred.

Spills of flammable liquids, such as diesel and gasoline, are reportable if the spilled quantity exceeds 100 litres. Spills of drilling fluid, used or waste oil, vehicle fluids and wastewater are reportable if the spilled quantity exceeds 100 litres or 100 kg. Spills are also reportable if they are near or into a water body, irrespective of quantity. For more details, consult the INAC protocol.

24 Hour NWT/Nunavut Spill Reporting Line

Phone:	(867) 920-8130
Fax	(867) 873-6924

Note: A spill report should be filled out on the Spill Reporting Form as completely as possible prior to calling the 24 Hour Spill Reporting Line.

4.0 Fuel Spill Response Planning and Response Actions

Spills that could potentially occur during fuel handling, transfer or storage operations, and their associated impacts, will be kept to a minimum by:

- utilizing fuel transfer hoses with double locking mechanisms;
- utilizing lined and self-bermed fuel storage areas with 110% capacity of the largest tank;
- ensuring all valves on storage tanks are secured and locked when not in use;
- conducting fuel transfers over secondary containment or a surface liner (e.g. drip pans, fold-a-tanks) placed under all container or vehicle fuel tank inlet and outlet points, hose connections and hose ends;
- maintaining a supply of spill response equipment (absorbent pads, booms) at all fuel transfer and vehicle maintenance locations;
- storing all contaminated equipment and related waste in sealed drums for later remediation and/or disposal with the appropriate authorizations;
- careful manual measurement of fuel content in the tanks when transferring fuel;
- regular inspections of fuel storage tanks and hoses for evidence of leaks;
- regular inspections of vehicles operating near surface water for evidence of leaks and hydrocarbon stains;
- training in proper fuel handling procedures and transfers conducted by trained personnel;
- spill response training for personnel associated with fuel handling;
- immediate cleanup of minor spills; and,
- identifying relevant control points down-gradient of fuel storage and transfer locations.

4.1 Response Actions for Fuel Spills on Land

1. Identify the source of the leak or spill, and if safe to do so and readily possible, stop the leak or spill;

2. Contain the spill and the source if possible, and block drainage paths down-gradient, especially at the pre-determined control points;
3. Leaks from a tank can be stopped by:
 - ceasing filling operations;
 - turning off valves;
 - utilizing patching kits to seal leaks;

In the event of a rupture to a tank, the self-bermed design is intended to capture the full capacity of the largest fuel tank within its walls. The captured fuel can be pumped into a reserve fuel storage tank.

4. Spills (on gravel, rock, soil, vegetation) can be contained by placing a soil berm down slope of the running or seeping fuel. Plastic tarps can be placed over the berm and at the foot of it, to permit the fuel to pool on the tarp for easy capture. Absorbent pads can be used for this purpose, and the pads can be squeezed into empty drums and re-used. Larger pools can be pumped back into drums, empty storage tanks, or “TIDY” tanks. It is especially important to prevent the fuel from entering a body of water where it will have greater environmental impact. Even if a spill is contained, it is important to collect free product as soon as possible because seepage into a permeable ground surface can occur;
5. Stains on rock can be soaked up with absorbent sheeting. The sheeting should be placed in drums for disposal;
6. Contaminated soil and vegetation may have to be removed and disposed of in an environmentally acceptable manner. Contact the government authority identified by the 24 Hour Spill Reporting Line for approval before undertaking this.

4.2 Response Actions for Fuel Spills on Snow

- The presence of snow can assist in containing spilled fuel and functions as a natural absorbent to facilitate the collection of spilled fuel;
- Berms can be constructed from compacted snow with a plastic tarp placed over this;
- The snow-fuel mixture can be scraped up and stored in a lined area or in drums for future disposal following the appropriate authorization.

4.3 Response Actions for Fuel Spills on Water

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

- Deploy boom (s) to contain the spill area. The effectiveness of this action can be limited by winds, currents (in the case of moving water) and other factors;
- Absorbent pads and similar materials can be used to capture small spills on water. Absorbent booms can be drawn in slowly to encircle spilled fuel and absorb it. These materials are hydrophobic (absorb hydrocarbons and repel water). Absorbent booms are often relied on to recover any hydrocarbons that escape containment booms. Contaminated material must be subsequently placed in drums for later approved disposal;
- In the event of a larger spill on water, it will be necessary to limit the extent of the spill, using booms, and immediately seek the assistance of the Shell Bulk Petroleum response team. Keep the 24 Hour Spill Reporting Line informed of the situation and developments.
- A skimmer may be deployed once a boom has been secured to capture the spilled product. The skimmer utilizes a mechanism to draw hydrocarbons (and a percentage of water). It is then pumped through hoses to empty fuel drums;
- Culverts can permit water flow while capturing and collecting fuel by using a board to control the water level. It can be staked and surrounded with absorbent material to capture the fuel on the water surface.

4.4 Response Actions for Fuel Spills on Ice

- Where a spill occurs on ice, snow should be compacted around the edge of the spill to serve as a berm (and lined with plastic sheeting). The ice will limit seepage of fuel into the water, but the contaminated snow/ice must be immediately scraped up. Permission may be given from the government to burn off pools of fuel (contact the 24 Hour NWT/Nunavut Spill Reporting Line). Remaining contaminated snow can be placed in drums or in a lined berm (on land) for later approved disposal
- Fuel that escapes under the ice through breaks or cracks is extremely difficult to collect. Expertise should be sought immediately. Shell Bulk Petroleum's response team can be made available in a matter of hours.

4.5 Disposal of Waste from Response Actions

Used absorbent materials from response actions will be incinerated in CZN's on-site incinerator. Camp waste is presently incinerated daily using waste oil as an ignition source. Absorbent materials containing hydrocarbon residues will assist with incinerator ignition and reduce the quantity of waste oil required. Plastics are not incinerated, and are taken off-site for disposal.

FUEL SPILL CONTINGENCY PLAN

Contaminated soil and/or vegetation will be stored in steel drums inside the berm of the Tank Farm containment until suitable disposal can be arranged. CZN presently has an inventory of waste oil stored in this location. This inventory existed when CZN's predecessor San Andreas Resources acquired the site. The inventory is being used in incinerator ignition. If a large quantity of contaminated soil is derived from spill response, it will be temporarily stockpiled inside the Tank Farm berm with a bottom and top liner to prevent infiltration of precipitation and seepage. In this event, CZN will apply for and build an approved biocell to remediate the contaminated material. Alternatively, the material can be left in the temporary stockpile and taken off-site for disposal over the winter road when in operation. CZN will consult with government and all interested parties before a course of action is decided on.

5.0 Inventory of Fuel Sources and Response Equipment

5.1 Fuel Sources and Spill Control Points

The main fuel source locations at the Prairie Creek Mine site are as follows (see Figure 1 for locations):

- The Tank Farm consists of four 10,700 barrel capacity tanks for diesel, two 350 barrel capacity tanks for gasoline, and approximately 10,000 litres of waste oil in two 5,000 litre tanks. The control point for spills in the farm is the main containment berm for the tanks and the concrete truck apron for gasoline transfers. Beyond this, the control point would be the culverts where Harrison Creek discharges to Prairie Creek, and for spills to the south-east of the farm, the toe of the Prairie Creek containment berm;
- The three power generators are fed by a 1,000 gallon tank for diesel in a lined containment area on a concrete pad near the Mill. The control point for a spill is the main site drainage channel which flows into the Catchment Pond (the outlet of the Catchment Pond is also a control point with a gate weir);
- A 5,000 gallon tank on the south-west corner of the Machine Shop provides 40-weight oil for the Shop. The tank is within a concrete berm with a sump;
- A 1,000 gallon tank on the north-west corner, and a 200 gallon tank on the south-east corner of the Administration Building (which currently houses the kitchen, Mine Rescue, First Aid and Mine Dry) provide diesel for heating furnaces. Although the tanks themselves have containments, the control point for a spill outside of the containments is the main site drainage channel;
- A 500 gallon tank on a concrete pad with a sump, located on the 870 level staging area, provides diesel to the compressor for mine ventilation. The control point for a spill is the main site drainage channel; and,
- A limited number of 207 litre drums containing aviation gas are stored at the airstrip. The control point for a spill beyond the containment is the toe of the Prairie Creek containment berm.

5.2 General Equipment

CZN has rotary and fixed wing aircraft on call. Heavy earth moving equipment, hand tools and miscellaneous equipment (e.g. plastic sheeting) are available at the Prairie Creek Property as part of the exploration activities, and are accessible in the event of a spill.

5.3 *Personal Protective Equipment*

Personal protective equipment (PPE) is maintained on-site for the management and handling of fuels, chemicals and reagents. PPE available includes splash protection goggles, nitrile rubber gloves, impervious (Tyvek) suits and half-face masks equipped with HEPA-filters. This equipment should be used by all personnel involved in spill response who will be proximal to the spill.

For specific first aid, toxicological and other health related data, and the relevant protection equipment, the Spill Response team should consult the Material Safety Data Sheet (MSDS) for the specific fuel that has been spilled. MSDS's are maintained in the Administration Building.

5.4 *Spill Kits*

Spill kits are maintained on site. Table 5-1 lists the items contained in the kit at the main fuel storage/transfer facility.

Table 5-1: Items Contained in the Tank Farm Spill Kit

<p>1-45 gal, 16-Gauge Open Top Drum, c/w Bolting Ring & Gasket 1-48" x 48" x 1/16" Neoprene Pad (Drain Stop) Plug N Dike Granular, 1-gal U.S. (3.8 litres) Splash Protection Goggles 2-PVC Oil Resistant Gloves 1 Pkg. Polyethylene Disposable Bags (5 mil), 10 per Package 1 Shovel (Spark Proof) 1 Case T-12 3"x12' Mini Boom, 4 Booms/Case 1 Bale 11P 256 17" x 19" x 1/2" Pads, 100 Pads / Bail</p>

Two similar kits in 25 gallon pails are kept in the Maintenance Shops. These contain Plug N Dike, absorbent pads, a mini-boom, gloves and goggles. In addition, mini-kits in 5 gallon pails are kept on the fuel truck, fire truck and flat-deck truck.

A 25 gallon spill kit will be maintained at locations where road repairs are being undertaken. In addition, every vehicle using the access road will have the mini-kit consisting of a 5 gallon pail with absorbent pads and material.

6.0 *Training and Spill Exercises*

6.1 *Training*

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

All personnel and contractors at the Prairie Creek property will be familiarized with the location of the Fuel Spill Contingency Plan on site and encouraged to read it. All personnel and contractors will be introduced to the salient aspects of initial response actions to a spill as part of site orientation on arrival.

Fuel handling crews will be trained in the safe operation of these facilities, spill prevention techniques and initial spill response actions.

6.2 *Spill Exercises*

CZN will conduct annual spill exercises to test the response of the Spill Response Team to fuel spills.

A report will be made by the On-Scene Coordinator noting the responses of personnel, and any problems or deficiencies encountered. This report will be used to evaluate the ability to respond to spills and determine areas necessary for improvement.

24 Hour spill report line: ph 867-920-8130
fx: 867-873-6924

CANADIAN ZINC FUEL SPILL REPORT FORM

Date and Time:

Person Reporting:

Date and Time of Spill:

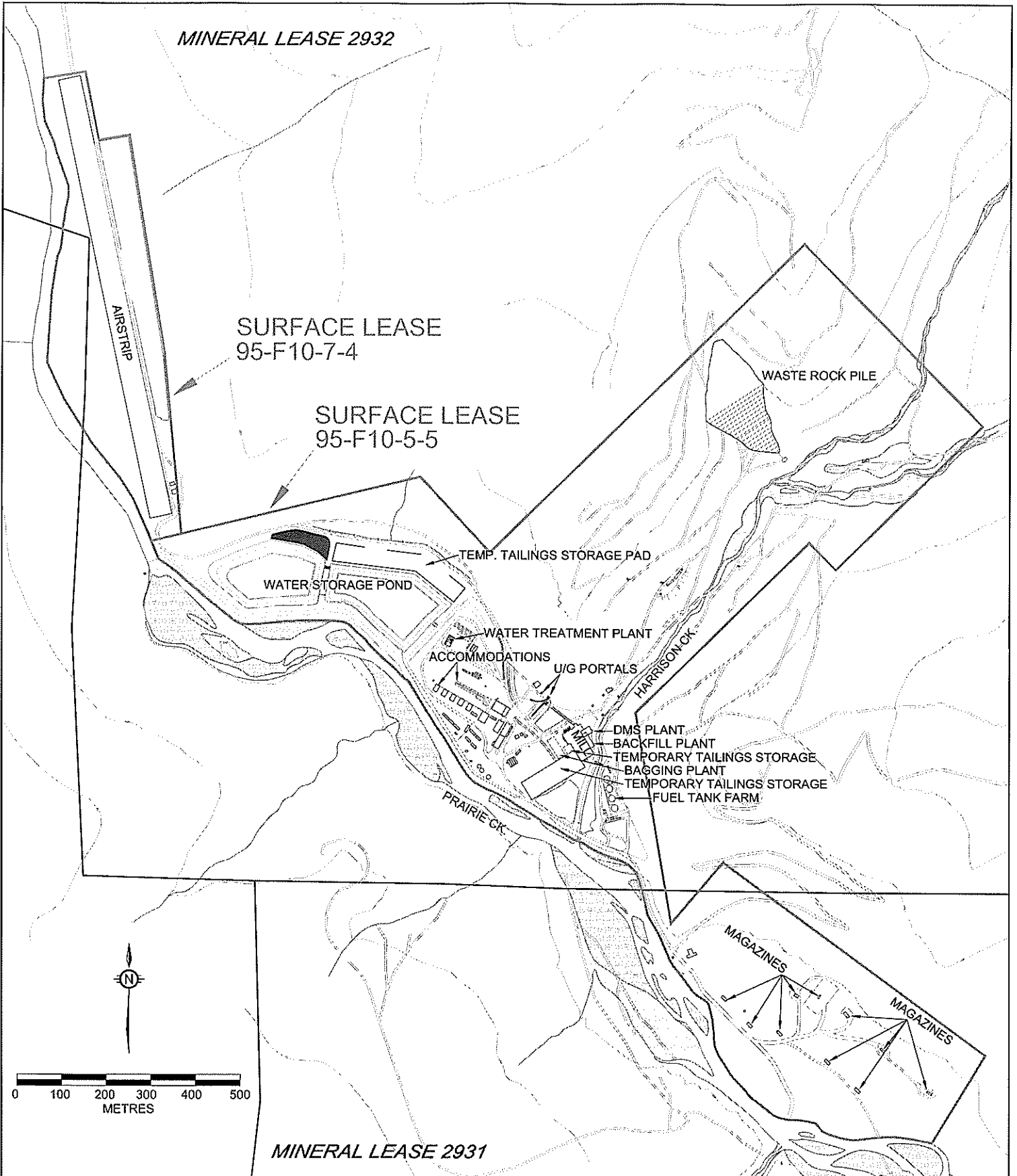
Exact Location of Spill:

Cause of Fuel Spill:

Nature of Fuel and Amount Estimated:

Action Taken:

Follow-up:





MATERIAL SAFETY DATA SHEET

Product Name: Arctic Diesel Fuel (3090)

SECTION 1 – PRODUCT IDENTIFICATION AND USE

Product name	Arctic Diesel Fuel	PIN #, UN #	1202
Chemical name	None	TDG, DOT class	Class 3
Common names and Product use	Diesel fuel No. 1, Fuel oil #1-D Fuel	Packing group	III
WHMIS classification	Combustible liquid Class B Division 3 Toxic material Class D Division 2 Subdivision B	Shipping name	Diesel Fuel
Hazard codes	NFPA Health 2 Flammability 2 Reactivity 0	HMIS Health 2 Flammability 2 Reactivity 0	
<i>NFPA & HMIS Ratings: 0=Insignificant/No Hazard. 1=Slight Hazard. 2=Moderate Hazard. 3=High/Serious Hazard. 4=Extreme/Severe</i>			
Supplier	Irving Oil Limited, Refining Division Box 1260, Saint John New Brunswick Canada E2L 4H6	Phone Emergency Refinery	(506) 202-2000 1-800-424-9300 (506) 202-3000

SECTION 2 – HAZARDOUS INGREDIENTS

Ingredients	CAS#	Wt (%)	ACGIH-TLVs (2004)	OSHA PELs (general industry) (2004)	NIOSH RELs (2004)	LD ₅₀ (rat, oral)	LC ₅₀ (rat, 4 hours)
Diesel fuel no. 1	68334-30-5	100	200 mg/m ³ TWA (total hydrocarbon vapour)	NAv for this product name or	100 mg/m ³ TWA	>5 g/kg	~5g/m ³
<i>May contain:</i> Benzene	71-43-2	Trace	0.5 ppm TWA 2.5 ppm STEL	1 ppm TWA 5 ppm STEL	0.1 ppm TWA 1.0 ppm STEL	930 mg/kg	13,200 ppm
<i>May also contain:</i> Sulphur	7704-34-9	Trace	NAv	NAv	NAv	>8.4 mg/kg	NAv
<i>Which, under certain circumstances, may result in the evolution of:</i>							
Hydrogen sulphide (H ₂ S)	7783-04-6	NAP	10 ppm TWA 15 ppm STEL	20 ppm CEILING	10 ppm CEILING	NAP	444 ppm
<i>Arctic diesel is a complex mixture of hydrocarbons. Its exact composition depends on the source of the crude oil from which it was produced and the refining methods used. Arctic diesel contains hundreds of individual organic chemicals. This section identifies only some of the well-known chemical constituents.</i>							

SECTION 3 – PHYSICAL DATA

Form	Liquid	Vapour	10.5 mm Hg @ 38°C
Colour	Colourless to pale yellow	Evaporation rate	NAv
Odour	Kerosene-like	Boiling point	157 to 261°C (315 to 501°F)
Odour	Not available	Freezing point	- 47°C (- 53°F)
Specific gravity	0.81 @ 15°C	pH	NAp
Vapour density	4.5	Coefficient of water/oil	3.3 to >6(Log P _{ow})

SECTION 4 – FIRE AND EXPLOSION HAZARDS

Flammability	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Conditions	Easily ignited by heat, sparks or flames.
Flash point	40°C (104°F) (cc)	Auto ignition	210°C (410°F)
Lower flammable limit	0.7%	Upper flammable limit	5%
Explosion data: Sensitivity		Mechanical impact	Not expected to be sensitive
		Static discharge	Yes
Means of extinction	In general, do not extinguish fire unless flow can be stopped. Use carbon dioxide, dry chemical, or foam. Cool containers with flooding quantities of water until well after the fire is out.		
Special precautions	Vapour is heavier than air. It will spread along the ground and collect in low or confined areas (sewers, basements, tanks). Vapour may travel to source of ignition and flash back. Containers may explode when heated.		
Hazardous combustion products	Carbon monoxide. Nitrogen oxides. Aromatic hydrocarbons.		

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MATERIAL SAFETY DATA SHEET

Product Name: Arctic Diesel Fuel (3090)

SECTION 5 – REACTIVITY INFORMATION

Stability	Stable
Conditions to avoid	Sources of ignition. Static discharges. High temperatures.
Incompatible substances	Oxidizers such as peroxides, nitric acid, and perchlorates.
Hazardous decomposition products	Carbon monoxide. Nitrogen oxides. Aromatic hydrocarbons. H ₂ S and sulphur dioxide (SO ₂) may be produced from minor amounts of sulphur in the product.

SECTION 6 – HEALTH HAZARD INFORMATION

Route of Entry	<input type="checkbox"/> Eye <input checked="" type="checkbox"/> Skin absorption Diesel fuel itself, as well as some components <input checked="" type="checkbox"/> Inhalation <input checked="" type="checkbox"/> Ingestion	Hazardous Contact	<input type="checkbox"/> Eye <input checked="" type="checkbox"/> Skin contact
Acute exposure	Headache and other symptoms of central nervous system (CNS) depression, such as nausea and dizziness, as well as burning sensation in chest following inhalation. Aspiration into the lungs can cause severe pneumonitis (serious lung irritation), chest pain, and/or pulmonary edema (swelling). Ingestion may produce nausea, vomiting, and cramping. Note: H₂S may offgas from the product in confined spaces such as the headspace in tanks, even though the concentration of sulphur in the product is minimal. H ₂ S is very toxic. At concentrations as low as 1 to 5 ppm, nausea and severe eye irritation may occur. Sense of smell may be impaired at about 20 ppm, with headache and respiratory tract lung irritation. At 250 to 500 ppm, potentially fatal pulmonary edema (fluid in the lungs) may occur. Dizziness, sudden (often fatal) collapse, unconsciousness, and death occur at higher concentrations. Pulmonary edema may be delayed as long as 48 hours.		
Chronic exposure	Dermatitis. Possibly blood and nervous system disorders. Fatigue, and severe nervous and respiratory system symptoms may follow survival of H ₂ S poisoning.		
Carcinogenicity	Benzene is known to be carcinogenic. Exposure to fuel oils during refining is considered "probably carcinogenic to humans". IARC and NTP classify untreated and mildly treated mineral oils as known human carcinogens. ACGIH, EPA, NIOSH, and OSHA have not classified them.	Mutagenicity	Not known to be mutagenic
		Sensitization	No
		Irritancy	Skin, respiratory
		Teratogenicity	NAv
		Reproductive toxicity	NAv
Toxicologically synergistic	Other CNS depressants can be expected to produce additive or synergistic effects. May increase photosensitizing ability of certain chemicals, such as dinitrochlorobenzene (DNCB).		

SECTION 7 – FIRST AID

Inhalation	Move victim to fresh air. Give artificial respiration if breathing has stopped and if a qualified AR administrator is available. Apply CPR if both pulse and breathing have stopped. Obtain medical attention immediately.
Ingestion	Never give anything by mouth if the person is unconscious, rapidly losing consciousness, or convulsing. If the person is conscious, have them drink 8 to 10 ounces of water or milk to dilute the material in the stomach. Do not induce vomiting. If vomiting occurs spontaneously, have the person lean forward to avoid aspiration. Obtain medical attention immediately.
Eye	If irritation occurs, flush eye with lukewarm, gently flowing fresh water for at least 10 minutes.
Skin	Quickly and gently blot away excess chemical. Gently remove contaminated clothing and shoes under running water. Wash gently and thoroughly with water and non-abrasive soap. Obtain medical assistance.

SECTION 8 – PRECAUTIONARY MEASURES

Do not attempt rescue of an H₂S knockdown victim without the use of proper respiratory protective equipment.	
Personal protective equipment	Gloves: Nitrile, Viton™, polyethylene preferred.
	Eye: Chemical safety goggles or face shield, as a good general safety practice.
	Respiratory: NIOSH-approved. SCBA or air line respirator with escape cylinder for confined spaces or work with sulphur-containing product. A qualified occupational health and safety professional should advise on respirator selection. If an air-purifying respirator is appropriate, use organic vapour.
Clothing & footwear	Coveralls to prevent skin contact with product. If clothing or footwear becomes contaminated with product, completely decontaminate it before re-use, or discard it.

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MATERIAL SAFETY DATA SHEET

Product Name: Arctic Diesel Fuel (3090)

Engineering controls	Enclose processes. Use local exhaust ventilation to remove vapour at its site of generation. Handle laboratory samples in a fume hood. Use mechanical ventilation in confined spaces.
Handling	Avoid heating open containers of product so as to minimize vapour production and accumulation. Use non-sparking equipment, explosion-proof ventilation, and intrinsically safe electrical equipment. Ground handling equipment. Have clean emergency eyewash and shower readily available in the work area.
procedures & equipment	
Leak & spill procedure	Keep unauthorized persons away. Eliminate all sources of ignition. Ventilate area. Stop leak if it can be done safely. Prevent entry into sewers, waterways, or confined spaces. Absorb or cover with dry earth, sand or other non-combustible material and use clean, non-sparking tools to transfer to container.
Waste disposal	Consult local authorities for advice.
Storage	Cool, dry, well-ventilated area. No ignition sources. Containers should be vented and have flame arresters.
Shipping	Stable during transport. May be transported hot.

SECTION 9 – PREPARATION DATE OF MSDS

Prepared by	Irving Oil Limited, Refining Division	Phone	(506) 202-3000
Revision date	July 26, 2005	To re-order MSDS,	(506) 202-2000

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**ZINC CONCENTRATE
MATERIAL SAFETY DATA SHEET**

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product Identity: Pend Oreille Zinc Concentrate

Manufacturer:

Teck Cominco American Incorporated
Pend Oreille Mine
1382 Pend Oreille Mine Road
P.O. Box 7
Metaline Falls, WA 99153
Emergency Telephone: (250) 364-4214

Supplier:

Teck Cominco American Incorporated
Pend Oreille Mine
1382 Pend Oreille Mine Road
P.O. Box 7
Metaline Falls, WA 99153

MSDS Preparer:

Teck Cominco Metals Ltd.
600 - 200 Burrard Street
Vancouver, British Columbia
V6C 3L9

Date of Last Review/Edit: February 15, 2007.

Product Use: Zinc concentrate is used in the production of zinc metal and zinc alloys.

SECTION 2. COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous Ingredient	Approximate Percent by Weight	CAS Number	Occupational Exposure Limits (OELs)		LD ₅₀ /LC ₅₀ Species and Route
Zinc Sulphide	86 to 92%	1314-98-3	OSHA PEL ACGIH TLV NIOSH REL	None established None established None established	LD ₅₀ Rat-oral >2000 mg/kg LC ₅₀ Rat-inhl >5040 mg/m ³ /4H LD ₅₀ Rat-skin >2000 mg/kg
Iron Sulphide	3 to 6%	1317-37-9	OSHA PEL ACGIH TLV NIOSH REL	None established None established None established	No data
Lead Sulphide	1 to 2%	1314-87-0	OSHA PEL ACGIH TLV NIOSH REL	0.05 mg/m ³ 0.05 mg/m ³ 0.10 mg/m ³	No Data
Silica	0.2 to 0.5%	14808-60-7	OSHA PEL ACGIH TLV NIOSH REL	4 mg/m ³ (resp)** 12 mg/m ³ (total)** 0.025 mg/m ³ (resp) 0.05 mg/m ³ (resp)	No Data
Cadmium Sulphide	0.1 to 0.3%	1306-23-6	OSHA PEL OSHA SECAL ACGIH TLV NIOSH REL	0.005 mg/m ³ 0.015 / 0.05 mg/m ³ 0.01 mg/m ³ (total) 0.002 mg/m ³ (resp) Lowest feasible level	LD ₅₀ Rat-oral 7080 mg/kg LD ₅₀ Mouse-oral 1166 mg/kg

NOTE: OELs for individual jurisdictions may differ from OSHA PELs. Check with local authorities for the applicable OELs in your jurisdiction. OSHA - Occupational Safety and Health Administration; ACGIH - American Conference of Governmental Industrial Hygienists; NIOSH - National Institute for Occupational Safety and Health. OEL - Occupational Exposure Limit, PEL - Permissible Exposure Limit, TLV - Threshold Limit Value, REL - Recommended Exposure Limit, SECAL - Special Engineering Control Airborne Limits. The OSHA PEL for zinc oxide dust is 15 mg/m³ (total) and 5 mg/m³ (respirable); the OSHA PEL for zinc oxide fume is 5 mg/m³. The ACGIH TLV for zinc oxide is 2 mg/m³ (respirable fraction) with a Short Term Exposure Limit (STEL) of 10 mg/m³ (respirable fraction). The NIOSH REL for zinc oxide (dust or fume) is 5 mg/m³ 10 hr TWA with a 15 mg/m³ ceiling for zinc oxide dust and a 10 mg/m³ STEL for zinc oxide fume (15 min. sample). The OSHA PEL for iron oxide fume is 10 mg/m³. The NIOSH REL for iron oxide dust and fume is 5 mg/m³ (as Fe) and the ACGIH TLV is 5 mg/m³ of iron oxide dust/fume (respirable fraction).

Cadmium SECAL: The airborne concentration to be achieved in specified processes and work places where it is not possible to achieve the PEL through engineering and work practices alone. The OSHA SECAL for cadmium is 0.015 or 0.05 mg/m³, depending on the processes involved. See Table 1 of 29 CFR § 1910.1017.

**The OSHA PEL for silica applies to the total airborne zinc concentrate dust concentration and has been calculated based on the maximum percent SiO₂ in the sample using the formulas: Respirable Dust PEL = 10 mg/m³/(%SiO₂ + 2); Total Dust PEL = 30 mg/m³/(%SiO₂ + 2)

Trade Names and Synonyms: None

SECTION 3. HAZARDS IDENTIFICATION

Emergency Overview: A dark green-brown, heavy, soil-like material that is not flammable or combustible under normal conditions of transport and storage. However, when heated strongly in air it will burn, releasing toxic and irritating sulphur dioxide gas as well as zinc oxide and possible lead and cadmium oxide fumes. Contact with strong acids will generate flammable and highly toxic hydrogen sulphide gas (H₂S). Inhalation or ingestion of concentrate dust may produce both acute and chronic health effects. Possible cancer hazard due to lead, cadmium and silica content. Possible reproductive hazard due to the lead content. SCBA and full protective clothing required for fire emergency response personnel.

Potential Health Effects: *Caution: The toxicological properties of this material have not been fully investigated. The information contained in this MSDS is therefore based on information in the technical and scientific literature about the material's constituent compounds.*

Concentrate dust is irritating to the nose, throat and respiratory tract. Inhalation or ingestion of very high concentrations of concentrate dust may result in lead and cadmium absorption and possible intoxication. Symptoms include headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia and leg, arm, and joint pain. Prolonged exposure may also cause central nervous system damage (e.g. fatigue, headaches, tremors, hypertension), gastrointestinal disturbances, anemia, kidney dysfunction and possible reproductive effects. Pregnant women should be protected from excessive exposure to prevent lead crossing the placental barrier and causing infant neurological disorders. Lead and lead compounds are listed as an *A3 Carcinogen (Confirmed Animal Carcinogen with Unknown Relevance to Humans)* by the ACGIH. IARC has listed lead compounds as *Group 2A Carcinogens (Probably Carcinogenic to Humans)* while lead metal is listed as *Group 2B (Possibly Carcinogenic to Humans)*. The NTP has recently listed lead and lead compounds as *Reasonably Anticipated to be a Human Carcinogen*. OSHA and the EU do not currently list lead as a human carcinogen. Silica is classified as an *A2 Carcinogen* by the ACGIH and as a *Group 1 Carcinogen* by IARC. Cadmium is classified as an *A2 Carcinogen* by the ACGIH and as a *Group 1 Carcinogen* by IARC. (see Toxicological Information, Section 11)

Potential Environmental Effects: Zinc concentrate is insoluble in water and its metals contents have low direct bioavailability. However, extended exposure in the aquatic and terrestrial environments can lead to the release of contained metals in bioavailable forms. These can cause toxic impacts in organisms.

EU Risk Phrase(s): R48/20/22 - Harmful – danger of serious damage to health by prolonged exposure through inhalation and if swallowed; R32 – Contact with acids liberates very toxic gas; R61 – May cause harm to the unborn child; R49 – May cause cancer by inhalation.

SECTION 4. FIRST AID MEASURES

Eye Contact: Do not allow victim to rub eye(s). Let the eye(s) water naturally for a few minutes. If particle/dust does not dislodge, flush with lukewarm, gently flowing water for 5 minutes or until particle/dust is removed, while holding eyelid(s) open. If irritation persists, immediately obtain medical attention. DO NOT attempt to manually remove anything stuck to the eye.

Skin Contact: No health effects expected. If irritation does occur, flush with lukewarm, gently flowing water for 5 minutes. If irritation persists, obtain medical advice.

Inhalation: Remove victim from exposure area to fresh air immediately. If breathing has stopped, trained personnel should begin artificial respiration. Medical oxygen may be administered by trained personnel, where breathing is difficult. If the heart has stopped, immediately start cardiopulmonary resuscitation (CPR), or automated external defibrillation (AED). Quickly transport victim to an emergency care facility.

Ingestion: Never give anything by mouth if victim is rapidly losing consciousness, or is unconscious or convulsing. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. Have victim drink 2 – 8 oz. (60 – 240 ml) of water. If vomiting occurs naturally, have victim rinse mouth with water again. Obtain medical advice and bring a copy of this MSDS.

SECTION 5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Product is not considered a fire or explosion hazard. However, concentrate will burn if strongly heated in a fire situation, releasing toxic and irritating sulphur dioxide gas (SO₂). Contact with strong acids will generate

flammable and highly toxic hydrogen sulphide gas (H₂S). The ignition temperature of zinc concentrate is approximately 700 – 800°C.

Extinguishing Media: Use any means of extinction appropriate for surrounding fire conditions such as water spray, carbon dioxide, dry chemical, or foam.

Fire Fighting: Toxic fumes of sulphur dioxide will result from combustion. Fire fighters must be fully trained and wear full protective clothing including an approved, self-contained breathing apparatus which supplies a positive air pressure within a full facepiece mask.

Flashpoint and Method: Not Applicable.

Upper and Lower Flammable Limit: Not Applicable.

Autoignition Temperature: Not Applicable.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Control source of spillage if possible to do so safely. Restrict access to the area until completion of cleanup. Clean up spilled material immediately, observing precautions in Section 8, Personal Protection and using methods that will minimize dust generation (e.g. vacuum solids, dampen material and shovel or wet sweep). Return uncontaminated spilled material to the process if possible. Place contaminated material in suitable labeled containers for recovery or disposal. Treat or dispose of waste material in accordance with all local, regional, and national requirements.

Personal Precautions: Persons responding to an accidental release should wear coveralls or other protective clothing, gloves and a respirator (see also Section 8). Close-fitting safety goggles may be necessary in some circumstances to prevent eye contact with dust. Workers should wash and change clothing following cleanup of a spill to prevent personal contamination with lead-containing dust.

Environmental Precautions: The handling, shipment, storage and processing of this material requires appropriate controls and care to prevent spillage or gradual accumulation in the terrestrial and aquatic environment. Spilled material should be promptly cleaned up.

SECTION 7. HANDLING AND STORAGE

Health Precautions: Avoid breathing dust. Always practice good personal hygiene. Refrain from eating, drinking, or smoking in work areas. Thoroughly wash hands after handling and before eating, drinking, or smoking in appropriate designated areas only. Some sulphide concentrates may slowly oxidize in storage and generate sulphur dioxide as well as deplete the oxygen content of a confined space. The atmosphere within confined spaces containing concentrate must be tested before entry and the area thoroughly ventilated or self-contained breathing apparatus used, if conditions warrant.

Handling (Physical Aspects): Avoid excessive heat. Avoid contact with acids, oxidizers and combustible materials. Minimize dust generation and accumulation.

Storage Precautions: Store in a cool, dry area.

Autoignition: Some sulphide concentrates may oxidize and generate heat, which accumulates in storage piles. If material is to be stored for an extended period, the temperature of piles should be monitored.

Means of Control: If heating of the concentrate is detected, the material should be sealed from air or oxygen in one of the following ways:

1. Leave the piles totally intact, do not open them up or try to spread them around.
2. Tamp or compact the surface of the piles.
3. Spray the pile with water. Resort to an organic binder only if needed because it can cause formation of hard lumps and subsequent problems for future processing. Suggestions for organic binders include Aerospray 70A Binder, CohereX, Igepal CA-720 and lignin sulphonate, a pulp mill by-product.
4. For smaller piles, cover them with a tarp that will prevent exposure of the material to air.
5. If inside a building or ship's hold, keep all doors closed as much as possible.

EU Safety Phrase(s): S24/25 – Avoid contact with skin and eyes; S53 -Avoid exposure - obtain special instructions before use; S45 - In case of accident or if you feel unwell seek medical advice immediately (show the label where possible); S22 – Do not breathe dust; S36/37 – Wear protective clothing and gloves.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Protective Clothing: Coveralls or other work clothing, glasses or goggles, and gloves are recommended to prevent prolonged or repeated direct skin contact. Close-fitting safety goggles should be worn to prevent eye contact if excessive dust is generated or where any possibility exists that eye contact may occur. Workers should wash immediately when skin becomes contaminated and at the end of each work shift. Work clothing should be removed immediately if it becomes heavily contaminated and should be changed daily and laundered before reuse if there is reasonable probability that the clothing may be contaminated.

Ventilation: Use adequate local or general ventilation to maintain the concentration of zinc concentrate dust in the working environment well below the appropriate occupational exposure limits. Supply sufficient replacement air to make up for air removed by the exhaust system.

Respirators: Where zinc concentrate dust is generated and cannot be controlled to within acceptable levels by engineering means, use appropriate NIOSH-approved respiratory protection equipment (a 42CFR84 Class N, R or P-100 particulate filter cartridge).

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Dark green-brown, fine-grained powder	Odour: Weak organic odour from entrained flotation reagents	Physical State: Solid	pH: 7.5 to 8.5
Vapour Pressure: Negligible @ 20°C	Vapour Density: Not Applicable	Boiling Point/Range: Not Applicable	Freezing/Melting Point/Range: Will burn first unless in an inert atmosphere
Specific Gravity: 2.0 (Bulk Sp. Gr.)	Evaporation Rate: Not Applicable	Coefficient of Water/Oil Distribution: Not Applicable	Odour Threshold: No Data
Solubility: Essentially insoluble	Percent Volatiles: 9 – 12% (Moisture)		

SECTION 10. STABILITY AND REACTIVITY

Stability and Reactivity: Material is stable under normal temperatures and pressures. Hazardous polymerization or runaway reactions will not occur.

Incompatibilities: Reacts violently with iodine pentachloride. Incompatible with iodine monochloride, hydrogen peroxide, strong oxidizers, and strong acids.

Hazardous Decomposition Products: May release highly toxic and flammable hydrogen sulphide gas on contact with strong acids. This material can decompose at high temperatures forming toxic and irritating sulphur dioxide gas and zinc oxides as well as small amounts of lead and cadmium oxides.

SECTION 11. TOXICOLOGICAL INFORMATION

General: In the powder form in which this product is sold, the metals are present as sulphides that are relatively insoluble in the body. However, high temperature operations such as oxy-acetylene cutting, electric arc welding or gouging on dust-contaminated surfaces will generate zinc oxide fume that also contains lead and cadmium oxides. These oxides are soluble in body fluids and the particle size of the metal fumes is largely within the respirable size range, which increases the likelihood of inhalation and deposition of the fume within the body. The primary route of exposure would be through inhalation of metal oxide fumes, composed principally of zinc oxide and including some lead and cadmium oxides.

NOTE: The toxicological properties of this material have not been fully investigated. The information contained in this MSDS is therefore based on information in the technical and scientific literature about the material's constituent compounds.

Acute:

Skin/Eye: Contact with dust or fume may cause local irritation but would not cause tissue damage.

Inhalation: Exposure to dust or fume is irritating to the nose, throat and respiratory tract with dryness and irritation of the nose and throat, possible tightness of the chest, coughing and metallic taste. It may cause headache, as well as gastrointestinal disturbances with nausea, vomiting, diarrhea, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia, and pain in legs, arms, and joints. An intense, short-term exposure to welding/burning fumes could cause congestion and pulmonary edema. However, short-term exposures of this magnitude are unlikely in industry today. Less intense short-term exposure could result in the condition called metal fume fever. The symptoms of metal fume fever will occur within 3 to 10 hours, and include immediate dryness and irritation of the throat, tightness of the chest, and coughing which may later be followed by flu-like symptoms of fever, malaise, perspiration, frontal headache, muscle cramps, low back pain, occasionally blurred vision, nausea, and vomiting. The symptoms are temporary and generally disappear, without medical intervention, within 24 to 48 hours of onset. There are no recognized complications, after effects, or chronic effects that result from zinc metal fume fever. An acute, short-term exposure to high levels of oxide fumes could also result in the absorption of lead and cadmium in the body. Kidney damage, as well as anemia, can then result from acute exposure.

Ingestion: Symptoms due to ingestion of dust or fume would be similar to those from inhalation. Other health effects such as constipation or bloody diarrhea might also occur.

Chronic:

The chronic health effects of zinc concentrate have not been fully investigated. Prolonged exposure to zinc concentrate dust may be expected to produce many of the symptoms of short-term exposure and may also cause central nervous system damage, gastrointestinal disturbances, kidney dysfunction, anemia, and possible skin rashes or dermatitis. Reduced hemoglobin production has been associated with low lead exposures. Symptoms of central nervous system damage due to moderate exposure include fatigue, headaches, tremors and hypertension. Very high exposure can result in lead encephalopathy with symptoms of hallucinations, convulsions, and delirium. Kidney dysfunction and possible injury has also been associated with chronic lead and cadmium poisoning. Chronic over-exposure to lead has been implicated as a causative agent for the impairment of male and female reproductive capacity. Pregnant women should be protected from excessive exposure, as lead can cross the placental barrier and unborn children may suffer neurological damage or developmental problems. Teratogenic and mutagenic effects from exposure to lead have been reported in some studies but not in others. The literature is inconsistent and no firm conclusions can be drawn at this time. Lead and lead compounds are listed as an *A3 Carcinogen (Confirmed Animal Carcinogen with Unknown Relevance to Humans)* by the ACGIH. IARC has listed lead compounds as *Group 2A Carcinogens (Probably Carcinogenic to Humans)* while lead metal is listed as *Group 2B (Possibly Carcinogenic to Humans)*. The NTP has recently listed lead and lead compounds as *Reasonably Anticipated to be a Human Carcinogen*. OSHA and the EU do not currently list lead as a human carcinogen. IARC has classified cadmium and certain cadmium compounds as a *Group 1 Carcinogen (Carcinogenic to Humans)* while ACGIH classifies cadmium as a *Suspected Human Carcinogen (A2)*. The NTP classifies cadmium as a *Known Human Carcinogen* and OSHA lists cadmium as a *Carcinogen*. The European Union (EU) classifies cadmium sulphide as a *Category 3 (Possible) Carcinogen*. IARC has classified crystalline silica of respirable particle size as a *Group 1 Carcinogen (Carcinogenic to Humans)* while ACGIH classifies it as a *Suspected Human Carcinogen (A2)*. The NTP recently reclassified silica as a *Known Human Carcinogen*. OSHA and the EU do not list silica as a carcinogen.

SECTION 12. ECOLOGICAL INFORMATION

Zinc concentrate is insoluble in water and its metals contents have low direct bioavailability. However, extended exposure in the aquatic and terrestrial environments can lead to the release of contained metals in bioavailable forms. These can cause detrimental environmental effects. The mobility of zinc and lead is media dependent. They can bind with inorganic and organic ligands, reducing their mobility and bioavailability in soil and water. Bioavailability is also controlled by other factors such as pH and hardness.

Zinc: Zinc in the aquatic environment can be toxic to organisms. In aquatic systems, zinc bioaccumulates in both plants and animals. Zinc also bioaccumulates in terrestrial plants, vertebrates and mammals, with plant uptake from soil dependent on the plant species, soil pH, and soil composition. In general, zinc does not biomagnify through food chains.

Lead: Lead compounds are highly persistent in water. Dissolved lead compounds bioaccumulate in plants and animals, both aquatic and terrestrial. Lead may occur as sorbed ions or surface coatings on sediment mineral particles or may be carried in colloidal particles in surface water. Most lead is strongly retained in soil, resulting in little mobility. Lead may be immobilized by ion exchange with hydrous oxides or clays or by chelation with humic or fulvic acids in the soil.

SECTION 13. DISPOSAL CONSIDERATIONS

If material cannot be returned to process or salvage, dispose of only in accordance with applicable regulations.

SECTION 14. TRANSPORT INFORMATION

TRANSPORT CANADA CLASSIFICATION..... Not regulated
U.S. DOT HAZARD CLASSIFICATION Class 9, Packing Group III
U.S. PROPER SHIPPING NAME Environmentally Hazardous Substance, Solid, n.o.s.
(contains lead sulfide)
U.S. DOT RQ Lead sulphide 10 lbs.
U.S. DOT PRODUCT IDENTIFICATION NUMBER..... UN3077
MARINE POLLUTANT No
IMO CLASSIFICATION MHB - Materials Hazardous Only in Bulk

SECTION 15. REGULATORY INFORMATION

U.S.
INGREDIENTS LISTED ON TSCA INVENTORY Yes

HAZARDOUS UNDER HAZARD COMMUNICATION STANDARD..... Lead Sulphide Yes
Cadmium Sulphide Yes
Silica Yes

CERCLA SECTION 103 HAZARDOUS SUBSTANCES Lead Sulphide RQ: 10 lbs. (4.54 kg.)
Zinc Compounds RQ: None assigned
Cadmium Compounds ... RQ: None assigned

EPCRA SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCE..... None of the Ingredients qualify

EPCRA SECTION 311/312 HAZARD CATEGORIES Delayed (chronic) Health Hazard – Carcinogen
Delayed (chronic) Health Hazard – Reproductive Toxin

EPCRA SECTION 313 TOXIC RELEASE INVENTORY Lead Compounds (Lead Sulphide)
CAS No 1314-87-0
Percent by Weight:..... 1 to 2%

Zinc Compounds (Zinc Sulphide)
CAS No 1314-98-3
Percent by Weight:..... 86 to 92%

Cadmium Compounds (Cadmium Sulphide)
CAS 1306-23-6
Percent by Weight 0.1 to 0.3%

CANADIAN:
INGREDIENTS LISTED ON DOMESTIC SUBSTANCES LIST Yes

WHMIS CLASSIFICATION: D2A, Material Causing Other Toxic Effects – Very Toxic

EUROPEAN UNION:
Ingredients Listed on the European Inventory
of Existing Commercial Chemical Substances (EINECS) Yes

EU Classification Toxic, Repr. Cat 1, Carc. Cat 2

SECTION 16. OTHER INFORMATION

- American Conference of Governmental Industrial Hygienists, 2004, Documentation of the Threshold Limit Values and Biological Exposure Indices, Seventh Edition plus updates.
- American Conference of Governmental Industrial Hygienists, 2006, Guide to Occupational Exposure Values.
- American Conference of Governmental Industrial Hygienists, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices – 2006.
- Bretherick's Handbook of Reactive Chemical Hazards, 20th Anniversary Edition. (P. G. Urben ed.) 1995.
- Canadian Centre for Occupational Health and Safety (CCOHS), Hamilton, Ont., CHEMINFO Record No. 608 - Lead (Rev. 2005-09).
- Canadian Centre for Occupational Health and Safety (CCOHS), Hamilton, Ont., CHEMINFO Record No. 548 - Zinc (Rev. 2006-01).

- Canadian Centre for Occupational Health and Safety (CCOHS), Hamilton, Ont., CHEMINFO Record No. 3454 - Cadmium (Rev. 2006-05).
- European Economic Community, Commission Directives 91/155/EEC and 67/548/EEC.
- Industry Canada, SOR/88-66, as amended, Controlled Products Regulations.
- International Agency for Research on Cancer (IARC), Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, 1972 – 2006, (multi-volume work), World Health Organization, Geneva.
- International Chemical Safety Cards (WHO/IPCS/ILO), ICSC:0052 – Lead, ICSC 0208 – Zinc Oxide, ICSC 0404 – Cadmium Sulphide.
- Merck & Co., Inc., 2001, The Merck Index, An Encyclopedia of Chemicals, Drugs, and Biologicals, 13th Edition.
- National Library of Medicine, National Toxicology Information Program, Hazardous Substance Data Bank (HSDB) online.
- Patty's Toxicology; 5th Edition, 2001, Bingham, Cochrane & Powell, Editors.
- Sax, N. Irving, 1989, Dangerous Properties of Industrial Materials, Seventh Edition.
- U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health, NIOSH Pocket Guide to Chemical Hazards. CD-ROM Edition September 2005.
- U.S. Department of Health and Human Services, National Institute of Environmental Health Sciences, National Toxicology Program (NTP), 11th Report on Carcinogens, January 2005.
- U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Update Toxicological Profile for Lead. (September 2005).
- U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Update Toxicological Profile for Zinc (September 2005).
- U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Toxicological Profile for Cadmium. (July 1999).
- U.S. Occupational Safety and Health Administration, 1989, Code of Federal Regulations, Title 29, Part 1910.

Notice to Reader

Although reasonable precautions have been taken in the preparation of the data contained herein, it is offered solely for your information, consideration and investigation. Teck Cominco American Incorporated extends no warranty and assumes no responsibility for the accuracy of the content and expressly disclaims all liability for reliance thereon. This material safety data sheet provides guidelines for the safe handling and processing of this product; it does not and cannot advise on all possible situations, therefore, your specific use of this product should be evaluated to determine if additional precautions are required. Individuals exposed to this product should read and understand this information and be provided pertinent training prior to working with this product.

LEAD CONCENTRATE MATERIAL SAFETY DATA SHEET

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product Identity: Pend Oreille Lead Concentrate

Manufacturer:

Teck Cominco American Incorporated
Pend Oreille Mine
1382 Pend Oreille Mine Road
P.O. Box 7
Metaline Falls, WA 99153
Emergency Telephone: (250) 364-4214

Supplier:

Teck Cominco American Incorporated
Pend Oreille Mine
1382 Pend Oreille Mine Road
P.O. Box 7
Metaline Falls, WA 99153

MSDS Preparer:

Teck Cominco Metals Ltd.
600 - 200 Burrard Street
Vancouver, British Columbia
V6C 3L9

Date of Last MSDS Review/Edit: February 15, 2007.

Product Use: Lead concentrate is used in the production of lead metal and lead alloys.

SECTION 2. COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous Ingredient	Approximate Percent by Weight	CAS Number	Occupational Exposure Limits (OELs)	LD ₅₀ /LC ₅₀ Species and Route
Lead Sulphide	66 to 73%	1314-87-0	OSHA PEL 0.05 mg/m ³ ACGIH TLV 0.05 mg/m ³ NIOSH REL 0.10 mg/m ³	No Data
Zinc Sulphide	7 to 10%	1314-98-3	OSHA PEL None established ACGIH TLV None established NIOSH REL None established	LD ₅₀ Rat-oral >2000 mg/kg LC ₅₀ Rat-inhal >5040 mg/m ³ /4H LD ₅₀ Rat-skin >2000mg/kg
Iron Sulphide	12 to 18%	1317-37-9	OSHA PEL None established ACGIH TLV None established NIOSH REL None established	No Data
Silica	0.1 to 0.2%	14808-60-7	OSHA PEL 4.5 mg/m ³ (resp)** 13 mg/m ³ (total)** ACGIH TLV 0.025 mg/m ³ (resp) NIOSH REL 0.05 mg/m ³ (resp)	No Data

NOTE: OELs for individual jurisdictions may differ from OSHA PELs. Check with local authorities for the applicable OELs in your jurisdiction. OSHA - Occupational Safety and Health Administration; ACGIH - American Conference of Governmental Industrial Hygienists; NIOSH - National Institute for Occupational Safety and Health. OEL - Occupational Exposure Limit, PEL - Permissible Exposure Limit, TLV - Threshold Limit Value, REL - Recommended Exposure Limit.

The OSHA PEL for zinc oxide dust is 15 mg/m³ (total) and 5 mg/m³ (respirable); the OSHA PEL for zinc oxide fume is 5 mg/m³. The ACGIH TLV for zinc oxide is 2 mg/m³ (respirable fraction) with a Short Term Exposure Limit (STEL) of 10 mg/m³ (respirable fraction). The NIOSH REL for zinc oxide (dust or fume) is 5 mg/m³ 10 hr TWA with a 15 mg/m³ ceiling for zinc oxide dust and a 10 mg/m³ STEL for zinc oxide fume (15 min. sample). The OSHA PEL for iron oxide fume is 10 mg/m³. The NIOSH REL for iron oxide dust and fume is 5 mg/m³ (as Fe) and the ACGIH TLV is 5 mg/m³ of iron oxide dust/fume (respirable fraction).

** - The OSHA PEL for silica applies to the total airborne lead concentrate dust concentration and has been calculated based on the maximum percent SiO₂ in the sample using the formulas: Respirable Dust PEL = 10 mg/m³/(%SiO₂ + 2); Total Dust PEL = 30 mg/m³/(%SiO₂ + 2)

Trade Names and Synonyms: Lead Concentrate

SECTION 3. HAZARDS IDENTIFICATION

Emergency Overview: A dark black-grey, heavy, soil-like material that is not flammable or combustible under normal conditions of transport and storage. However, when heated strongly in air it will burn, releasing toxic and irritating sulphur dioxide gas as well as possible lead and zinc oxide fumes. Contact with strong acids will generate flammable and highly toxic hydrogen sulphide gas (H₂S). Inhalation or ingestion of concentrate dust may produce both acute and chronic health effects. Possible cancer hazard due to lead and silica content. Possible reproductive hazard due to lead content. SCBA and full protective clothing required for fire emergency response personnel.

Potential Health Effects: *Caution: The toxicological properties of this material have not been fully investigated. The information contained in this MSDS is therefore based on information in the technical and scientific literature about the material's constituent compounds.*

Inhalation or ingestion of concentrate dust may result in lead absorption and possible lead intoxication. Symptoms include headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia and leg, arm, and joint pain. Prolonged exposure may also cause central nervous system damage (e.g., fatigue, headaches, tremors, hypertension), gastrointestinal disturbances, anemia, kidney dysfunction and possible reproductive effects. Pregnant women should be protected from excessive exposure to prevent lead crossing the placental barrier and causing infant neurological disorders. Lead and lead compounds are listed as an *A3 Carcinogen (Confirmed Animal Carcinogen with Unknown Relevance to Humans)* by the ACGIH. IARC has listed lead compounds as *Group 2A Carcinogens (Probably Carcinogenic to Humans)* while lead metal is listed as *Group 2B (Possibly Carcinogenic to Humans)*. The NTP has recently listed lead and lead compounds as *Reasonably Anticipated to be a Human Carcinogen*. OSHA and the EU do not currently list lead as a human carcinogen. Silica is classified as an *A2 Carcinogen* by the ACGIH and as a *Group 1 Carcinogen* by IARC. (see Toxicological Information, Section 11)

Potential Environmental Effects: Lead concentrate is insoluble in water and its metals contents have low direct bioavailability. However, extended exposure in the aquatic and terrestrial environments can lead to the release of contained metals in bioavailable forms. These can cause toxic impacts in organisms

EU Risk Phrase(s): R20/22 – Harmful by inhalation and if swallowed; R33 - Danger of cumulative effects; R61 – May cause harm to the unborn child; R62 – Risk of impaired fertility; R32 – Contact with acids liberates very toxic gas; R49 – May cause cancer by inhalation.

SECTION 4. FIRST AID MEASURES

Eye Contact: Do not allow victim to rub eye(s). Let the eye(s) water naturally for a few minutes. If particle/dust does not dislodge, flush with lukewarm, gently flowing water for 5 minutes or until particle/dust is removed, while holding eyelid(s) open. If irritation persists, immediately obtain medical attention. DO NOT attempt to manually remove anything stuck to the eye.

Skin Contact: No health effects expected. If irritation does occur, flush with lukewarm, gently flowing water for 5 minutes. If irritation persists, obtain medical advice.

Inhalation: Remove victim from exposure area to fresh air immediately. If breathing has stopped, trained personnel should begin artificial respiration. Medical oxygen may be administered by trained personnel, where breathing is difficult. If the heart has stopped, immediately start cardiopulmonary resuscitation (CPR), or automated external defibrillation (AED). Quickly transport victim to an emergency care facility.

Ingestion: Never give anything by mouth if victim is rapidly losing consciousness, or is unconscious or convulsing. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. Have victim drink 2 – 8 oz. (60 – 240 ml) of water. If vomiting occurs naturally, have victim rinse mouth with water again. Obtain medical advice and bring a copy of this MSDS.

SECTION 5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Product is not considered a fire or explosion hazard. However, concentrate will burn if heated strongly in a fire situation, releasing toxic and irritating sulphur dioxide gas (SO₂). Contact with strong acids will generate flammable and highly toxic hydrogen sulphide gas (H₂S). The ignition temperature of lead concentrate is approximately 500 – 600°C.

Extinguishing Media: Use any means of extinction appropriate for surrounding fire conditions such as water spray, carbon dioxide, dry chemical, or foam.

Fire Fighting: Toxic fumes of sulphur dioxide will result from combustion. Fire fighters must be fully trained and wear full protective clothing including an approved, self-contained breathing apparatus which supplies a positive air pressure within a full facepiece mask.

Flashpoint and Method: Not Applicable.

Upper and Lower Flammable Limit: Not Applicable.

Autoignition Temperature: Not Applicable.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup: Control source of spillage if possible to do so safely. Restrict access to the area until completion of clean-up. Clean up spilled material immediately, observing precautions in Section 8, Personal Protection and using methods that will minimize dust generation (e.g., vacuum solids, dampen material and shovel or wet sweep). Return uncontaminated spilled material to the process if possible. Place contaminated material in suitable labeled containers for recovery or disposal. Treat or dispose of waste material in accordance with all local, regional, and national requirements.

Personal Precautions: Persons responding to an accidental release should wear coveralls or other protective clothing, gloves and a respirator (see also Section 8). Close-fitting safety goggles may be necessary in some circumstances to prevent eye contact with dust. Workers should wash and change clothing following cleanup of a spill to prevent personal contamination with lead-containing dust.

Environmental Precautions: The handling, shipment, storage and processing of this material requires appropriate controls and care to prevent spillage or gradual accumulation in the terrestrial and aquatic environments. Spilled material should be promptly cleaned up.

SECTION 7. HANDLING AND STORAGE

Health Precautions: Avoid breathing dust. Always practice good personal hygiene. Refrain from eating, drinking, or smoking in work areas. Thoroughly wash hands after handling and before eating, drinking, or smoking in appropriate designated areas only. Some sulphide concentrates may slowly oxidize in storage and generate sulphur dioxide as well as deplete the oxygen content of a confined space. The atmosphere within confined spaces containing concentrate must be tested before entry and the area thoroughly ventilated or self-contained breathing apparatus used, if conditions warrant.

Handling (Physical Aspects): Avoid excessive heat. Avoid contact with acids, oxidizers and combustible materials. Minimize dust generation and accumulation.

Storage Precautions: Store in a cool, dry area.

Autoignition: Some sulphide concentrates may oxidize and generate heat which accumulates in storage piles. If material is to be stored for an extended period, the temperature of piles should be monitored.

Means of Control: If heating of the concentrate is detected, the material should be sealed from air or oxygen in one of the following ways:

1. Leave the piles totally intact, do not open them up or try to spread them around.
2. Tamp or compact the surface of the piles.
3. Spray the pile with water. Resort to an organic binder only if needed because it can cause formation of hard lumps and subsequent problems for processing. Suggestions for organic binders include Aerospray 70A Binder, CohereX, Igepal CA-720 and lignin sulphonate, a pulp mill by-product.
4. For smaller piles, cover them with a tarp that will prevent exposure of the material to air.
5. If inside a building or ship's hold, keep all doors closed as much as possible.

EU Safety Phrase(s): S22 – Do not inhale dust; S36/37 – Wear suitable protective clothing and gloves; S45 – In case of accident, or if you feel unwell, seek medical advice immediately (show the label where possible); S53 – Avoid exposure – obtain special instructions before use.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Protective Clothing: Coveralls or other work clothing, glasses or goggles, and gloves are recommended to prevent prolonged or repeated direct skin contact. Close-fitting safety goggles should be worn to prevent eye contact if excessive dust is generated or where any possibility exists that eye contact may occur. Workers should wash immediately when skin becomes contaminated and at the end of each work shift. Work clothing should be removed immediately if it becomes heavily contaminated and should be changed daily and laundered before reuse if there is reasonable probability that the clothing may be contaminated.

Ventilation: Use adequate local or general ventilation to maintain the concentration of lead concentrate dust in the working environment well below the appropriate occupational exposure limit. Supply sufficient replacement air to make up for air removed by the exhaust system.

Respirators: Where lead concentrate dust is generated and cannot be controlled to within acceptable levels by engineering means, use appropriate NIOSH-approved respiratory protection equipment (a 42CFR84 Class N, R or P-100 particulate filter cartridge).

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Dark black-grey, fine powder	Odour: Weak organic odour from entrained flotation reagents	Physical State: Solid	pH: 7.5 to 8.5
Vapour Pressure: Negligible @ 20°C	Vapour Density: Not Applicable	Boiling Point/Range: Not Applicable	Freezing/Melting Point/Range: Will burn first unless in an inert atmosphere
Specific Gravity: 3.5 (Bulk Sp. Gr.)	Evaporation Rate: Not Applicable	Coefficient of Water/Oil Distribution: Not Applicable	Odour Threshold: No Data
Solubility: Essentially insoluble	Percent Volatiles: 9 – 12% (moisture)		

SECTION 10. STABILITY AND REACTIVITY

Stability and Reactivity: Material is stable under normal temperatures and pressures. Hazardous polymerization or runaway reactions will not occur.

Incompatibilities: Reacts violently with iodine pentachloride. Incompatible with iodine monochloride, hydrogen peroxide, strong oxidizers, and strong acids.

Hazardous Decomposition Products: May release highly toxic and flammable hydrogen sulphide gas on contact with strong acids. This material can decompose at high temperatures forming toxic and irritating sulphur dioxide gas as well as lead and zinc oxides.

SECTION 11. TOXICOLOGICAL INFORMATION

General: In the powder form in which this product is sold, the metals are present as sulphides that are relatively insoluble in the body. However, high temperature operations such as oxy-acetylene cutting, electric arc welding or gouging on dust-contaminated surfaces will generate highly toxic lead oxide fume that also contains some zinc oxide. These oxides are highly soluble in body fluids and the particle size of the metal fumes is largely within the respirable size range, which increases the likelihood of inhalation and deposition of the fume within the body. The primary route of exposure would be through inhalation of metal oxide fumes, composed principally of lead oxide and including some zinc oxide as well.

NOTE: The toxicological properties of this material have not been fully investigated. The information contained in this MSDS is therefore based on information in the technical and scientific literature about the material's constituent compounds.

Acute:

Skin/Eye: Contact with dust or fume may cause local irritation but would not cause tissue damage.

Inhalation: Exposure to dust or fume is irritating to the nose, throat and respiratory tract with dryness and irritation of the nose and throat, tightness of the chest, coughing and metallic taste. It may cause headache, as well as gastrointestinal disturbances with nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia, and pain in legs, arms, and joints. An intense, short-term exposure to welding/burning fumes could cause congestion and pulmonary edema as well as acute encephalopathy with seizures, coma, and death. However, short-term exposures of this magnitude are unlikely in industry today. Less intense short-term exposure to such fumes could produce metal fume fever with flu-like symptoms of fever, malaise, perspiration, frontal headache and muscle cramps from the zinc oxide fume. Kidney damage, as well as anemia, can occur from acute exposure.

Ingestion: Symptoms due to ingestion of dust or fume would be similar to those from inhalation. Other health effects such as constipation or bloody diarrhea might also occur.

Chronic:

Prolonged exposure to lead concentrate dust may produce many of the symptoms of short-term exposure and may also cause central nervous system damage, gastrointestinal disturbances, kidney dysfunction, anemia, skin rashes or dermatitis and, rarely, wrist drop. Reduced hemoglobin production has been associated with low lead exposures. Symptoms of central nervous system damage due to moderate exposure include fatigue, headaches, tremors and hypertension. Very high exposure can result in lead encephalopathy with symptoms of hallucinations, convulsions, and delirium. Kidney dysfunction and possible injury has also been associated with chronic lead poisoning. Chronic over-exposure to lead has been implicated as a causative agent for the impairment of male and female reproductive capacity. Pregnant women should be protected from excessive exposure as lead can cross the placental barrier and unborn children may suffer neurological damage or developmental problems. Teratogenic and mutagenic effects from exposure to lead have been reported in some studies but not in others. The literature is inconsistent and no firm conclusions can be drawn at this time. Lead and lead compounds are listed as an *A3 Carcinogen (Confirmed Animal Carcinogen with Unknown Relevance to Humans)* by the ACGIH. IARC has listed lead compounds as *Group 2A Carcinogens (Probably Carcinogenic to Humans)* while lead metal is listed as *Group 2B (Possibly Carcinogenic to Humans)*. The NTP has recently listed lead and lead compounds as *Reasonably Anticipated to be a Human Carcinogen*. OSHA and the EU do not currently list lead as a human carcinogen. IARC has classified crystalline silica of respirable particle size as a *Group 1 Carcinogen (Carcinogenic to Humans)* while ACGIH classifies it as a *Suspected Human Carcinogen (A2)*. The NTP recently reclassified silica as a *Known Human Carcinogen*. OSHA and the EU do not list silica as a carcinogen.

SECTION 12. ECOLOGICAL INFORMATION

Lead concentrate is insoluble in water and its metals contents have low direct bioavailability. However, extended exposure in the aquatic and terrestrial environments can lead to the release of contained metals in bioavailable forms. These can cause detrimental environmental effects. The mobility of lead and zinc is media dependent. They can bind with inorganic and organic ligands, reducing their mobility and bioavailability in soil and water. Bioavailability is also controlled by other factors such as pH and hardness.

Lead: Lead compounds are highly persistent in water. Dissolved lead compounds bioaccumulate in plants and animals, both aquatic and terrestrial. Lead may occur as sorbed ions or surface coatings on sediment mineral particles or may be carried in colloidal particles in surface water. Most lead is strongly retained in soil, resulting in little mobility. Lead may be immobilized by ion exchange with hydrous oxides or clays or by chelation with humic or fulvic acids in the soil.

Zinc: Zinc in the aquatic environment can be toxic to organisms. In aquatic systems, zinc bioaccumulates in both plants and animals. Zinc also bioaccumulates in terrestrial plants, vertebrates, and mammals, with plant uptake from soil dependent on the plant species, soil pH, and soil composition. In general, zinc does not biomagnify through food chains.

SECTION 13. DISPOSAL CONSIDERATIONS

If material cannot be returned to process or salvage, dispose of only in accordance with applicable regulations.

SECTION 14. TRANSPORT INFORMATION

TRANSPORT CANADA CLASSIFICATION.....	Not regulated
U.S. DOT HAZARD CLASSIFICATION	Class 9, Packing Group III
U.S. PROPER SHIPPING NAME	Environmentally Hazardous Substance, Solid, n.o.s. (contains lead sulfide)
U.S. DOT RQ	Lead sulphide 10 lbs.
U.S. DOT PRODUCT IDENTIFICATION NUMBER.....	UN3077
MARINE POLLUTANT	No
IMO CLASSIFICATION	MHB - Materials Hazardous Only in Bulk

SECTION 15. REGULATORY INFORMATION

U.S.
INGREDIENTS LISTED ON TSCA INVENTORY Yes

HAZARDOUS UNDER HAZARD COMMUNICATION STANDARD: Lead SulphideYes
SilicaYes

CERCLA SECTION 103 HAZARDOUS SUBSTANCES Lead SulphideYes ... RQ: 10 lbs. (4.54 kg.)

Zinc Compounds.....Yes ... RQ: None assigned

EPCRA SECTION 302 EXTREMELY HAZARDOUS SUBSTANCE None of the ingredients qualify.

EPCRA SECTION 311/312 HAZARD CATEGORIES Delayed (Chronic) Health Hazard - Carcinogen
Delayed (Chronic) Health Hazard – Reproductive Toxin

EPCRA SECTION 313 TOXIC RELEASE INVENTORY..... Lead Compounds (Lead Sulphide)
CAS No 1314-87-0
Percent by Weight:..... 66 to 73%

Zinc Compounds (Zinc Sulphide)
CAS No 1314-98-3
Percent by Weight:..... 7 to 10%

CANADIAN:

INGREDIENTS LISTED ON DOMESTIC SUBSTANCES LIST Yes

WHMIS CLASSIFICATION: D2A, Material Causing Other Toxic Effects – Very Toxic

EUROPEAN UNION:

Ingredients Listed on the European Inventory

of Existing Commercial Chemical Substances (EINECS) Yes

EU Classification Toxic, Repr. Cat. 1; Repr. Cat. 3

SECTION 16. OTHER INFORMATION

The information in this Material Safety Data Sheet is based on the following references:

- American Conference of Governmental Industrial Hygienists, 2004, Documentation of the Threshold Limit Values and Biological Exposure Indices, Seventh Edition plus updates.
- American Conference of Governmental Industrial Hygienists, 2006, Guide to Occupational Exposure Values.
- American Conference of Governmental Industrial Hygienists, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices - 2006.
- Bretherick's Handbook of Reactive Chemical Hazards, 20th Anniversary Edition. (P. G. Urben ed.) 1995.
- Canadian Centre for Occupational Health and Safety (CCOHS), Hamilton, Ont., CHEMINFO Record No. 608 Lead (Rev. 2005-09).
- Canadian Centre for Occupational Health and Safety (CCOHS), Hamilton, Ont., CHEMINFO Record No. 548 – Zinc (Rev 2006-01).
- European Economic Community, Commission Directives 91/155/EEC and 67/548/EEC.
- Industry Canada, SOR/88-66, as amended, Controlled Products Regulations.
- International Agency for Research on Cancer (IARC), Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, 1972 – 2006, (multi-volume work), World Health Organization, Geneva.
- International Chemical Safety Cards (WHO/IPCS/ILO), ICSC:0052 – Lead, ICSC 0208 – Zinc Oxide.
- Merck & Co., Inc., 2001, The Merck Index, An Encyclopedia of Chemicals, Drugs, and Biologicals, 13th Edition.
- National Library of Medicine, National Toxicology Information Program, Hazardous Substance Data Bank (HSDB) online.
- Patty's Toxicology; 5th Edition, 2001, Bingham, Cohrssen & Powell, Editors.
- Sax, N. Irving, 1989, Dangerous Properties of Industrial Materials, Seventh Edition.
- U.S. Department of Health and Human Services, National Institute of Environmental Health Sciences, National Toxicology Program (NTP), 11th Report on Carcinogens, January 2005.
- U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Update Toxicological Profile for Lead (September 2005).
- U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Update Toxicological Profile for Zinc (September 2005).
- U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health, NIOSH Pocket Guide to Chemical Hazards. CD-ROM Edition September 2005.
- U.S. Occupational Safety and Health Administration, 1989, Code of Federal Regulations, Title 29, Part 1910.

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MSDS Number: S3242 * * * * * Effective Date: 08/17/06 * * * * * Supersedes: 12/03/03



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



24 Hour Emergency Telephone: 906-659-2151
CHEMTREC: 1-800-424-9300

National Response In Canada
CANUTEC: 613-696-6666

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

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

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

SODIUM 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 gastrointestinal 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 conjunctival 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---		IARC Category
	Known	Anticipated	
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

```

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-----\Chemical Inventory Status - Part 2\-----
Ingredient                                     Korea  --Canada--  DSL  NDSL  Phil.
-----
Sodium Carbonate (497-19-8)                   Yes    Yes    No    Yes

```

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-----\Federal, State & International Regulations - Part 1\-----
Ingredient                                     -SARA 302-  -SARA 313-----
RQ  TPQ  List  Chemical Catg.
-----
Sodium Carbonate (497-19-8)                   No   No    No    No

```

```

-----\Federal, State & International Regulations - Part 2\-----
Ingredient                                     -RCRA-  -TSCA-
CERCLA  261.33  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.

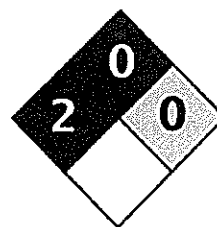
Revision Information:

MSDS Section(s) changed since last revision of document include: 12.

Disclaimer:

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)



Health	2
Fire	0
Reactivity	0
Personal Protection	E

Material Safety Data Sheet

Sodium metabisulfite, Anhydrous MSDS

Section 1: Chemical Product and Company Identification

Product Name: Sodium metabisulfite, Anhydrous	Contact Information:
Catalog Codes: SLS3823	Sciencelab.com, Inc. 14025 Smith Rd. Houston, Texas 77396
CAS#: 7681-57-4	US Sales: 1-800-901-7247 International Sales: 1-281-441-4400
RTECS: VZ2000000	Order Online: ScienceLab.com
TSCA: TSCA 8(b) inventory: Sodium metabisulfite	CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300
CI#: Not available.	International CHEMTREC, call: 1-703-527-3887
Synonym: Disodium disulfite; Disodium pyrosulfite; Sodium Pyrosulfite; Sodium Metabisulphite	For non-emergency assistance, call: 1-281-441-4400
Chemical Name: Pyrosulfurous acid, disodium salt	
Chemical Formula: Na ₂ S ₂ O ₅	

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Sodium metabisulfite	7681-57-4	100

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

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator), of eye contact (irritant).

Potential Chronic Health Effects:

Slightly hazardous in case of skin contact (sensitizer), of ingestion, of inhalation (lung irritant).

CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC.

MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast.

TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Not available.

The substance may be toxic to upper respiratory tract, skin, eyes.

Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

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

Skin Contact:

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

Serious Skin Contact:

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

Inhalation:

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

Serious Inhalation: Not available.

Ingestion:

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

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available.

Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards:

When heated to decomposition it emits toxic fumes of SO_x, Na₂O.

Decomposes on heating to form sodium sulfate

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:

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

Large Spill:

Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage**Precautions:**

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

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

Section 8: Exposure Controls/Personal Protection**Engineering Controls:**

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

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

Personal Protection in Case of a Large Spill:

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

Exposure Limits:

TWA: 5 (mg/m³) [United Kingdom (UK)]

TWA: 5 (mg/m³) from ACGIH (TLV) [United States]

TWA: 5 (mg/m³) from NIOSH [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

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

Odor: odor of sulfur dioxide

Taste: Not available.

Molecular Weight: 190.13 g/mole

Color: White to yellowish.

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

Boiling Point: Not available.

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

Critical Temperature: Not available.

Specific Gravity: 1.4 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility:

Easily soluble in cold water, hot water.

Freely soluble in glycerol.

Slightly soluble in alcohol.

Moderately soluble in ethanol.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

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

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

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Moisture sensitive Air sensitive.

It slowly oxidizes to sodium sulfate upon exposure to air and moisture.

Incompatible with sodium nitrite

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals:

Acute oral toxicity (LD50): 1131 mg/kg [Rat].

Acute dermal toxicity (LD50): >1000 mg/kg [Guinea pig].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC.

MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast.

May cause damage to the following organs: upper respiratory tract, skin, eyes.

Other Toxic Effects on Humans:

Hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

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

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects:

Skin: May cause skin irritation.

Eyes: May cause eye irritation.

Inhalation: May cause respiratory tract irritation with coughing and wheezing.

Ingestion: May be harmful if swallowed. May cause gastrointestinal tract irritation with abdominal pain, nausea, vomiting, diarrhea, violent colic, and possible gastric hemorrhaging. May affect behavior/central nervous system and cause central nervous system depression/seizures. It may also affect the cardiovascular system (hypotension, tachycardia, cardiovascular collapse). Ingestion of sulfite compounds may cause a severe allergic reaction (anaphylactoid symptoms) in sensitive individuals and some asthmatics.

Chronic Potential Health Effects:

Skin: Prolonged or repeated skin contact may cause allergic dermatitis.

Ingestion: Prolonged or repeated ingestion may affect the liver, urinary system, and metabolism (weight loss).

Future exposures may also cause asthma like allergy with coughing, shortness of breath, wheezing and/or chest tightness.

Inhalation: Prolonged or repeated inhalation may irritate the lungs, may cause bronchitis to develop with cough, phlegm and/or shortness of breath.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

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

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

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

Section 14: Transport Information

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

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations:

Connecticut hazardous material survey.: Sodium metabisulfite

Illinois toxic substances disclosure to employee act: Sodium metabisulfite

Rhode Island RTK hazardous substances: Sodium metabisulfite

Pennsylvania RTK: Sodium metabisulfite

Minnesota: Sodium metabisulfite

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

Other Regulations:

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

Other Classifications:

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

DSCL (EEC):

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

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

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves.

Lab coat.

Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.

Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/09/2005 06:33 PM

Last Updated: 10/09/2005 06:33 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the

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Anachemia

255 Norman.
Lachine (Montreal), Que
H8R 1A3

Material Safety Data Sheet

EMERGENCY NUMBERS:

(USA) CHEMTREC : 1(800) 424-9300 (24hrs)
(CAN) CANUTEC : 1(613) 996-6666 (24hrs)
(USA) Anachemia : 1(518) 297-4444
(CAN) Anachemia : 1(514) 489-5711

WHMIS	Protective Clothing	TDG Road/Rail
WHMIS CLASS: D-2B		Not controlled under TDG (Canada). PIN: Not applicable. PG: Not applicable.

Section I. Product Identification and Uses

Product name	SODIUM THIOSULFATE, ANHYDROUS	CI#	Not available.
Chemical formula	Na ₂ S ₂ O ₃	CAS#	7772-98-7
Synonyms	Sodium hyposulfite, Sodium thiosulfate, AC-8547, 85786	Code	AC-8547
Supplier	Anachemia Canada. 255 Norman. Lachine (Montreal), Que H8R 1A3	Formula weight	158.11
		Supersedes	
Material uses	For laboratory use only.		

Section II. Ingredients

Name	CAS #	%	TLV
1) SODIUM THIOSULFATE	7772-98-7	100	Not established by ACGIH: ACGIH (Sulfur dioxide) TWA 2 ppm (5.2 mg(SO ₂)/m ³); STEL 5 ppm (13 mg(SO ₂)/m ³)

Toxicity values of the hazardous ingredients	SODIUM THIOSULFATE: INTRAPERITONEAL (LD50): Acute: 5200 mg/kg (Mouse).
--	---

Section III. Physical Data

SODIUM THIOSULFATE, ANHYDROUS page 2/4

Physical state and appearance / Odor	Clear to white granules or crystals. Odorless.
pH (1% soln/water)	8.6
Odor threshold	Not available.
Percent volatile	0% at 21°C
Freezing point	Transition at 48°C
Boiling point	Decomposes at >100°C.
Specific gravity	1.66-1.73 (Water = 1)
Vapor density	Not applicable.
Vapor pressure	Not applicable.
Water/oil dist. coeff.	Not available.
Evaporation rate	Not applicable.
Solubility	33% (in H ₂ O)

Section IV. Fire and Explosion Data

Flash point	Not available.
Flammable limits	Not available.
Auto-ignition temperature	Not available.
Fire degradation products	Oxides of sulfur and sodium. Hydrogen sulfide. Sodium sulfide.
Fire extinguishing procedures	Use DRY chemical, carbon dioxide, foam or water spray. Wear adequate personal protection to prevent contact with material or its combustion products. Self contained breathing apparatus with a full facepiece operated in a pressure demand or other positive pressure mode. Disperse vapors with water spray if they have not ignited. Cool containing vessels with flooding quantities of water until well after fire is out.
Fire and Explosion Hazards	The sensitivity to impact is not applicable. The sensitivity to static discharge is not applicable. Heating above 100°C yields a flammable residue sodium sulfide. Contact with oxidizers may cause fire and/or explosion. Emits toxic fumes under fire conditions.

Section V. Toxicological Properties

Routes of entry	Inhalation and ingestion. Eye contact. Skin contact.
Effects of Acute Exposure	May be harmful by ingestion, inhalation, or skin absorption. Irritant.
Eye	May irritate or burn eyes and cause temporary conjunctivitis.
Skin	May cause skin irritation. Aqueous solutions or dust may cause irritation from repeated or prolonged contact.
Inhalation	Dust or mist may cause severe irritation to the respiratory tract. Exposure may cause coughing, chest pains, and difficulty in breathing. If heated to the point where sulfur dioxide gas is driven off, then this gas is highly irritating to the respiratory tract.
Ingestion	May cause gastrointestinal irritation. May cause nausea, vomiting, purging, cyanosis. Doses of 8 g/kg (oral, rat) were non-toxic.

Section V. Toxicological Properties

SODIUM THIOSULFATE, ANHYDROUS page 3/4

Effects of Chronic Overexposure Carcinogenic effects: Not available. Mutagenic effects: Not available. Teratogenic effects: Not available. Toxicity of the product to the reproductive system: Not available. To the best of our knowledge, the chemical, physical, and toxicity of this substance has not been fully investigated.

Section VI. First Aid Measures

Eye contact Immediately flush eyes with copious quantities of water for at least 15 minutes holding lids apart to ensure flushing of the entire surface. Seek immediate medical attention.

Skin contact Immediately flush skin with plenty of water and soap for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Wash contaminated clothing before reusing.

Inhalation Remove patient to fresh air. Administer approved oxygen supply if breathing is difficult. Administer artificial respiration or CPR if breathing has ceased. Seek immediate medical attention.

Ingestion If conscious, wash out mouth with water. Have conscious person drink several glasses of water to dilute. Seek immediate medical attention. Never give anything by mouth to an unconscious or convulsing person.

Section VII. Reactivity Data

Stability Stable. Conditions to avoid: High temperatures, sparks, open flames and all other sources of ignition, contamination.

Hazardous decomp. products Not available.

Incompatibility Oxidizing agents (e.g., nitrates, sodium nitrite, halogens) cause vigorous exothermic reactions. Acids release sulfur dioxide gas. Water-reactive materials such as sodium, cause strong exothermic reaction. Mercury salts, lead, silver, iodides, iodine, mercury.

Reaction Products Sulfur dioxide gas which is toxic, corrosive, and an oxidizer, is driven off above 100°C leaving, a sodium sulfide residue which is flammable, a strong irritant to skin and tissue and is also incompatible with acids. Hazardous polymerization will not occur.

Section VIII. Preventive Measures

SODIUM THIOSULFATE, ANHYDROUS

page 4/4

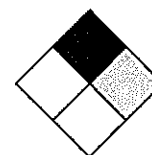
Protective Clothing in case of spill and leak	Wear respirator, chemical safety goggles, rubber boots and heavy rubber gloves.
Spill and leak	Evacuate the area. Sweep up and place in container for disposal. Avoid raising dust. Ventilate area and wash spill site after material pick up is complete. DO NOT empty into drains. DO NOT touch damaged container or spilled material. Avoid run off.
Waste disposal	According to all applicable regulations.
Storage and Handling	Store in a cool place away from heated areas, sparks, and flame. Store in a well ventilated area. Store away from incompatible materials. Do not add any other material to the container. Do not wash down the drain. Do not breathe dust. Keep away from direct sunlight or strong incandescent light. Keep container tightly closed and dry. Manipulate in a well ventilated area or under an adequate fume hood. Avoid raising dust. Handle and open container with care. Minimize dust generation and exposure - use dust mask or appropriate protection. This product must be manipulated by qualified personnel. Do not get in eyes, on skin, or on clothing. Wash well after use. In accordance with good storage and handling practices. Do not allow smoking and food consumption while handling.

Section IX. Protective Measures

Protective clothing	Splash goggles. Impervious gloves, apron, coveralls, and/or other resistant protective clothing. Sufficient to protect skin. If use conditions generate dusts, wear a NIOSH-approved respirator appropriate for those emission levels. Appropriate respirators may be a full facepiece or a half mask air-purifying cartridge respirator with particulate filters, a self-contained breathing apparatus in the pressure demand mode, or a supplied-air respirator. Do not wear contact lenses. Make eye bath and emergency shower available. Ensure that eyewash station and safety shower is proximal to the work-station location.
Engineering controls	Local mechanical exhaust ventilation capable of minimizing dust emissions at the point of use. Do not use in unventilated spaces.

Section X. Other Information

Special Precautions or comments	Irritant! Do not breathe dust. Avoid all contact with the product. Avoid prolonged or repeated exposure. Manipulate in a well ventilated area or under an adequate fume hood. Keep away from heat, sparks and flame. Handle and open container with care. Container should be opened only by a technically qualified person. RTECS NO: XN6472000.
---------------------------------	--



NFPA

Prepared by MSDS Department/Département de F.S..

Validated 28-Jul-1999

) Telephone# (514) 489-5711

While the company believes the data set forth herein are accurate as of the date hereof, the company makes no warranty with respect thereto and expressly disclaims all liability for reliance thereon. Such data are offered solely for your consideration, investigation and verification.

MSDS Number: **Z4560** * * * * * *Effective Date: 11/10/05* * * * * * *Supersedes: 01/10/03*

MSDS **Material Safety Data Sheet**

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



24 Hour Emergency Telephone: 900-659-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-627-3887

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.

Zinc Sulfate, 7-Hydrate

1. Product Identification

Synonyms: Sulfuric acid, zinc salt (1:1) heptahydrate; Zinc vitriol, heptahydrate; Zinc sulfate, heptahydrate

CAS No.: 7733-02-0 (Anhydrous) 7446-20-0 (heptahydrate)

Molecular Weight: 287.56

Chemical Formula: ZnSO₄·7H₂O

Product Codes:

J.T. Baker: 4382, 4383, 4384

Mallinckrodt: 7805, 8872, 8880

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Zinc Sulfate	7733-02-0	100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

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

Health Rating: 2 - Moderate (Life)

Flammability Rating: 0 - None

Reactivity Rating: 1 - Slight

Contact Rating: 3 - Severe

Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD;
PROPER GLOVES

Storage Color Code: Green (General Storage)

Potential Health Effects

Inhalation:

Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath.

Ingestion:

As with other soluble zinc salts, zinc sulfate may hydrolyze into acid if swallowed. Severe irritation and burns of the mouth, throat and digestive system may occur. Symptoms may include vomiting, stomach pain, increased pulse rate without blood pressure decrease, blood pressure decrease, acute pulmonay edema (fluid in the lungs), diarrhea, kidney damage, other gastrointestinal disturbances and hemorrhagic pancreatitis. A fatality following ingestion of 10 grams has been reported.

Skin Contact:

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

Eye Contact:

Irritant, can cause pain and redness, possible mechanical harm. May cause severe irritation.

Chronic Exposure:

Chronic exposure may cause fatigue, slow tendon reflexes, intestinal inflammation (with bleeding), diarrhea, blood effects, central nervous system depression, tremors and paralysis of the extremities. Repeated skin or eye contact can cause skin and eye effects.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders or impaired respiratory function may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion:

If swallowed, give several glasses of water to drink. Vomiting may occur spontaneously, but **DO NOT INDUCE!** Never give anything by mouth to an unconscious person. Get

medical attention.

Skin Contact:

Wipe off excess material from skin then immediately flush skin with plenty of 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.

5. Fire Fighting Measures

Fire:

Not considered to be a fire hazard.

Explosion:

Sealed containers may rupture when heated.

Fire Extinguishing Media:

Use any means suitable for extinguishing surrounding fire. Use water carefully as material will react with water to form acidic solution. Water spray may be used to keep fire exposed containers cool.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Zinc sulfate can decompose at high temperatures to form toxic oxides, sulfur and zinc oxide as well as water vapor. Sealed containers of this material may rupture at moderate temperatures (release of water vapor). Forms acidic solutions in water.

6. Accidental Release Measures

Ventilate area of leak or spill. Keep unnecessary and unprotected people away from area of spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust. Material dissolves in water to form an acidic solution. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Material dissolves in water to form an acidic solution. 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 a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

Colorless crystals or granules.

Odor:

Odorless.

Solubility:

Soluble in water.

Specific Gravity:

1.97

pH:

ca. 4.5 Aqueous solution

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

0

Boiling Point:

> 500C (> 932F) Decomposes.

Melting Point:

100C (212F) Loses all water at 280C.

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.

Hazardous Decomposition Products:

Oxides of sulfur and oxides of zinc. Reacts with water to form sulfuric acid.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Lead, calcium, strontium salts, borax, alkali carbonates and hydroxides, silver protein and tannins.

Conditions to Avoid:

Heat, moisture, incompatibles.

11. Toxicological Information

Hydrate: Oral rat LD50: 2150 mg/kg. Investigated as a mutagen.

For anhydrous zinc sulfate: oral rat LD50: 1710 mg/kg; Irritation, rabbit eye, standard Draize: 420 ug, moderate. Investigated as a tumorigen, mutagen, reproductive effector.

-----\Cancer Lists\-----			
Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Zinc Sulfate (7733-02-0)	No	No	None

12. Ecological Information

Environmental Fate:

No information found.

Environmental Toxicity:

The LC50/96-hour values for fish are between 1 and 10 mg/l. This material is expected to be toxic to aquatic life.

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
-----
Zinc Sulfate (7733-02-0)                       Yes  Yes  Yes    Yes
  
```

```

-----\Chemical Inventory Status - Part 2\-----
Ingredient                                     Korea  DSL   NDSL  Phil.
-----
Zinc Sulfate (7733-02-0)                       Yes   Yes  No    Yes
  
```

```

-----\Federal, State & International Regulations - Part 1\-----
Ingredient                                     -SARA 302-  -SARA 313-----
RQ   TPQ   List  Chemical Catg.
-----
Zinc Sulfate (7733-02-0)                       No    No    No    Zinc compoun
  
```

```

-----\Federal, State & International Regulations - Part 2\-----
Ingredient                                     CERCLA  -RCRA-  -TSCA-
                                     1000    261.33  8(d)
-----
Zinc Sulfate (7733-02-0)                       1000    No      No
  
```

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

Australian Hazchem Code: None allocated.

Poison Schedule: S6

WHMIS:

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

16. Other Information

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

Label Hazard Warning:

WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

Label Precautions:

- Avoid breathing dust.
- Keep container closed.
- Use only with adequate ventilation.
- Wash thoroughly after handling.
- Avoid contact with eyes, skin and clothing.

Label First Aid:

If swallowed, give several glasses of water to drink. Vomiting may occur spontaneously, but DO NOT INDUCE! 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, wipe off excess material from skin then immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove 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.)

Fisher Scientific

[Back to Sodium Phosphate Dibasic Heptahydrate \(Crystalline/Certified ACS\)](#)

Material Safety Data Sheet

Sodium Phosphate Dibasic Heptahydrate

ACC# 21535

Section 1 - Chemical Product and Company Identification

MSDS Name: Sodium Phosphate Dibasic Heptahydrate**Catalog Numbers:** BP331 1, BP331 500, BP331-1, BP331-500, BP3311, BP331500, BW13640300, BW13645250, BW1364550, S373 3, S373 50, S373 500, S373-3, S373-50, S373-500, S373250LB, S3733, S3733LC, S37350, S373500, S471-10, S471-3, S471-500, S471300LB**Synonyms:** Sodium monohydrogen phosphate heptahydrate; phosphoric acid, disodium salt, heptahydrate; disodium phosphate heptahydrate; sodium phosphate; disodium phosphate; sodium phosphate, dibasic**Company Identification:**

Fisher Scientific
1 Reagent Lane
Fairlawn, 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
7782-85-6	DISODIUM ORTHOPHOSPHATE HEPTAHYDRATE	100.0	unlisted

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: white. **Caution!** Causes eye and skin irritation. Causes digestive and respiratory tract irritation.

Target Organs: None.**Potential Health Effects****Eye:** May cause eye irritation.**Skin:** May cause skin irritation.**Ingestion:** May cause gastrointestinal irritation with nausea, vomiting and diarrhea.**Inhalation:** May cause respiratory tract irritation.**Chronic:** No information found.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids. Get medical aid.

Skin: Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists.

Ingestion: If victim is conscious and alert, give 2-4 cupfuls of milk or water. Get medical aid.

Inhalation: Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid if cough or other symptoms appear.

Notes to Physician: Treat symptomatically and supportively.

Antidote: None reported.

Section 5 - Firefighting 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.

Extinguishing Media: For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam.

Autoignition Temperature: Not applicable.

Flash Point: Not applicable.

NFPA Rating: Not published. Explosion Limits, Lower: Not available. Upper: Not available.

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Avoid generating dusty conditions.

Section 7 - Handling and Storage

Handling: Use with adequate ventilation. Avoid prolonged or repeated contact with skin. Avoid contact with eyes. Avoid ingestion and inhalation.

Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate ventilation to keep airborne concentrations low.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
DISODIUM			

ORTHOPHOSPHATE HEPTAHYDRATE	none listed	none listed	none listed
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OSHA Vacated PELs: DISODIUM ORTHOPHOSPHATE HEPTAHYDRATE: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

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

Skin: Wear appropriate protective gloves and clothing to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

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

Section 9 - Physical and Chemical Properties

Physical State: Solid

Appearance: white

Odor: None reported

pH: Not available.

Vapor Pressure: Not available.

Vapor Density: Not available.

Evaporation Rate:

Viscosity: Not available.

Boiling Point: Not applicable.

Freezing/Melting Point: 48.00 deg C

Decomposition Temperature: Not available.

Solubility: 154 g/l (20 C)

Specific Gravity/Density: 1.6790

Molecular Formula: HNa₂O₄P₇H₂O

Molecular Weight:

Section 10 - Stability and Reactivity

Chemical Stability: Stable. Stable under normal temperatures and pressures.

Conditions to Avoid: Acids, metals.

Incompatibilities with Other Materials: Strong acids.

Hazardous Decomposition Products: Oxides of phosphorus, sodium oxide.

Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:

CAS# 7782-85-6: WC4600000

LD50/LC50:

CAS# 7782-85-6:

Oral, rat: LD50 = 12930 mg/kg;

Carcinogenicity:

CAS# 7782-85-6: Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.

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

Section 12 - Ecological Information
--

Ecotoxicity: No information found.**Environmental Fate:** No information reported.**Physical/Chemical:** No information found.**Other:** No information found.

Section 13 - Disposal Considerations

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

RCRA D-Series Maximum Concentration of Contaminants: None listed.**RCRA D-Series Chronic Toxicity Reference Levels:** None listed.**RCRA F-Series:** None listed.**RCRA P-Series:** None listed.**RCRA U-Series:** None listed.

Section 14 - Transport Information

	US DOT	IATA	RID/ADR	IMO	Canada TDG
Shipping Name:	No information available.	No information available.	No information available.	No information available.	SODIUM PHOSPHATE, DIBASIC
Hazard Class:					9.2
UN Number:					UN9147
Packing Group:					III
Additional Info:					REGULATED LIMIT 230 KG

Section 15 - Regulatory Information
--

US FEDERAL**TSCA**

CAS# 7782-85-6 is not listed on the TSCA inventory. It is for research and development use only.

Health & Safety Reporting List

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

Chemical Test Rules

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

Section 12b

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

TSCA Significant New Use Rule

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

SARA**Section 302 (RQ)**

None of the chemicals in this material have an RQ.

Section 302 (TPQ)

None of the chemicals in this product have a TPQ.

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 depleters. This material does not contain any Class 2 Ozone depleters.

Clean Water Act:

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

OSHA:

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

STATE

CAS# 7782-85-6 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

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

European/International Regulations**European Labeling in Accordance with EC Directives****Hazard Symbols:**

Not available.

Risk Phrases:**Safety Phrases:**

S 24/25 Avoid contact with skin and eyes. S 7 Keep container tightly closed.

WGK (Water Danger/Protection)

CAS# 7782-85-6: No information available.

Canada

None of the chemicals in this product are listed on the DSL/NDSL list. This product has a WHMIS classification of D2B.

CAS# 7782-85-6 is not listed on Canada's Ingredient Disclosure List.

Exposure Limits

Section 16 - Additional Information
--

MSDS Creation Date: 10/23/1995

Revision #6 Date: 9/02/1997

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

2. COMPOSITION/INFORMATION ON INGREDIENTS (Continued)

1344-09-8 Silicic acid, sodium salt

EXPOSURE LIMITS	PERCENTAGE	
PEL: Not Established	VOL	ND
TLV: Not Established	WT	20-49
PELZ2:Not Established		

COMMON NAMES:
Sodium Silicate

Listed On(List Legend Below):
00 19 22 23 51

LIST LEGEND	
00 TSCA INVENTORY	19 PA REQUIREMENT- 3% OR GREATER
22 CANADIAN DOMESTIC SUB LIST	23 NJ REQUIREMENT- 1% OR GREATER
51 EINECS	

Revised

3. HAZARDS IDENTIFICATION

***** EMERGENCY OVERVIEW *****
*
* IRRITATING TO EYES AND SKIN. *
*
* Colorless, turbid liquid; none to slightly soapy odor. *

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY:

Inhalation, Ingestion.

TARGET ORGANS:

Eyes, Skin, Respiratory Tract, Gastrointestinal Tract.

IRRITANCY:

Potentially by all routes of exposure.

SENSITIZING CAPABILITY:

None known.

REPRODUCTIVE EFFECTS:

None known.

CANCER INFORMATION:

Not classified as carcinogenic by NTP, IARC, OSHA, ACGIH, or NIOSH.

3. HAZARDS IDENTIFICATION (Continued)

SHORT-TERM EXPOSURE (ACUTE)

INHALATION:

May be irritating.

EYES:

Irritating.

SKIN:

May be irritating.

INGESTION:

May be irritating.

REPEATED EXPOSURE (CHRONIC)

None known.

SYNERGISTIC MATERIALS:

None known.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:

None known.

Revised

4. FIRST AID MEASURES

EYES:

Immediately flush eyes with a directed stream of water for at least 15 minutes, forcibly holding eyelids apart to ensure complete irrigation of all eye and lid tissues. Washing eyes within several seconds is essential to achieve maximum effectiveness. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN:

Immediately flush contaminated areas with water. Remove contaminated clothing and footwear. Wash contaminated areas with plenty of soap and water. Wash clothing before reuse. Discard footwear which cannot be decontaminated. GET MEDICAL ATTENTION IMMEDIATELY.

INHALATION:

Remove to fresh air if safe to transport. Otherwise attempt to provide fresh air by ventilation. If breathing is difficult, have a trained person administer oxygen. If respiration or pulse has stopped, have a trained person administer Basic Life Support (Cardio-Pulmonary Resuscitation/Automatic External Defibrillator) and CALL FOR EMERGENCY SERVICES IMMEDIATELY (911 or emergency transport services).

4. FIRST AID MEASURES (Continued)

INGESTION:

Never give anything by mouth to an unconscious person. If swallowed, do not induce vomiting. Give large quantities of water. (If available, give several glasses of milk.) If vomiting occurs spontaneously, keep airway clear and give more water. GET MEDICAL ATTENTION IMMEDIATELY.

NOTES TO PHYSICIAN:

No specialized procedures. Treat for clinical symptoms.

Revised

5. FIRE FIGHTING MEASURES

Flash Point: Not applicable

Method: Not applicable

Autoignition Temperature: Not applicable

FLAMMABLE LIMITS IN AIR, BY % VOLUME

Upper: Not applicable

Lower: Not applicable

EXTINGUISHING MEDIA:

Non-flammable / Non-combustible.

Use agents appropriate for surrounding fire.

FIRE FIGHTING PROCEDURES:

Wear NIOSH/MSHA approved positive pressure self-contained breathing apparatus and full protective clothing.

FIRE AND EXPLOSION HAZARD:

None known.

SENSITIVITY TO MECHANICAL IMPACT:

Not sensitive.

SENSITIVITY TO STATIC DISCHARGE:

Not sensitive.

Revised

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS:

Evacuate unnecessary personnel.

6. ACCIDENTAL RELEASE MEASURES (Continued)

Follow protective measures provided under Personal Protection in Section 8.

ENVIRONMENTAL PRECAUTIONS:

Contain spill with dike to prevent entry into sewers or waterways.

Spills or releases should be reported, if required, to the appropriate local, state and federal agencies.

METHODS FOR CLEANING UP:

Dry material can be shoveled up, liquid material can be removed with a vacuum truck. Neutralize remaining traces with any dilute inorganic acid (hydrochloric, sulfuric or acetic acid). Flush spill area with water followed by a liberal covering of sodium carbonate. All clean-up material should be removed for proper treatment or disposal. Spills on other than pavement (eg. dirt or sand) may be handled by removing the affected soil and placing in approved containers.

Revised

7. HANDLING AND STORAGE

HANDLING:

Wear personal protective equipment as described in Exposure Controls/Personal Protection (Section 8) of the MSDS.

Do not get in eyes, on skin or clothing.

Avoid breathing airborne particulates; wear respiratory protection when exposure is possible.

Wash contaminated clothing before reuse.

Wash thoroughly with soap and water after handling.

SPECIAL MIXING AND HANDLING INSTRUCTIONS:

Do not allow contact with materials as noted in Section 10.

Contact with acids will cause gelling and the evolution of heat.

STORAGE:

Keep container tightly closed and properly labeled.

Do not store in aluminum container or use aluminum fittings or transfer lines, as flammable hydrogen gas can be generated.

Revised

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS:

Use adequate local exhaust ventilation where dust, mist or spray may be generated.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION (Continued)

PERSONAL PROTECTION

RESPIRATORY:

A NIOSH approved respirator with a dust, fume and mist filter may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits, or when symptoms have been observed that are indicative of overexposure.

A respiratory protection program that meets 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant use of a respirator.

EYE/FACE:

Wear chemical safety goggles plus full face shield to protect against contact when appropriate (ANSI Z87.1).

SKIN:

Wear protective clothing to minimize skin contact.

Wear chemical resistant gloves such as rubber, neoprene or vinyl.

Wash contaminated clothing and dry before reuse.

OTHER:

Emergency shower and eyewash facility should be in close proximity (ANSI Z358.1).

Revised

9. PHYSICAL AND CHEMICAL PROPERTIES

Property	Principal Grades*					
	40	42	47	49FG	JW25	52
Weight Ratio SiO ₂ :Na ₂ O	3.22	3.22	2.84	2.58	2.54	2.4
Total Solids, %	38.3	39.3	43.1	44.5	37.5	47.3
Specific Gravity @20°C (H ₂ O=1)	1.40	1.41	1.48	1.51	1.41	1.56
pH	11.2	11.2	11.6	11.6	11.7	11.8
Density, lb/gal @ 20°C (68°F)	11.7	11.8	12.3	12.6	11.7	13.0
Odor Threshold	Not applicable					
Vapor Pressure	Not applicable					
Vapor Density (Air=1)	Not applicable					
Evaporation Rate	Not applicable					
% Volatiles by Wt.	<80%					

9. PHYSICAL AND CHEMICAL PROPERTIES (Continued)

Boiling Point @ 760 mm Hg 214-216°F (101-102°C)
Freezing Point 30°F (-1°C)
Solubility in H₂O, % by Wt. 100%
Octanol/Water Partition Coefficient Not applicable
Thermal Decomposition Temperature Not applicable
VOC (g/l by wt.) Not applicable
*Includes typical data for principal grades. Contact Oxychem's
Technical Service Department for information regarding other grades.
Appearance and Odor: Colorless, turbid liquid; none to slightly
soapy odor.

10. STABILITY AND REACTIVITY

CHEMICAL STABILITY:

STABLE UNSTABLE

REACTS WITH:

<input type="checkbox"/> AIR	<input type="checkbox"/> OXIDIZERS	<input checked="" type="checkbox"/> METALS
<input type="checkbox"/> WATER	<input checked="" type="checkbox"/> ACIDS	<input type="checkbox"/> OTHER
<input type="checkbox"/> HEAT	<input type="checkbox"/> ALKALIS	<input type="checkbox"/> NONE

HAZARDOUS POLYMERIZATION:

OCCURS WILL NOT OCCUR

COMMENTS:

Contact with acids will cause gelling and the evolution of heat.
Prolonged contact with aluminum may produce flammable hydrogen gas.

HAZARDOUS DECOMPOSITION PRODUCTS:

None.

Revised

II. TOXICOLOGICAL INFORMATION

[1344-09-8] Silicic acid, sodium salt, siliceous. This substance is not corrosive. It is slightly toxic by the oral route. It is irritating but not corrosive to the eyes and skin.

For further information call or write the address shown on page 1 of the MSDS.

Revised

12. ECOLOGICAL INFORMATION

1344-09-8 Silicic acid, sodium salt

TOXICITY: This material is believed to be non-toxic to aquatic life.

PERSISTENCE: This material is believed to be likely to persist in the environment. This substance is inorganic and not subject to biodegradation.

BIOACCUMULATION: No data available. This material is believed to be unlikely to bioaccumulate.

For further information call or write the address shown on page 1 of the MSDS.

13. DISPOSAL CONSIDERATIONS

Dispose of all waste and contaminated equipment in accordance with all applicable federal, state and local health and environmental regulations.

Revised

14. TRANSPORT INFORMATION

DOT INFORMATION: Not Regulated

Revised

15. REGULATORY INFORMATION

U.S. FEDERAL REGULATIONS:

OSHA Standard 29 CFR 1910.1200 requires that information be provided to employees regarding the hazards of chemicals by means of a hazard communication program including labeling, material safety data sheets, training and access to written records. We request that you, and it is your legal duty to, make all information in this Material Safety Data Sheet available to your employees.

TSCA:

All components of this product that are required to be on the TSCA inventory are listed on the inventory.

SARA/TITLE III HAZARD CATEGORIES:

If the word "YES" appears next to any category, this product may be reportable by you under the requirements of 40 CFR 370. Please consult those regulations for details.

Immediate (Acute) Health:	<u>YES</u>	Reactive Hazard	<u>NO</u>
Delayed (Chronic) Health:	<u>NO</u>	Sudden Release of Pressure	<u>NO</u>
Fire Hazard:	<u>NO</u>		

15. REGULATORY INFORMATION (Continued)

HMIS HAZARD RATINGS:

HEALTH HAZARD: 2 FIRE HAZARD: 0 REACTIVITY: 0

STATE REGULATIONS:

See Section 2. COMPOSITION/INFORMATION ON INGREDIENTS list legend for applicable state regulation.

Consult local laws for applicability.

INTERNATIONAL REGULATIONS:

Consult the regulations of the importing country.

CANADA:

WHMIS Hazard Class: NOT CLASSIFIABLE

16. OTHER INFORMATION

For additional non-emergency health, safety or environmental information telephone (972) 404-2076 or write to:

Occidental Chemical Corporation
Product Stewardship Department
5005 LBJ Freeway
P.O. Box 809050
Dallas, Texas 75380

MSDS LEGEND:

ACGIH = American Conference of Governmental Industrial Hygienists

CAS = Chemical Abstracts Service Registry Number

CEILING = Ceiling Limit (15 Minutes)

CEL = Corporate Exposure Limit

OSHA = Occupational Safety and Health Administration

PEL = Permissible Exposure Limit (OSHA)

STEL = Short Term Exposure Limit (15 Minutes)

TDG = Transportation of Dangerous Goods (Canada)

TLV = Threshold Limit Value (ACGIH)

TWA = Time Weighted Average (8 Hours)

WHMIS = Worker Hazardous Materials Information System (Canada)

* = See Section 3 Hazards Identification - Repeated Exposure (Chronic) Information

16. OTHER INFORMATION (Continued)

IMPORTANT: The information presented herein, while not guaranteed, was prepared by competent technical personnel and is true and accurate to the best of our knowledge. NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE, OR OF ANY OTHER KIND, EXPRESS OR IMPLIED, IS MADE REGARDING PERFORMANCE, STABILITY OR OTHERWISE. This information is not intended to be all-inclusive as to the manner and conditions of use, handling and storage. Other factors may involve other or additional safety or performance considerations. While our technical personnel will be happy to respond to questions regarding safe handling and use procedures, safe handling and use remains the responsibility of the customer. No suggestions for use are intended as, and nothing herein shall be construed as a recommendation to infringe any existing patents or violate any federal, state or local laws, rules, regulations or ordinances.

This Material Safety Data Sheet (MSDS) covers the following materials:

- SODIUM SILICATE LIQUID SILICEOUS - PILOT SPECIAL
- SODIUM SILICATE LIQUID SILICEOUS (ALL GRADES)
- SODIUM SILICATE LIQUID SILICEOUS - JW 25
- SODIUM SILICATE LIQUID SILICEOUS - JW CLEAR
- SODIUM SILICATE LIQUID SILICEOUS - JW-27
- SODIUM SILICATE LIQUID SILICEOUS - 20 CLEAR
- SODIUM SILICATE LIQUID SILICEOUS - 20 SPECIAL CLEAR
- SODIUM SILICATE LIQUID SILICEOUS - 30 CLEAR
- SODIUM SILICATE LIQUID SILICEOUS - 33
- SODIUM SILICATE LIQUID SILICEOUS - 3.4
- SODIUM SILICATE LIQUID SILICEOUS - 40
- SODIUM SILICATE LIQUID SILICEOUS - 40 CLEAR
- SODIUM SILICATE LIQUID SILICEOUS - 40 L
- SODIUM SILICATE LIQUID SILICEOUS - 40 L CLEAR
- SODIUM SILICATE LIQUID SILICEOUS - 40 SPECIAL
- SODIUM SILICATE LIQUID SILICEOUS - 40 SPECIAL CLEAR
- SODIUM SILICATE LIQUID SILICEOUS - 42
- SODIUM SILICATE LIQUID SILICEOUS - 42 H
- SODIUM SILICATE LIQUID SILICEOUS - 42 L
- SODIUM SILICATE LIQUID SILICEOUS - 42 SPECIAL
- SODIUM SILICATE LIQUID SILICEOUS - 45
- SODIUM SILICATE LIQUID SILICEOUS - 47
- SODIUM SILICATE LIQUID SILICEOUS - 47 L
- SODIUM SILICATE LIQUID SILICEOUS - 47 SPECIAL
- SODIUM SILICATE LIQUID SILICEOUS - 49 FG
- SODIUM SILICATE LIQUID SILICEOUS - 49 FG SPECIAL
- SODIUM SILICATE LIQUID SILICEOUS - 52
- SODIUM SILICATE LIQUID SILICEOUS - 52 L
- SODIUM SILICATE LIQUID SILICEOUS - 52 SPECIAL

Revised

17. WARNING LABEL INFORMATION

SIGNAL WORD:

WARNING

HAZARD WARNINGS:

IRRITATING TO EYES AND SKIN.

17. WARNING LABEL INFORMATION (Continued)

PRECAUTIONS:

Avoid contact with eyes, skin and clothing.

Avoid breathing dust, vapors or mist.

Use with adequate ventilation.

Wash thoroughly after handling.

Keep container tightly closed and properly labeled.

Before using, read Material Safety Data Sheet (MSDS) for this material.

FIRST AID

EYES:

Immediately flush eyes with a directed stream of water for at least 15 minutes, forcibly holding eyelids apart to ensure complete irrigation of all eye and lid tissues. Washing eyes within several seconds is essential to achieve maximum effectiveness. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN:

Immediately flush contaminated areas with water. Remove contaminated clothing and footwear. Wash contaminated areas with plenty of soap and water. Wash clothing before reuse. Discard footwear which cannot be decontaminated. GET MEDICAL ATTENTION IMMEDIATELY.

INHALATION:

Remove to fresh air if safe to transport. Otherwise attempt to provide fresh air by ventilation. If breathing is difficult, have a trained person administer oxygen. If respiration or pulse has stopped, have a trained person administer Basic Life Support (Cardio-Pulmonary Resuscitation/Automatic External Defibrillator) and CALL FOR EMERGENCY SERVICES IMMEDIATELY (911 or emergency transport services).

INGESTION:

Never give anything by mouth to an unconscious person. If swallowed, do not induce vomiting. Give large quantities of water. (If available, give several glasses of milk.) If vomiting occurs spontaneously, keep airway clear and give more water. GET MEDICAL ATTENTION IMMEDIATELY.

IN CASE OF SPILL OR LEAK:

Contain spill with dike to prevent entry into sewers or waterways.

Dry material can be shoveled up, liquid material can be removed with a vacuum truck. Neutralize remaining traces with any dilute inorganic acid (hydrochloric, sulfuric or acetic acid). Flush spill area with water followed by a liberal covering of sodium carbonate. All clean-up material should be removed for proper treatment or disposal. Spills on other than pavement (eg. dirt or sand) may be handled by removing the affected soil and placing in approved containers.

17. WARNING LABEL INFORMATION (Continued)

FIRE:

Non-flammable / Non-combustible.

Use agents appropriate for surrounding fire.

HANDLING AND STORAGE:

Wear a NIOSH/MSHA approved respirator, chemical splash goggles, full face shield, protective clothing and chemical resistant gloves.

Avoid contact with acids.

Do not store in aluminum container or use aluminum fittings or transfer lines, as flammable hydrogen gas can be generated.

DISPOSAL:

Dispose of all waste and contaminated equipment in accordance with all applicable federal, state and local health and environmental regulations.

INFORMATION REQUIRED BY FEDERAL, STATE OR LOCAL REGULATIONS:

This Product Contains:

CAS#	NAME
7732-18-5	Water
1344-09-8	Silicic acid, sodium salt

HMIS RATING: HEALTH 2 FLAMMABILITY 0 REACTIVITY 0

LABEL NUMBER: 0901M35887

For Industrial Use Only



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ACUMER™ 9300 Dispersant acrylic homopolymer for mineral slurries

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Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

ACUMER (TM) 9300 POLYMER

Supplier

Rohm and Haas Company

100 Independence Mall West

Philadelphia, PA 19106-2399 United States of America

For non-emergency information contact: 215-592-3000

Emergency telephone number

Spill Emergency	215-592-3000
Health Emergency	215-592-3000
Chemtrec	800-424-9300

2. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No.
Polycarboxylate, sodium salt	Not Hazardous

Residual monomers Not Required

Water 7732-18-5

3. HAZARDS IDENTIFICATION

Emergency Overview

Appearance

Form	liquid
Colour	amber
	clear
Odour	Mild odor

<p>Hazard Summary</p>	<p><u>CAUTION!</u></p> <p>INHALATION OF VAPOR OR MIST CAN CAUSE HEAD IRRITATION OF THE NOSE, THROAT AND LUNGS.</p> <p>MAY CAUSE EYE/SKIN IRRITATION.</p>
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Potential Health Effects

Primary Routes of Entry:

- Inhalation
- Eye contact
- Skin contact

Eyes:Direct contact with material can cause the following:

slight irritation

Skin:Prolonged or repeated skin contact can cause the following:

slight irritation

Inhalation:Inhalation of vapor or mist can cause the following:

irritation of nose, throat, and lungs

headache

nausea

Chronic Exposure:Prolonged or repeated overexposure can cause the following:

lung irritation

4. FIRST AID MEASURES

Inhalation: Move to fresh air.

Skin contact: Wash with water and soap as a precaution. If skin irritation persists, c

Eye contact: Rinse with plenty of water. If eye irritation persists, consult a specialist

Ingestion: Drink 1 or 2 glasses of water. Consult a physician if necessary. Never gi

5. FIRE-FIGHTING MEASURES

Flash point Noncombustible

Lower explosion limit Not Applicable

Upper explosion limit Not Applicable

Thermal decomposition >230.00 °C

Suitable extinguishing media: Use extinguishing media appropriate for surrounding f

Specific hazards during fire fighting: Material can splatter above 100C/212F. Drie

Special protective equipment for fire-fighters: Wear self-contained breathing appa

6. ACCIDENTAL RELEASE MEASURES

Personal precautions

Use personal protective equipment.

Keep people away from and upwind of spill/leak.

Material can create slippery conditions.

Environmental precautions

CAUTION: Keep spills and cleaning runoff out of municipal sewers and open bodies of

Methods for cleaning up

Contain spills immediately with inert materials (e.g., sand, earth).

Transfer liquids and solid diking material to separate suitable containers for recovery c

7. Handling and storage

Handling

Monomer vapors can be evolved when material is heated during processing operations

Further information on storage conditions:Keep from freezing - product stability r

Storage

Storage temperature:1.00 - 49.00 °C (33.80 - 120.20 °F)

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure limit(s)

Exposure limits are listed below, if they exist.

	Regulation	Type of listing
Product	Rohm and Haas	TWA Respirable fraction.

Eye protection:safety glasses with side-shields Eye protection worn must be compa

Hand protection:The glove(s) listed below may provide protection against permeatio
not provide adequate protection): Neoprene gloves

Respiratory protection:A respiratory protection program meeting OSHA 1910.134 a
followed whenever workplace conditions warrant a respirator's use. None required if
exposure limit listed in Exposure Limit Information. For dust or mist up to 5 times the
(or equivalent) single use N95 filtering facepiece. If oil mist is present, wear a single u

Protective measures:Facilities storing or utilizing this material should be equipped w

Engineering measures:Use local exhaust ventilation with a minimum captur
dust or mist evolution. Refer to the current edition of "Industrial Ventilation: A Manua
Conference of Governmental Industrial Hygienists for information on the design, instal

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form

liquid

Colour	amber clear
Odour	Mild odor
pH	6.5 - 7.5
Boiling point/range	100 °C (212.00 °F) Water
Melting point/range	0 °C (32 °F) Water
Flash point	Noncombustible
Lower explosion limit	Not Applicable
Upper explosion limit	Not Applicable
Vapour pressure	17.0 mmHg at 20 °C (68.00 °F) Water
Relative vapour density	<1.0water
Water solubility	completely soluble
Relative density	1.25 - 1.35approximately
Viscosity, dynamic	400.000 - 1,400.000 mPa.s
Evaporation rate	<1.00 Water
Percent volatility	54 - 56 % water

NOTE: The physical data presented above are typical values and should not be constr

10. STABILITY AND REACTIVITY

Hazardous reactions	None known. Stable However, avoid temperatures above 230C/446F, the o decomposition. Thermal decomposition is dependent o temperature.
Materials to avoid	There are no known materials which are incompatible
Hazardous decomposition products	Thermal decomposition may yield acrylic monomers.
polymerization	Product will not undergo polymerization.

11. TOXICOLOGICAL INFORMATION

Acute oral toxicity	LD50 rat > 5,000 mg/kg
Acute inhalation toxicity	LC50 rat NOEL 10 mg/m3
Acute dermal toxicity	LD50 rabbit > 5,000 mg/kg
Skin irritation	rabbit slight irritation
Eye irritation	rabbit slight irritation
Sensitization	guinea pig Not a sensitizer.
Subchronic toxicity	A 13 week inhalation study in rats of a compositionally polycarboxylate material showed inflammatory effects concentrations of 5 mg/m3 for 6 hours per day, 5 days observed-effect-level for this response was judged to be Maintaining airborne concentrations within the recomr is not expected to produce adverse effects within the l

Mutagenicity

Ames mutagenicity:

Negative

12. ECOLOGICAL INFORMATION

Ecotoxicity effects

Toxicity to fish	LC50 Rainbow trout 96 h
Toxicity to fish	700 mg/l LC50 Bluegill sunfish (<i>Lepomis macrochirus</i>) 96 h
Toxicity to fish	>1,000 mg/l LC50 Zebra fish (<i>Danio/Brachydanio rerio</i>) 96 h
Toxicity to algae	>200 mg/l EC10 Algae 96 h
Toxicity to aquatic invertebrates	>180 mg/l EC50 Daphnia magna 48 h >1,000 mg/l

13. DISPOSAL CONSIDERATIONS

Environmental precautions: CAUTION: Keep spills and cleaning runoff out

Disposal

Waste Classification: When a decision is made to discard this material as supplied, it is ignitable, corrosive, or reactive, and is not listed in 40 CFR 261.33. The toxicity of the material is determined by the Toxicity Characteristic Leaching Procedure (TCLP).

For disposal, incinerate or landfill at a permitted facility in accordance with local, state

14. TRANSPORT INFORMATION

DOT

Not regulated for transport

IMO/IMDG

Not regulated (Not dangerous for transport)

15. REGULATORY INFORMATION

Workplace Classification

This product as supplied is non-hazardous under the OSHA Hazard Communication Standard. It may become OSHA hazardous due to the potential for overexposure to dusts or mists.

This product as supplied is not a 'controlled product' under the Canadian Workplace Hazardous Materials Information System (WHMIS).

SARA TITLE III:Section 311/312 Categorizations (40CFR311.10-311.12, 29CFR 1910.1200, and therefore is not covered by Title III of SARA.

SARA TITLE III:Section 313 Information (40CFR372)

This product does not contain a chemical which is listed in Section 313 at or above de

CERCLAInformation(40CFR302.4)

Releases of this material to air, land, or water are not reportable to the National Response, Compensation, and Liability Act (CERCLA) or to state and local emergency response and Reauthorization Act (SARA) Title III Section 304.

US. Toxic Substances Control Act (TSCA) All components of this product meet the requirements of the U.S. Toxic Substances Control Act (TSCA) Chemical Substance Inventory.

16. OTHER INFORMATION

Hazard Rating

	Health	Fire	Reactivity
HMIS	1	0	0

Legend


ACGIH	American Conference of Governmental Industrial Hygienists
BAc	Butyl acetate
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
STEL	Short Term Exposure Limit (STEL):
TLV	Threshold Limit Value
TWA	Time Weighted Average (TWA):

| | Bar denotes a revision from prior MSDS.

The information provided in this Safety Data Sheet is correct to the best of our knowledge. The information given is designed only as a guidance for safe handling, use, processing, and should not be considered a warranty or quality specification. The information relates only to the material as used for such material used in combination with any other materials or in any process, unless otherwise specified.

Layout 209150

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WHMIS  	Protective Clothing       	TDG Road / Rail 
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Section 1. Chemical product and company identification

Sodium isobutyl xanthate 85%

Code : Q02084
Synonym : Not available.
Manufacturer : Aslchem International
Supplier : QUADRA CHEMICALS LTD.
 370, boul. Joseph-Carrier
 Vaudreuil-Dorion QC J7V 5V5
 Tel: (450) 424-0161

 Burlington ON Tel: (905) 336-9133
 Delta BC Tel: (604) 940-2313
 Edmonton AB Tel: (780) 451-9222
 Calgary AB Tel: (403) 232-8130

Material uses : Industrial applications: Flotation agent.

**TRANSPORTATION EMERGENCY - 24HRS/DAY - 7 DAYS/WEEK
 IN CANADA - CALL 1-800-567-7455**

Section 2. Composition, Information on Ingredients

Name	CAS #	% by weight	Exposure limits
sodium isobutyl xanthate	25306-75-6	60-100	Not available.
carbonotrithioic acid, disodium salt	534-18-9	1-5	Not available.
sodium carbonate	497-19-8	0.5-1.5	Not available.
disodium sulfide	1313-82-2	0.5-1.5	Not available.

Consult local authorities for acceptable exposure limits.

Section 3. Hazards identification

Emergency overview : PYROPHORIC MATERIAL.
 CAUSES RESPIRATORY TRACT, EYE AND SKIN IRRITATION.
 HARMFUL IF SWALLOWED.

Routes of entry : Eye contact. Inhalation. Ingestion.

Potential acute health effects

- Eyes** : Dust and vapours cause eye irritation.
- Skin** : Repeated contact with dust causes irritation to the skin.
- Inhalation** : Inhalation of the dust will irritate the nose and throat and cause coughing and chest discomfort. Carbon disulphide (CS₂) vapours are rapidly absorbed and may cause headache, nausea and dizziness followed by vomiting, blurred vision, respiratory depression and unconsciousness.
- Ingestion** : Will cause vomiting, headache, convulsions and unconsciousness.

Continued on next page

Potential chronic health effects : **CARCINOGENIC EFFECTS** Not available.
MUTAGENIC EFFECTS Not available.
TERATOGENIC EFFECTS Not available.
DEVELOPMENTAL TOXICITY Not available.

Medical conditions aggravated by overexposure : No additional information.

Over-exposure signs/symptoms : No additional information.

See toxicological Information (section 11)

Section 4. First aid measures

Eye Contact : IMMEDIATELY flush eyes with running water for at least 15 minutes, keeping eyelids open. COLD water may be used. Seek immediate medical attention.

Skin Contact : Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Seek immediate medical attention.

Inhalation : Allow the victim to rest in a well ventilated area. If breathing is difficult, administer oxygen. If the victim is not breathing, perform artificial respiration. Seek immediate medical attention.

Ingestion : DO NOT induce vomiting. If the victim is conscious, give a little water or milk. NEVER give an unconscious person anything to ingest. Seek immediate medical attention.

Notes to Physician : No additional information.

Section 5. Fire fighting measures

Flammability of the product : Spontaneously combustible.

Auto-ignition Temperature : 100°C (212°F) (carbon disulphide)

Flash Points : Not available.

Flammable limits : Not available.

Products of combustion : Exposure to heat and moisture may cause the decomposition of the isobutyl xanthate to flammable and explosive vapours of carbon disulphide.

Fire hazards in presence of various substances : Flammable in presence of open flames, sparks and static discharge, of heat.

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.
Dust can combine with air to form an explosive mixture.

Fire fighting media and instructions : Use DRY chemicals, carbon dioxide or alcohol-resistant foam. Do not use water. Wear NIOSH approved self-contained breathing apparatus (SCBA) when either in confined areas or exposed to combustion products.

Section 6. Accidental release measures

Spill or leak : Use appropriate tools to put the spilled material in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to federal, provincial and municipal environmental control regulations.

Section 7. Handling and storage

Handling : Follow routine safe handling procedures.

Storage : Keep container tightly closed. Keep in a cool, well ventilated place. Avoid dust generation. Store away from incompatible materials. Avoid all possible sources of ignition (spark or flame). Protect from humidity.

Section 8. Exposure Controls, Personal Protection

Engineering controls : Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapours below their respective threshold limit value. Ensure that eye stations and safety showers are proximal to the work-station location.

Personal protection

Eyes : Splash goggles or faceshield.

Body : Full suit. Rubber apron.

Continued on next page

Respiratory : If user operations generate dust, fume, mist or if workplace contaminant level is above threshold limit, ensure to use a MSHA/NIOSH approved respirator or equivalent.

Hands : Chemical resistant gloves.

Feet : Chemical resistant boots.

Section 9. Physical and chemical properties

Physical State and Appearance : Solid. (Pellets.)

Color : Yellow to green.

Odor : Disagreeable sulphur-type. (Slight.)

Melting/freezing point : 229 to 253°C (444.2 to 487.4°F)

Specific Gravity : 0.8 to 0.825 (Water = 1)

Volatility : 0% (v/v)

Evaporation rate : <1 compared to (butyl acetate = 1)

Solubility : Soluble in water: 11.2 g/100 ml @ 0°C; 33.4 g/100 ml @ 35°C

Section 10. Stability and reactivity

Stability and Reactivity : Stable under normal conditions.

Conditions of instability : Avoid elevated temperatures and moisture.

Incompatibility with various substances : Reactive with oxidizing agents, acids.
Do not apply steam to the material.

Hazardous Decomposition Products : May liberate carbon disulphide, isobutyl alcohol, oxides of carbon and sulphur.

Hazardous polymerization : Will not occur.

Section 11. Toxicological information

Toxicity data : Acute oral toxicity (LD50): 500 to 2000 mg/kg [Rat]. (sodium isobutyl xanthate).

Chronic effects on humans : No additional information.

Other toxic effects on humans : No additional information.

Remarks on toxicity to animals : No additional information.

Section 12. Ecological information

Ecotoxicity data : May be harmful to aquatic life.

Remarks on the products of biodegradation : No additional remark.

Section 13. Disposal considerations

Waste information : Waste must be disposed of in accordance with federal, provincial and municipal environmental control regulations.

Waste stream : Avoid entry of product into the sewage system or water streams.

Consult your local or regional authorities.

Section 14. Transport information

Regulatory Information	Shipping name and Class	UN number	Packing group
TDG Classification	XANTHATES Class 4.2	3342	III

Continued on next page

Section 15. Regulatory information

- WHMIS (Canada) : PYROPHORIC CHEMICAL. CAUSES RESPIRATORY TRACT, EYE AND SKIN IRRITATION.
HARMFUL IF SWALLOWED.
Class B-6, D-1B, D-2B.
- DSL (CEPA) : CEPA DSL: All ingredients are listed or exempted.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations.

Section 16. Other information

- References : Canadian Guide of the Law and Regulations of the Transportation of the Dangerous Goods. Controlled products regulations. Manufacturer's Material Safety Data Sheet.
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.
- Other special considerations : The product contains approx. 0.06% of sodium hydroxide.
- Regulatory Affairs Department : (450) 424-0161

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.

WHMIS 	Protective Clothing 	TDG Road / Rail 
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Section 1. Chemical product and company identification

Sodium isobutyl xanthate 90%

Code : Q02762
Synonym : Not available.
Manufacturer : Qixia Tongda Flotation Reagent Co. Ltd
Supplier : QUADRA CHEMICALS LTD.
 370, boul. Joseph-Carrier
 Vaudreuil-Dorion QC J7V 5V5
 Tel: (450) 424-0161

 Burlington ON Tel: (905) 336-9133
 Delta BC Tel: (604) 940-2313
 Edmonton AB Tel: (780) 451-9222
 Calgary AB Tel: (403) 232-8130

Material uses : Industrial applications: Flotation agent.

**TRANSPORTATION EMERGENCY - 24HRS/DAY - 7 DAYS/WEEK
IN CANADA - CALL 1-800-567-7455**

Section 2. Composition, Information on Ingredients

Name	CAS #	% by weight	Exposure limits
sodium isobutyl xanthate	25306-75-6	60-100	Not available.
carbonotrithioic acid, disodium salt	534-18-9	1-5	Not available.
sodium carbonate	497-19-8	0.5-1.5	Not available.
disodium sulfide	1313-82-2	0.5-1.5	Not available.

Consult local authorities for acceptable exposure limits.

Section 3. Hazards identification

Emergency overview : PYROPHORIC MATERIAL.
 CAUSES RESPIRATORY TRACT, EYE AND SKIN IRRITATION.
 HARMFUL IF SWALLOWED.

Routes of entry : Inhalation. Ingestion.

Potential acute health effects

- Eyes** : Dust and vapours cause eye irritation.
- Skin** : Repeated contact with dust causes irritation to the skin.
- Inhalation** : Inhalation of the dust will irritate the nose and throat and cause coughing and chest discomfort. Carbon disulphide (CS₂) vapours are rapidly absorbed and may cause headache, nausea and dizziness followed by vomiting, blurred vision, respiratory depression and unconsciousness.
- Ingestion** : Will cause vomiting, headache, convulsions and unconsciousness.

Continued on next page

Potential chronic health effects	: CARCINOGENIC EFFECTS Not available. MUTAGENIC EFFECTS Not available. TERATOGENIC EFFECTS Not available. DEVELOPMENTAL TOXICITY Not available.
Medical conditions aggravated by overexposure	: No additional information.
Over-exposure signs/symptoms	: No additional information.

See toxicological Information (section 11)

Section 4. First aid measures

Eye Contact	: IMMEDIATELY flush eyes with running water for at least 15 minutes, keeping eyelids open. COLD water may be used. Seek immediate medical attention.
Skin Contact	: Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Seek immediate medical attention.
Inhalation	: Allow the victim to rest in a well ventilated area. If breathing is difficult, administer oxygen. If the victim is not breathing, perform artificial respiration. Seek immediate medical attention.
Ingestion	: DO NOT induce vomiting. If the victim is conscious, give a little water or milk. NEVER give an unconscious person anything to ingest. Seek immediate medical attention.
Notes to Physician	: No additional information.

Section 5. Fire fighting measures

Flammability of the product	: Spontaneously combustible.
Auto-ignition Temperature	: 100°C (212°F) (carbon disulphide)
Flash Points	: Not available.
Flammable limits	: Not available.
Products of combustion	: Exposure to heat and moisture may cause the decomposition of the isobutyl xanthate to flammable and explosive vapours of carbon disulphide.
Fire hazards in presence of various substances	: Flammable in presence of open flames, sparks and static discharge, of heat.
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. Dust can combine with air to form an explosive mixture.
Fire fighting media and instructions	: Use DRY chemicals, carbon dioxide or alcohol-resistant foam. Do not use water. Wear NIOSH approved self-contained breathing apparatus (SCBA) when either in confined areas or exposed to combustion products.

Section 6. Accidental release measures

Spill or leak	: Use appropriate tools to put the spilled material in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to federal, provincial and municipal environmental control regulations.
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Section 7. Handling and storage

Handling	: Follow routine safe handling procedures.
Storage	: Keep container tightly closed. Keep in a cool, well ventilated place. Avoid dust generation. Store away from incompatible materials. Avoid all possible sources of ignition (spark or flame). Protect from humidity.

Section 8. Exposure Controls, Personal Protection

Engineering controls	: Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapours below their respective threshold limit value. Ensure that eye stations and safety showers are proximal to the work-station location.
Personal protection	: Eyes : Splash goggles or faceshield. Body : Full suit. Rubber apron.

Continued on next page

Respiratory : If user operations generate dust, fume, mist or if workplace contaminant level is above threshold limit, ensure to use a MSHA/NIOSH approved respirator or equivalent.

Hands : Chemical resistant gloves.

Feet : Chemical resistant boots.

Section 9. Physical and chemical properties

Physical State and Appearance : Solid. (Pellets.)
Color : Yellow to green.
Odor : Disagreeable sulphur-type. (Slight.)
Melting/freezing point : 229 to 253°C (444.2 to 487.4°F)
Specific Gravity : 0.8 to 0.825 (Water = 1)
Volatility : 0% (v/v)
Evaporation rate : <1 compared to (butyl acetate = 1)
Solubility : Soluble in water: 11.2 g/100 ml @ 0°C; 33.4 g/100 ml @ 35°C

Section 10. Stability and reactivity

Stability and Reactivity : Stable under normal conditions.
Conditions of instability : Avoid elevated temperatures and moisture.
Incompatibility with various substances : Reactive with oxidizing agents, acids.
 Do not apply steam to the material.
Hazardous Decomposition Products : May liberate carbon disulphide, isobutyl alcohol, oxides of carbon and sulphur.
Hazardous polymerization : Will not occur.

Section 11. Toxicological information

Toxicity data : Acute oral toxicity (LD50): 500 to 2000 mg/kg [Rat]. (sodium isobutyl xanthate).
Chronic effects on humans : No additional information.
Other toxic effects on humans : No additional information.
Remarks on toxicity to animals : No additional information.

Section 12. Ecological information

Ecotoxicity data : May be harmful to aquatic life.
Remarks on the products of biodegradation : No additional remark.

Section 13. Disposal considerations

Waste information : Waste and empty packaging must be disposed of in accordance with federal, provincial, and municipal environmental control regulations.
Waste stream : Avoid entry of product into the sewage system or water streams.

Consult your local or regional authorities.

Section 14. Transport information

Regulatory Information	Shipping name and Class	UN number	Packing group
TDG Classification	XANTHATES Class 4.2	3342	III

Continued on next page

Section 15. Regulatory information

- WHMIS (Canada) : PYROPHORIC CHEMICAL. CAUSES RESPIRATORY TRACT, EYE AND SKIN IRRITATION.
HARMFUL IF SWALLOWED.
Class B-6, D-1B, D-2B.
- DSL (CEPA) : CEPA DSL: All ingredients are listed or exempted.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations.

Section 16. Other information

- References : Canadian Guide of the Law and Regulations of the Transportation of the Dangerous Goods. Controlled products regulations. Manufacturer's Material Safety Data Sheet.
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.
- Other special considerations : No additional remark.
- Regulatory Affairs Department : (450) 424-0161

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.



Product name: Methyl isobutyl carbinol
MSDS number: 63
Material number: 80063
Published date: 02/02/2006(V1)

MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Product: Methyl isobutyl carbinol
MSDS number: 63
Material number: 80063

Celanese Pte Ltd
111 Somerset Road
Singapore Power Building #02-02/03
Singapore 238164
Tel No: (65) 6733 1767

Transportation emergency phone numbers:
+ (65) 66639259 (Operations Room direct dial)
+ (65) 62656917 (Operations Room direct dial)
+ (65) 62650177 (Switchboard, ask for Operations Room)

or fax request to
+(65) 62644190 (Facsimile to Operations Room)
+(65) 62664696 (Facsimile to Operations Room)

or email to
opsroom@semco.psa.com.sg

or Call CHEMTREC 703 527 3887 (USA), collect calls accepted
"+" = International Dialing Access Code

Product Use: Intermediate for lube oil additives, especially zinc dialkyl dithiophosphates; frothing agent for ore flotation, especially copper.

2. Composition / Information on Ingredients

Component	CAS Number	Percent %	OSHA hazard category:
METHYL ISOBUTYL CARBINOL	108-11-2	99	Hazardous

3. Hazards Identification

Transportation emergency: 703 527 3887 (USA) CHEMTREC, collect calls accepted, 24 hrs/day

Product name:	Methyl isobutyl carbinol
MSDS number:	63
Material number:	80063
Published date:	02/02/2006(V1)

Emergency Overview:

WARNING!

- Flammable liquid and vapor.
- May cause respiratory tract and eye irritation.
- May cause skin irritation.
- Prolonged or repeated contact may dry skin and cause irritation.
- Material creates a special hazard because it floats on water.

Product Description

Appearance: Clear, colorless mobile liquid.
Odor: Slightly irritating, alcohol odor.

Potential health effects

Routes of exposure: Skin, eyes, inhalation, ingestion.

Immediate effects:

- Skin:** May cause skin irritation. Prolonged or repeated contact may dry skin and cause irritation. May be harmful if absorbed through skin. Symptoms of exposure may include: Central nervous system depression with headache, stupor, uncoordinated or strange behavior or unconsciousness. Drying, cracking or inflammation of skin.
- Eyes:** Exposure to vapors and liquid Causes eye irritation. Symptoms of exposure may include: Eye irritation, burning sensation, pain, watering, and/or change of vision.
- Inhalation:** Causes respiratory tract irritation. Harmful if inhaled. Symptoms of exposure may include: Central nervous system depression with nausea, dizziness, headache, stupor, uncoordinated or strange behavior or unconsciousness. Nasal discharge, hoarseness, coughing, chest pain and breathing difficulty.
- Ingestion:** May be harmful if swallowed. Symptoms of exposure may include: Nausea, vomiting, loss of appetite, gastrointestinal irritation and/or diarrhea. Central nervous system depression with nausea, headache and mental sluggishness.
- Mutagenic:** Does not show mutagenic potential in most in vitro tests.
- Target organ effects:**
- Overexposure (prolonged or repeated exposure) may cause:
 - Kidney damage
 - Central nervous system depression
 - Injury to the eyes
 - Irritation of the respiratory tract
 - Irritation of the digestive tract
 - Drying of the skin



Product name:	Methyl isobutyl carbinol
MSDS number:	63
Material number:	80063
Published date:	02/02/2006(V1)

Medical conditions which may be aggravated by exposure: Significant exposure to this chemical may adversely affect people with acute or chronic disease of the:
Respiratory Tract
Skin
Eyes
Kidneys
Central nervous system
Digestive tract

For further information, see: Section 4 - First Aid Measures
Section 5 - Fire Fighting Measures
Section 6 - Accidental Release Measures
Section 8 - Exposure Controls/Personal Protection
Section 9 - Physical and Chemical Properties
Section 10 - Stability and Reactivity

4. First Aid Measures

Skin: Immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Call a physician if irritation develops and persists. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes. If easy to do, remove contact lenses, if worn. Get medical attention immediately.

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

Ingestion: DO NOT induce vomiting. Get medical attention immediately. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person.

5. Fire Fighting Measures

NFPA: Health: 2 Flammability: 2 Reactivity: 0

Flammable properties

Flash point (test method): 42.4 C (108 F)

Flammable limits in air, % by volume:

Upper: 5.5 %
Lower: 1 %

Autoignition temperature: 360.3 C (680 F)

Products of combustion: Carbon Monoxide.



Product name:	Methyl isobutyl carbinol
MSDS number:	63
Material number:	80063
Published date:	02/02/2006(V1)

Extinguishing Media:	Use CO ₂ or dry chemical for small fires. Use aqueous film forming foam for large fires.
Fire Fighting Instructions:	Water spray should be used to cool fire-exposed structures and vessels. Keep personnel removed from and upwind of fire. If potential for exposure to vapors or products of combustion exists, wear full fire fighting turnout gear and NIOSH approved self-contained breathing apparatus. Oxidizing chemicals may accelerate the burning rate in a fire situation.
Fire Fighting Environmental Concerns:	Thoroughly decontaminate bunker gear and other fire-fighting equipment before re-use.

6. Accidental Release Measures

Spill or Leak Instructions	<p>Eliminate ignition sources. See Section 8 for appropriate personal protective equipment. Contain spill with dikes of soil or nonflammable absorbent to minimize contaminated area. If fire potential exists, blanket spill with alcohol type aqueous film-forming foam or use water fog stream to disperse vapors. Avoid run-off into storm sewers and ditches leading to waterways. If required, notify state and local authorities. Place leaking containers in well-ventilated area. Clean up small spills by using a nonflammable absorbent or flushing sparingly with water. Contain larger spills with nonflammable diking or absorbent. Clean up by vacuuming or sweeping.</p> <p>Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Isolate for 800 meters or 0.5 miles in all directions if tank, rail car, or tank truck is involved in fire. Material creates a special hazard because it floats on water. Assess the spill situation, as the spill may not evolve large amounts of hazardous airborne contaminants in many outdoor spill situations. It may be advisable in some cases to simply monitor the situation until spilled product is removed.</p>
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7. Handling and Storage

Handling:	<p>Use with adequate ventilation. Keep containers closed when not in use. Always open containers slowly to allow any excess pressure to vent. Avoid breathing vapor. Avoid contact with eyes, skin or clothing. Wash thoroughly with soap and water after handling. Decontaminate soiled clothing thoroughly before re-use. Destroy contaminated leather clothing.</p> <p>This product may generate a static charge. Ground/bond equipment when transferring material to prevent static accumulation. Electrical equipment and circuits in all storage and handling must conform to requirements of National Electric Code (Article 500 and 501) for hazardous location.</p>
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Product name:	Methyl isobutyl carbinol
MSDS number:	63
Material number:	80063
Published date:	02/02/2006(V1)

Storage: Keep all containers tightly closed when not in use. Store out of direct sunlight and on an impermeable floor.
Do not store with incompatible materials. See Section 10. Stability and Reactivity.

8. Exposure Controls / Personal Protection

Engineering Controls: General or dilution ventilation is frequently insufficient as the sole means of controlling employee exposure. Local ventilation is usually preferred.

Protective Equipment A safety shower and eyebath should be readily available.

Skin protection: Wear impervious clothing and gloves to prevent contact. Butyl rubber is recommended. Other protective material may be used, depending on the situation, if adequate degradation and permeation data is available. If other chemicals are used in conjunction with this chemical, material selection should be based on protection for all chemicals present.

Eye/face protection: Wear chemical goggles when there is a reasonable chance of eye contact.

Respiratory protection: Based on workplace contaminant level and working limits of the respirator, use a respirator approved by NIOSH. The following is the minimum recommended equipment for an occupational exposure level. To estimate an occupational exposure level see Section 3, Section 8 and Section 11.

For concentrations > 1 and < 10 times the occupational exposure level: Use air-purifying respirator with full facepiece and organic vapor cartridge(s) or air-purifying full facepiece respirator with an organic vapor canister or a full facepiece powered air-purifying respirator fitted with organic vapor cartridge(s). The air purifying element must have an end of service life indicator, or a documented change out schedule must be established. Otherwise, use supplied air.

For concentrations more than 10 times the occupational exposure level and less than the lower of either 100 times the occupational exposure level or the IDLH: Use Type C full facepiece supplied-air respirator operated in positive-pressure or continuous-flow mode.

For concentrations > 100 times the occupational exposure level or greater than the IDLH level or unknown concentrations (such as in emergencies): Use self-contained breathing apparatus with full facepiece in positive-pressure mode or Type C positive-pressure full facepiece supplied-air respirator with an auxiliary positive-pressure self-contained breathing apparatus escape system.

For escape: Use self-contained breathing apparatus with full facepiece or any respirator specifically approved for escape.

Exposure guidelines



Product name:	Methyl isobutyl carbinol
MSDS number:	63
Material number:	80063
Published date:	02/02/2006(V1)

Component	CAS Number	Percent %	ACGIH TWA	ACGIH STEL	ACGIH CEILING	OSHA TWA	OSHA STEL	OSHA CEILING	Celanese WEL *	Mexico TWA	Mexico STEL	Mexico CEILING
METHYL ISOBUTYL CARBINOL	108-11-2	99	25 ppm	40 ppm	-	25 ppm	-	-	-	25 ppm	40 ppm	-

Component	CAS Number	Percent %	1990 NIOSH IDLH (Recognized by OSHA)	1994 NIOSH IDLH
METHYL ISOBUTYL CARBINOL	108-11-2	99	2000 PPM	400 ppm

Comments: Celanese has adopted the ACGIH TLVs
* Workplace Exposure Limit

9. Physical and Chemical Properties

Appearance: Clear, colorless mobile liquid.

Odor: Slightly irritating, alcohol odor.

Vapor Pressure: 4.7 mm Hg at 20 deg C

Vapor Density (Air=1 @ 20°C): 3.53

Boiling Point (760 mmHgA): 132 C (269.6 F)

Freezing Point: < -50 C (< -58 F)

Solubility In Water @ 20°C: 1.82 grams per 100 grams H2O

Specific Gravity: 0.808 at 20 deg C

Molecular Weight: 102.2

Evaporation Rate (n-Butyl acetate = 1): 0.26

10. Stability and Reactivity

Stability: Stable.

Conditions to Avoid: Avoid heat , flames, sparks, and other sources of ignition.

Incompatibility: Keep away from sulfuric and other strong inorganic acids, aluminum or lead (including equipment made of these metals), and oxidizing agents such as peroxides, nitric acid, perchloric acid or chromium trioxide.

Hazardous Combustion or Decomposition Products: Thermal decomposition products may include oxides of carbon.

Product name:	Methyl isobutyl carbinol
MSDS number:	63
Material number:	80063
Published date:	02/02/2006(V1)

Hazardous Polymerization: Hazardous polymerization will not occur.

11. Toxicological Information

Component Toxicological Information

Component	METHYL ISOBUTYL CARBINOL
	<p>Acute Exposure: Excessive exposure leads to depression of the central nervous system which is generally reversible and is shown by headache, dizziness, drowsiness, loss of coordination and unconsciousness.</p> <p>Oral LD50: 2.6g/kg (rats); Slightly toxic to animals. Nausea, vomiting, gastrointestinal irritation and diarrhea may occur.</p> <p>Inhalation LC50: >3776 ppm (rats; vapor; 4hrs.); Slightly toxic to animals. Vapors are irritating to the respiratory tract.</p> <p>Skin: Repeated or prolonged contact may cause drying of the skin dermatitis. Moderately irritating to rabbit skin. Slightly toxic (dermal LD50, rabbit:2.9g/kg).</p> <p>Eyes: Liquid causes moderate to severe irritation of rabbit eyes. Vapors are irritating to the eyes.</p> <p>Mutagenicity: Not mutagenic in bacterial, yeast and rat liver cell in vitro assays, including the Ames Test.</p> <p>Carcinogenicity: No information.</p> <p>Reproductive/Developmental Effects: No information.</p> <p>Other: Methyl isobutyl carbinol has potentiated the liver toxicity of halogenated solvents (e.g., chloroform and carbon tetrachloride) in experimental animals at oral doses of 570 mg/kg or higher.</p>



Product name:	Methyl isobutyl carbinol
MSDS number:	63
Material number:	80063
Published date:	02/02/2006(V1)

Repeated Exposure: Male and female rates exposed for 6hr/day, 5 days/wk for 6 wks to 211, 825 or 3698 mg/m³ showed no overt signs of toxicity, effects on blood parameters or compound-related effects based on gross and microscopic examination of tissues. Increased kidney weight was observed in the males at the high dose. Effects on urine parameters were noted at all dose levels except for the low dose males. There are several other studies of limited quality and with limited details. In a 90-day inhalation study, kidney effects were reported in rats at 0.425 mg/l, but not in monkeys or dogs. The effect in rats was reversible on cessation of exposure. In mice exposed 12 times for 4 hours to vapor saturated air (approximately 20 mg/l), an anesthetic effect was reported, but no mortality. In rabbits exposed dermally 5 times over a period of 15-21 days at 2.5 g/kg, no systemic effects were observed.

12. Ecological Information

Component Ecological Information

Component	METHYL ISOBUTYL CARBINOL
	<p>Ecotoxicity: Methyl isobutyl carbinol exhibits low acute toxicity to aquatic species. The 96-hour LC50 for fish (<i>Pimephales promelas</i>) was greater than 92.4 ppm. There was no mortality at this level. The 24-hour LC50 value for fish (<i>Carassius auratus</i>) is 360 ppm. The 24-hour LC50 value for shrimp (<i>Artemia salina</i>) is 370 ppm. The 48-hour LC50 value for the clawed toad (<i>Xenopus laevis</i>) is 656 ppm. The 3-hour EC50 for inhibition of bacteria was greater than 100 ppm in the Activated Sludge Respiration Inhibition Test.</p>



Product name:	Methyl isobutyl carbinol
MSDS number:	63
Material number:	80063
Published date:	02/02/2006(V1)

13. Disposal Considerations

Dispose of spilled material in accordance with state and local regulations for hazardous waste. Recommended methods are incineration or biological treatment at a federally or state-permitted disposal facility. Note that this information applies to the material as manufactured; processing, use, or contamination may make this information inappropriate, inaccurate, or incomplete.

Note that this handling and disposal information may also apply to empty containers, liners and rinsate. State or local regulations or restrictions are complex and may differ from federal regulations. This information is intended as an aid to proper handling and disposal; the final responsibility for handling and disposal is with the owner of the waste. See Section 9 - Physical and Chemical Properties.

EPA Hazardous Waste Code(s): D001

14. Transport Information

US Department of Transportation:

UN/NA Number: UN 2053
Shipping name: METHYL ISOBUTYL CARBINOL
Hazard class: 3
Packing Group: PG III
Emergency Response Guide: 129

ICAO/IATA:

IATA UN Number: UN 2053
Proper Shipping Name: METHYL ISOBUTYL CARBINOL
Hazard Classification: 3
Packing group: III
Label: (Flammable Liquid)

IMDG:

International Marine UN Number: UN 2053
Proper Shipping Name: METHYL ISOBUTYL CARBINOL
Hazard Class: 3
Packing Group: III
Flash point (test method): 42.4 C (108 F)

Transport Canada

Product name:	Methyl isobutyl carbinol
MSDS number:	63
Material number:	80063
Published date:	02/02/2006(V1)

Trade Information

Schedule B Code (export): 2905.19.0020

15. Regulatory Information**Hazard labeling:**

In accordance with EC Directives

R phrases

R 10 Flammable.

R 37 Irritating to respiratory system.

S phrase combination

S 24/25 Avoid contact with skin and eyes.

INTERNATIONAL REGULATIONS**International Chemical Inventory**

Listed on the chemical inventories of the following countries or qualifies for an exemption:
AUSTRALIA, CHINA, CANADA, EUROPE, KOREA, PHILIPPINES, JAPAN

16. Other Information

Prepared by: Product Stewardship Department
Celanese Ltd.

Hazard ratings This information is intended solely for the use of individuals trained in the NFPA and/or HMIS systems.

NFPA: Health: 2 Flammability: 2 Reactivity: 0

HMIS: Health: 2 Flammability: 2 Reactivity: 0

Revisions: The following sections have been revised since the last issue of this MSDS.

1. Product and Company Identification



Product name:	Methyl isobutyl carbinol
MSDS number:	63
Material number:	80063
Published date:	02/02/2006(V1)

For Industrial use only. The information contained herein is accurate to the best of our knowledge. We do not suggest or guarantee that any hazards listed herein are the only ones which exist. Celanese makes no warranty of any kind, express or implied, concerning the safe use of this material in your process or in combination with other substances. Effects can be aggravated by other materials and/or this material may aggravate or add to the effects of other materials. This material may be released from gas, liquid, or solid materials made directly or indirectly from it. User has the sole responsibility to determine the suitability of the materials for any use and the manner of use contemplated. User must meet all applicable safety and health standards. Material safety data sheets are provided on the Internet by Celanese as a service to its customers. Possession of an Internet MSDS does not indicate that the possessor of the MSDS was a purchaser or user of the subject product.

MATERIAL SAFETY DATA SHEET

Common Name	COPPER SULFATE
Manufacturer	Old Bridge Chemicals, Inc. P.O. Box 194 Old Bridge, New Jersey 08857
Telephone	(732) 727-2225
Emergency Telephone	1(800) 275-3924

This document is prepared pursuant to the OSHA Hazard Communication Standard (29 CFR 1910.1200).

SECTION I. MATERIAL IDENTIFICATION

Common Name	Copper Sulfate
Synonyms	Blue Vitrol, Bluestone, Cupric Sulfate
Molecular Formula	$\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
EPA Reg. Number	46923-4
CAS Number	7758-99-8
SIC Number	28199 C 29

SECTION II. PHYSICAL DATA

Physical State	Blue crystals or powder
Boiling Point	-5 H ₂ O @ 150° F
Melting Point	-4 H ₂ O @ 110° F
Specific Gravity	2.284
Solubility in H ₂ O	22.37% @ 0° C 117.95% @ 100° C
Solubility in other solvents	Soluble in methanol, glycerol and slightly soluble in ethanol
Appearance	Blue crystals or powder
Odor	Odorless

SECTION III. FIRE AND EXPLOSION DATA

Flash Point	Not applicable
Flammable Limits	Not flammable. If heated above 400° C it can decompose to emit toxic fumes of oxide and sulfur.
Extinguishing Media	Copper Sulfate does not burn nor will it support combustion. If stored with other combustible products use water, CO ₂ or dry chemical.
Special Fire Fighting Instructions	If dry heated above 600° C, SO ₂ is evolved. If water is used it will solubalize the Copper Sulfate and care should be taken to keep such water out of streams or other water bodies.
Fire and Explosion Hazards	None

SECTION IV. REACTIVITY DATA

Stability	Stable
Conditions to Avoid	Product is highly soluble, but does not react with water.
Incompatibility	None known when product remains dry. Product readily dissolves in water. Solutions are mildly corrosive to steel. Store solutions in plastic or rubber or 304, 316 or 317 stainless steel. Iron and moisture should be avoided. Store in a dry area. With exposure to air it will oxidize and turn whitish.
Hazardous Decomposition Products	None at normal production temperatures and pressures. If dry heated above 600° C toxic sulfur may evolve.
Polymerization	Will not occur.

SECTION V. HEALTH AND HAZARD INFORMATION

Swallowing	Toxic orally in accordance with FHSLA regulations. Acute oral LD50 (male rats) = 472 mg/kg.
Skin	Non-toxic. Skin irritation index is zero in accordance with FHSLA regulations.
Eyes	Corrosive in accordance with FHSLA regulations. Eye irritation score: 24 hours = 41.67; 48 hours = corrosive
Inhalation	Inhalation of dust may cause irritation to the upper respiration tract.
Carcinogenicity	None as per NTP, OSHA, and IARC.

This product contains Copper Sulfate subject to the reporting requirements of Section 13 of the Emergency Planning and Community-right-to-Know-Act of 1986 (40 CFR 372).

SECTION VI. FIRST AID PROCEDURES

Swallowing	Give large amounts of milk or water. Induce vomiting. Call Poison Control Center or a physician.
Skin	Wash thoroughly with soap and water. Remove and wash contaminated clothing before reuse.
Eyes	Immediately flush eyes with plenty of water for 15 minutes. Hold eyelids apart during irrigation. Call a physician.
Inhalation	Remove person to fresh air and call a physician.
Carcinogenicity	None

SECTION VII. HANDLING PRECAUTIONS

Personal Protective Equipment	Chemical safety goggles. Rubber gloves and rubber apron may be worn.
Ventilation	TWA = 1 mg/l for Copper Sulfate. When TWA exceeds this limit in the workplace, provide appropriate ventilation. Wear an approved respirator for dusts or mists: MSHA/NIOSH approved number prefix TC-21C, or a NIOSH approved respirator with any R, P or HE filter.

Alternatively, provide respiratory protection equipment in accordance with Paragraph 1910.134 of Title 29 of the Code of Federal Regulations.

SECTION VIII. ENVIRONMENTAL AND DISPOSAL INFORMATION

Aquatic Toxicity	LC50, 24 hours, Daphnia magna equals 0.182 mg/l. Rainbow Trout equals 0.17 mg/l. Blue Gill equals 1.5 mg/l. All values are expressed as Copper Sulfate Pentahydrate. Test water was soft.
Spills and Leaks	Comply with Federal, State and local regulations on reporting spills. Do not wash away crystals or powder. Recover dry if possible. If product is in a confined solution, react with soda ash to form an insoluble Copper Carbonate solid that can be scooped up.
Waste Disposal	Do not reuse container. Comply with Federal, State and local regulations. Sweep up crystals, powder or insoluble Copper Carbonate and dispose of in an approved landfill.
Environmental Effects	May be dangerous if it enters the public water systems. Follow local regulation. Toxic to fish and plants. Fish toxicity critical concentration is 235 mg/l and plant toxicity is 25 mg/l.

SECTION IX. SPECIAL PRECAUTIONS

Storage	Store in a dry place.
Other Precautions	None other than those stated in the MSDS or on the package.

SECTION XI. REGULATORY INFORMATION

NOTICE: The information herein is presented in good faith and believed to be accurate. However, no warranty, expressed or implied, is given. Regulatory requirements are subject to change and may differ from one location to another. It is the buyer's responsibility to ensure that its activities comply with Federal, State and local laws.

U.S. REGULATIONS: SARA 313 Information. This product contain the following substance subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372: **COPPER COMPOUND** 63.3%.

SARA HAZARD CATEGORY: This product has been reviewed according to the EPA "Hazard Categories" promulgated under Sections 311 and 312 of the Superfund Amendments and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following category: **AN IMMEDIATE HEALTH HAZARD.**

SECTION XII. SHIPPING INFORMATION

DOT Shipping Name: RQ, Environmentally Hazardous Substance, Solid, N.O.S., (CUPRIC SULFATE), 9, UN3077, PGIII, Marine Pollutant, ERG 171.

SECTION XIII. MSDS PREPARATION INFORMATION

Prepared by	Joel L. Goldschmidt, Vice President
Updated	March 16, 1999

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Technology ahead of its time™

MSDS: 0003480
Date: 06/29/2005
Supersedes: 06/24/2005

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: AERO® 3894 Promoter
Product Description: Thionocarbamate compound
Use: Mining chemical

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

Manufactured By: CYTEC INDUSTRIES INC., FIVE GARRET MOUNTAIN PLAZA,
WEST PATERSON, NEW JERSEY 07424, USA - 973/357-3100

® indicates trademark registered in the U.S. Outside the U.S., mark may be registered, pending or a trademark. Mark is or may be used under license.

2. COMPOSITION/INFORMATION ON INGREDIENTS

WHMIS REGULATED COMPONENTS

Component / CAS No.	% (w/w)	OSHA (PEL):	ACGIH (TLV)	Carcinogen
Isopropylethyl thionocarbamate 141-98-0	88 - 94	Not established	Not established	-
Isopropanol 67-63-0	2 - 5	400 ppm (TWA) 980 mg/m ³ (TWA)	200 ppm (TWA) 400 ppm (STEL)	-

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

APPEARANCE AND ODOR:

Color: colorless to straw
Appearance: liquid
Odor: characteristic

STATEMENTS OF HAZARD:

CAUTION! COMBUSTIBLE LIQUID AND VAPOR
MAY CAUSE ALLERGIC SKIN REACTION

POTENTIAL HEALTH EFFECTS

EFFECTS OF EXPOSURE:

The estimated acute oral (rat) LD50, acute dermal (rabbit) LD50 and 4-hour inhalation (rat) LC50 values for this material are 2,324 mg/kg, >2,000 mg/kg and 20 mg/l, respectively. Direct contact with this material may cause mild eye and skin irritation. This material was weakly sensitizing to the skin of guinea pigs. Refer to Section 11 for toxicology information on the regulated components of this product.

4. FIRST AID MEASURES

Ingestion:

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

Skin Contact:

Wash immediately with plenty of water and soap. Remove contaminated clothing and shoes without delay. Obtain medical attention. Do not reuse contaminated clothing without laundering. Destroy or thoroughly clean shoes before reuse.

Eye Contact:

Rinse immediately with plenty of water for at least 15 minutes.

Inhalation:

Remove to fresh air. If breathing is difficult, give oxygen. Obtain medical advice if there are persistent symptoms.

5. FIRE-FIGHTING MEASURES

Extinguishing Media:	Use water spray, alcohol foam, carbon dioxide or dry chemical to extinguish fires. Water stream may be ineffective.
Protective Equipment:	Firefighters, and others exposed, wear self-contained breathing apparatus.
Special Hazards:	Keep containers cool by spraying with water if exposed to fire.
Mechanical/Static Sensitivity Statements:	None

6. ACCIDENTAL RELEASE MEASURES

Personal precautions:

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

Methods For Cleaning Up:

Remove sources of ignition. Cover spills with some inert absorbent material; sweep up and place in a waste disposal container. Flush spill area with water.

7. HANDLING AND STORAGE

HANDLING

Precautionary Measures: Keep away from heat and flame. Avoid contact with eyes, skin and clothing. Wash thoroughly after handling.

Special Handling Statements: None

STORAGE

Avoid contact with brass or copper, explosive amides may be formed.

Storage Temperature: Room temperature

Reason: Safety.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Measures:

Engineering controls are not usually necessary if good hygiene practices are followed.

Respiratory Protection:

Where exposures are below the established exposure limit, no respiratory protection is required. Where exposures exceed the established exposure limit, use respiratory protection recommended for the material and level of exposure.

Eye Protection:

Wear eye/face protection such as chemical splash proof goggles or face shield.

Skin Protection:

Avoid skin contact. Wear impermeable gloves and suitable protective clothing.

Additional Advice:

Before eating, drinking, or smoking, wash face and hands thoroughly with soap and water.

9. PHYSICAL AND CHEMICAL PROPERTIES

Color:	colorless to straw
Appearance:	liquid
Odor:	characteristic
Boiling Point:	200 °C 392 °F (decomposes)
Melting Point:	<-4 - °C 24.8 - 32 °F (freezing point)
Vapor Pressure:	Not available
Specific Gravity:	>0.97 - 0.99@ 25 C
Vapor Density:	>1 (air = 1)
Percent Volatile (% by wt.):	<8 - 100 Includes isopropanol and water
pH:	Not applicable
Saturation In Air (% By Vol.):	Not available
Evaporation Rate:	Negligible
Solubility In Water:	Negligible
Volatile Organic Content:	Not available
Flash Point:	50 °C 122 °F Pensky-Martens Closed Cup
Flammable Limits (% By Vol):	Not available
Autolgnition Temperature:	Not available
Decomposition Temperature:	Greater than 150 C (302 F)
Partition coefficient (n-octanol/water):	~2 (Log Pow)
Odor Threshold:	Not available

10. STABILITY AND REACTIVITY

Stability:	Stable
Conditions To Avoid:	Oxidizing agents, sparks, open flames, heat and acids
Polymerization:	Will not occur
Conditions To Avoid:	Avoid contact with acids, oxidizing agents and heat.
Materials To Avoid:	Strong oxidizers, strong acids, aluminum and copper.

Hazardous Decomposition Products: carbon monoxide
carbon dioxide
oxides of sulfur (includes sulfur di and tri oxides)
oxides of nitrogen
carbonyl sulfide

11. TOXICOLOGICAL INFORMATION

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

Isopropylethyl thionocarbamate (IPETC) has acute oral (rat) and dermal (rabbit) LD50 values of 2324 mg/kg and >2000 mg/kg, respectively. This material causes mild eye and minimal skin irritation in studies with rabbits. Material tested positive (Guinea pig) for skin sensitization. This material is not expected to be an Ames mutagen based on SAR analysis.

Isopropanol has acute oral (rat) and dermal (rabbit) LD50 values of 5.0 g/kg and 12.8 g/kg, respectively. The 4-hour inhalation LC50 (rat) for isopropanol is >16,000 ppm (40.86 mg/L). Acute overexposure to isopropanol vapor may cause mild irritation of the eyes and respiratory tract. Chronic overexposure to isopropanol vapors may cause central nervous system depression, headaches, dizziness, nausea, and staggered gait. Liquid isopropanol may cause moderate to severe eye irritation. In laboratory animals studies, isopropanol has produced fetotoxic effects at levels that were maternally toxic and developmental effects at levels that were maternally non-toxic, and inhalation exposures that produced reduced fetal weight at non-maternally toxic levels.

12. ECOLOGICAL INFORMATION

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment. This material is not readily biodegradable.

ALGAE TEST RESULTS

Test: The *Selenastrum capricornutum* (Prinz) algal assay bottle test
Duration: 96 hr
Species: Green Algae (*Selenastrum capricornutum*)
21 mg/l EC50

FISH TEST RESULTS

Test: Acute toxicity, freshwater (OECD 203)
Duration: 96 hr. **Procedure:** Static renewal.
Species: Rainbow Trout (*Salmo gairdneri*)
50 mg/l LC50

INVERTEBRATE TEST RESULTS

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

DEGRADATION

Test: Biodegradability

Duration: 28 day

<70 %

Information based on a structurally
similar material

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORT INFORMATION

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

US DOT

Proper Shipping Name: Flammable liquid, n.o.s.

Hazard Class: 3

Packing Group: III

UN/ID Number: UN1993

Transport Label Required: Flammable Liquid

Technical Name (N.O.S.): Contains isopropanol, ethylamine

Hazardous Substances:

<u>Component / CAS No.</u>	<u>Reportable Quantity of Product (lbs)</u>
Ethylamine	16666.67

Comments:

Hazardous Substances/Reportable Quantities - DOT requirements specific to Hazardous Substances only apply if the quantity in one package equals or exceeds the product reportable quantity.

TRANSPORT CANADA

Proper Shipping Name: Flammable liquid, n.o.s.

Hazard Class: 3

Packing Group: III

UN Number: 1993

Transport Label Required: Flammable Liquid

Technical Name (N.O.S.): Contains isopropanol

ICAO / IATA

Proper Shipping Name: Flammable liquid, n.o.s.

Hazard Class: 3

Packing Group: III

UN Number: 1993

Transport Label Required: Flammable Liquid

Packing Instructions/Maximum Net Quantity Per Package:
Passenger Aircraft: 309; 60L
Cargo Aircraft: 310; 220L
Technical Name (N.O.S.): Contains isopropanol

IMO

Proper Shipping Name: Flammable liquid, n.o.s.
Hazard Class: 3
UN Number: 1993
Packing Group: III
Transport Label Required: Flammable Liquid
Technical Name (N.O.S.): Contains isopropanol

15. REGULATORY INFORMATION

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

WHMIS CLASSIFICATION:

Class B3 Combustible Liquid
Class D2B Toxic

INVENTORY INFORMATION

United States (USA): All components of this product are included on the TSCA Chemical Inventory or are not required to be listed on the TSCA Chemical Inventory.

Canada: All components of this product are included on the Domestic Substances List (DSL) or are not required to be listed on the DSL.

European Union (EU): All components of this product are included on the European Inventory of Existing Chemical Substances (EINECS) or are not required to be listed on EINECS.

Australia: All components of this product are included in the Australian Inventory of Chemical Substances (AICS) or are not required to be listed on AICS.

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

Japan: All components of this product are included on the Japanese (ENCS) inventory or are not required to be listed on the Japanese inventory.

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

Philippines: All components of this product are included on the Philippine (PICCS) inventory or are not required to be listed on the Philippine inventory.

16. OTHER INFORMATION**NFPA Hazard Rating (National Fire Protection Association)**

Health: 2 - Materials that, under emergency conditions, can cause temporary incapacitation or residual injury.

Fire: 2 - Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur.

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

Reasons For Issue:

Revised Section 2
Revised Section 9
Revised Section 10
Revised Section 14
Revised Section 15

Prepared By: Randy Deskin, Ph.D., DABT +1-973-357-3100
Date: 06/29/2005

This information is given without any warranty or representation. We do not assume any legal responsibility for same, nor do we give permission, inducement, or recommendation to practice any patented invention without a license. It is offered solely for your consideration, investigation, and verification. Before using any product, read its label.

Tradeasia International Pte Limited

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Phone : +65 - 6227 6365
Fax : +65 - 6225 6286
E-mail : tradeasiaservices@gmail.com

MATERIAL SAFETY DATA SHEET OF SODIUM SULPHIDE

Product Identification

PHYSICAL STATE : white granular powder
CAS NO. : 1313-82-2
EINECS NO. : 215-211-5
FORMULA : Na₂S
MOL WT. : 78.04
H.S. CODE : 2832.10
TOXICITY : Oral rat LD50: 208 mg/kg
SYNONYMS : Sodium monosulfide; Hesthsulphid; Sodium sulfuret; Disodium monosulfide; Disodium sulfide; Sodium Sulphide;

First Aid Measures

General information:

Instantly remove any clothing soiled by the product. Symptoms of poisoning may even occur after several hours; therefore medical observation for at least 48 hours after the accident.

After Inhalation:

Supply fresh air; consult doctor in case of symptoms. In case of unconsciousness bring patient into stable side position for transport.

After Skin Contact:

Instantly wash with water and soap and rinse thoroughly. If skin irritation continues, consult a doctor.

After Eye Contact:

Rinse opened eye for several minutes under running water. Then consult doctor.

After Swallowing:

Drink copious amounts of water and provide fresh air. Instantly call for doctor.

Information For Doctor:

Treatment: Medical supervision for at least 48 hours.

Physical Data

PHYSICAL STATE : yellow to red flakes
SPECIFIC GRAVITY : 1.86
SOLUBILITY IN WATER : Soluble (slightly soluble in alcohol)
pH : Alkaline
NFPA RATINGS : Health: 3 Flammability: 0 Reactivity: 0
STABILITY : Stable under ordinary conditions. Oxidizes in air .

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Preventive Measures

Accidental Release Measures

Person-related safety precautions:

Ensure adequate ventilation.

Put on breathing apparatus.

Wear protective clothing.

Measures for environmental protection:

Do not allow product to reach sewage system, water bodies, ground or soil. If material reaches soil, water bodies or sewage system inform authorities responsible for such cases.

Measures for cleaning/collecting:

Ensure adequate ventilation. Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust). Use neutralizing agent.

Additional information: See Section Disposal considerations for information on disposal.

Handling and Storage

Handling

Information for safe handling:

No special precautions necessary if used correctly.

Information about protection against explosions and fires:

The product is not flammable.

Storage

Requirements to be met by storerooms and containers:

Provide alkali-resistant floor.

Information about storage in one common storage facility:

Do not store together with acids.

Further information about storage conditions:

Protect from frost.

Keep container tightly sealed.

Store container in a well ventilated position.

The stability which is noticed on the label is only duty by right storage of the product.

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Protective Measures

Components with critical values that require monitoring at the workplace:

The product does not contain any relevant quantities of materials with critical values that have to be monitored at the workplace.

Additional information:

The lists that were valid during the compilation were used as basis.

Personal protective equipment

General protective and hygienic measures:

Keep away from foodstuffs, beverages and food.
Instantly remove any soiled and impregnated garments.
Wash hands during breaks and at the end of the work.
Use skin protection cream for preventive skin protection.
Avoid contact with the eyes and skin.

Protection of hands: Alkaline resistant gloves

Eye protection: Tightly sealed safety glasses

Body protection: Alkaline-resistant protective clothing

Stability and Reactivity

Thermal decomposition / conditions to be avoided:

No decomposition if used and stored according to specifications.

Dangerous reactions:

Strong exothermic reaction with acids.
Contact with acids releases toxic gases.

Dangerous products of composition:

Hydrogen sulphide None at correctly use.

Toxicological Information

Acute toxicity

Primary irritant effect:

on the skin: Irritant for skin and mucous membranes.

on the eye: Irritant effect.

Sensitization: No sensitizing effect known.

Additional toxicological information:

The product shows the following dangers according to the calculation method of the General EC

Classification Guidelines for Preparations as issued in the latest version:

Harmful

Irritant

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Ecological Information

Additional ecological information:

AOX-indication: The product does not contain organically bonded halogen compounds.

General notes:

Do not allow product to reach ground water, water bodies or sewage system, even in small quantities.

Disposal considerations

Product:

Recommendation:

Must not be disposed of together with household garbage. Do not allow product to reach sewage system.

Waste disposal key number:

Suggestion according to the European Waste Catalogue (EWC):

11 01 09, sludges and filter cakes containing dangerous substances

11 01 11, aqueous rinsing liquids containing dangerous substances

The mentioned waste codes are recommendations based on the product application as suggested by the manufacturer. Special applications and special disposal conditions at the applicer's place may however require another waste code.

Uncleaned packagings:

Recommendation:

Empty contaminated packagings thoroughly. They can be recycled after thorough and proper cleaning.

Disposal must be made according to official regulations.

Recommended cleaning agent: Water, if necessary with cleaning agent.

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Transport Information

Land transport ADR/RID (cross-border)

ADR/RID Class: 8 (C6) Corrosive substances.

Kemler Number: 80

UN-Number: 1849

Packaging group: II

Label: 8

Designation of goods: 1849 SODIUM SULPHIDE, HYDRATED, solution

Maritime transport IMDG

IMDG Class: 8

UN Number: 1849

Label 8

Packaging group: II

EMS Number: F-A,S-B

Label: 8

Marine pollutant: N

Correct technical name: SODIUM SULPHIDE, HYDRATED, solution

Air transport ICAO-TI and IATA-DGR

ICAO/IATA Class: 8

UN/ID Number: 1849

Label: 8

Label 8

Packaging group: II

Correct technical name: SODIUM SULPHIDE, HYDRATED, solution

WHMIS	Protective Clothing	TDG Road / Rail
		

Section 1. Chemical product and company identification

Danafloat 066

Code : Q02817
Synonym : Not available.
Manufacturer : CHEMINOVA AGRO A/S
Supplier : QUADRA CHEMICALS LTD.
 370, boul. Joseph-Carrier
 Vaudreuil-Dorion QC J7V 5V5
 Tel: (450) 424-0161

Burlington ON Tel: (905) 336-9133
 Delta BC Tel: (604) 940-2313
 Edmonton AB Tel: (780) 451-9222
 Calgary AB Tel: (403) 232-8130

Material uses : Mining industry: Flotation reagent (flotation collector).

**TRANSPORTATION EMERGENCY - 24HRS/DAY - 7 DAYS/WEEK
 IN CANADA - CALL 1-800-567-7455**

Section 2. Composition, Information on Ingredients

Name	CAS #	% by weight	Exposure limits
phosphorodithioic acid, O,O-diphenyl ester, ammonium salt	1085-35-4	30-70	Not available.
phenol	108-95-2	5-10	ACGIH TLV TWA: 5 ppm 8 hour(s). TWA: 19 mg/m ³ 8 hour(s). OSHA PEL TWA: 5 ppm 8 hour(s). TWA: 19 mg/m ³ 8 hour(s). NIOSH REL TWA: 5 ppm 8 hour(s). TWA: 19 mg/m ³ 8 hour(s).
ammonia	7664-41-7	1-3	OSHA PEL TWA: 50 ppm 8 hour(s). TWA: 35 mg/m ³ 8 hour(s). ACGIH TLV TWA: 25 ppm 8 hour(s). TWA: 17 mg/m ³ 8 hour(s). NIOSH REL TWA: 25 ppm 8 hour(s). TWA: 18 mg/m ³ 8 hour(s).

Consult local authorities for acceptable exposure limits.

Section 3. Hazards identification

Emergency overview	CAUSES RESPIRATORY TRACT, EYE AND SKIN BURNS. MAY BE FATAL IF INHALED, ABSORBED THROUGH SKIN OR SWALLOWED.
Routes of entry	: Eye contact. Inhalation. Ingestion.
Potential acute health effects	<p>Eyes : The phenol is corrosive to the eyes.</p> <p>Skin : The phenol is corrosive to the skin. May be fatal if absorbed through the skin (phenol).</p> <p>Inhalation : May be fatal if inhaled (phenol). The phenol is corrosive to the respiratory tract. Phenol may cause pulmonary oedema. Effects may be delayed.</p> <p>Ingestion : May be fatal if swallowed (phenol). Phenol may cause effects on the central nervous system, heart and kidneys.</p>
Potential chronic health effects	: CARCINOGENIC EFFECTS: Classified A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC [phenol]. MUTAGENIC EFFECTS Not available. TERATOGENIC EFFECTS Not available. DEVELOPMENTAL TOXICITY Not available. Prolonged or repeated contact with skin may cause dermatitis.
Medical conditions aggravated by overexposure	: No additional information.
Over-exposure signs/symptoms	: Burning sensation, cough, dizziness, nausea, headache, vomiting, convulsions, shortness of breath, unconsciousness, coma.

See toxicological Information (section 11)

Section 4. First aid measures

Eye Contact	: IMMEDIATELY flush eyes with running water for at least 15 minutes, keeping eyelids open. COLD water may be used. Seek immediate medical attention.
Skin Contact	: Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Seek immediate medical attention.
Inhalation	: Allow the victim to rest in a well ventilated area. If breathing is difficult, administer oxygen. If the victim is not breathing, perform artificial respiration. Seek immediate medical attention.
Ingestion	: DO NOT induce vomiting. If the victim is conscious, give a little water or milk. NEVER give an unconscious person anything to ingest. Seek immediate medical attention.
Notes to Physician	: No additional information.

Section 5. Fire fighting measures

Flammability of the product	: Combustible.
Auto-ignition Temperature	: Not available.
Flash Points	: Closed cup: 65°C (149°F). (Pensky-Martens.)
Flammable limits	: Not available.
Products of combustion	: The essential breakdown products are volatile, toxic, malodorous and inflammable compounds such as: hydrogen sulphide, sulphur dioxide, nitrogen oxides and phosphorus pentoxide, but only after water content has evaporated.
Fire hazards in presence of various substances	: Not available.
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	: Use DRY chemicals, CO ₂ , water spray or foam. Use water spray to cool fire exposed containers. Wear NIOSH approved self-contained breathing apparatus (SCBA) when either in confined areas or exposed to combustion products.

Continued on next page

Section 6. Accidental release measures

Spill or leak : Use appropriate tools to put the spilled material in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to federal, provincial and municipal environmental control regulations.

Section 7. Handling and storage

Handling : Follow routine safe handling procedures.
Storage : Keep container tightly closed. Keep in a cool, well ventilated place. Store away from incompatible materials. To avoid freezing, store wherever possible above 0°C.

Section 8. Exposure Controls, Personal Protection

Engineering controls : Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapours below their respective threshold limit value. Ensure that eye stations and safety showers are proximal to the work-station location.

Personal protection

Eyes : Splash goggles or faceshield.
Body : Lab coat.
Respiratory : If user operations generate dust, fume, mist or if workplace contaminant level is above threshold limit, ensure to use a MSHA/NIOSH approved respirator or equivalent.
Hands : Chemical resistant gloves, such as barrier laminate, butyl rubber, nitrile rubber or viton.
Feet : Safety shoes.

Section 9. Physical and chemical properties

Physical State and Appearance : Liquid.
Color : Red/ Brown
Density : 1.143 (25°C / 77°F)
pH : 9 to 10.5
Boiling/condensation point : >100°C (212°F)
Melting/freezing point : -5 to -8°C (23 to 17.6°F)
Solubility : Miscible in water.

Section 10. Stability and reactivity

Stability and Reactivity : The product is stable.
Conditions of instability : No additional remark.
Incompatibility with various substances : Not available.
Hazardous Decomposition Products : The essential breakdown products are volatile, toxic, malodorous and inflammable compounds such as: hydrogen sulphide, sulphur dioxide, nitrogen oxides and phosphorus pentoxide, but only after water content has evaporated.
Hazardous polymerization : Will not occur.

Section 11. Toxicological information

Toxicity data : Acute oral toxicity (LD50): >2000 mg/kg [Rat].
Acute toxicity of the gas (LC50): 2000 ppm 4 hour(s) [Rat]. (ammonia).
Chronic effects on humans : No additional information.
Other toxic effects on humans : No additional information.
Remarks on toxicity to animals : No additional information.

Continued on next page

Section 12. Ecological information

- Ecotoxicity data : Phenol is toxic to the fish (96h-LC50, 5-25mg/l) and to the aquatic invertebrates.
- Biodegradable/OECD : The product is biodegradable. It undergoes degradation in the environment and in wastewater treatment plants.
- Remarks on the products of biodegradation : No additional remark.

Section 13. Disposal considerations

- Waste information : Waste must be disposed of in accordance with federal, provincial and municipal environmental control regulations.
- Waste stream : Avoid entry of product into the sewage system or water streams.

Consult your local or regional authorities.

Section 14. Transport information

Regulatory Information	Shipping name and Class	UN number	Packing group
TDG Classification	CORROSIVE LIQUID, BASIC, ORGANIC, N.O.S. (phenyl-dtp-NH4, phenol) Class 8	3267	II

Section 15. Regulatory information

- WHMIS (Canada) : HARMFUL IF INHALED, ABSORBED THROUGH SKIN OR SWALLOWED. CAUSES RESPIRATORY TRACT, EYE AND SKIN BURNS.
Class D-1A: Material causing immediate and serious toxic effects (VERY TOXIC).
- DSL (CEPA) : CEPA DSL: All ingredients are listed or exempted.
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations.

Section 16. Other information

- References : Canadian Guide of the Law and Regulations of the Transportation of the Dangerous Goods. Controlled products regulations. Manufacturer's Material Safety Data Sheet.
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.
- Other special considerations : No additional remark.
- Regulatory Affairs Department : (450) 424-0161

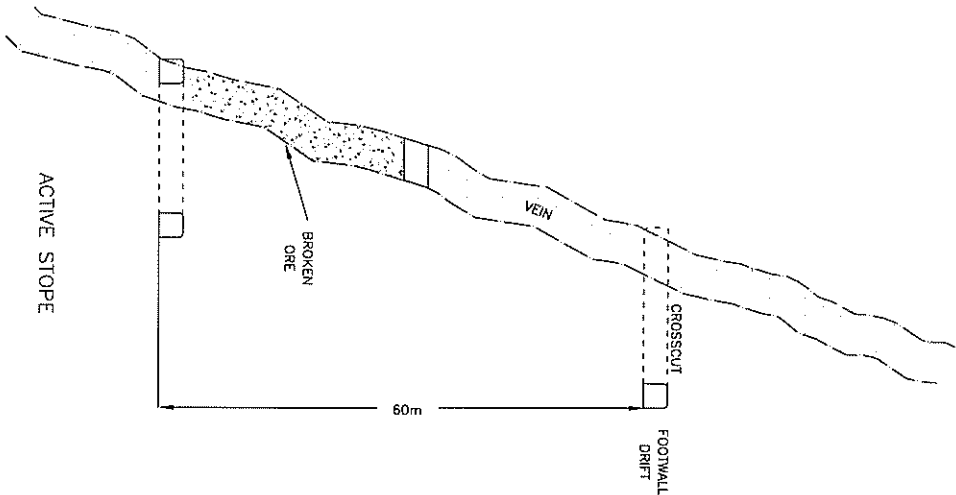
Notice to reader

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.

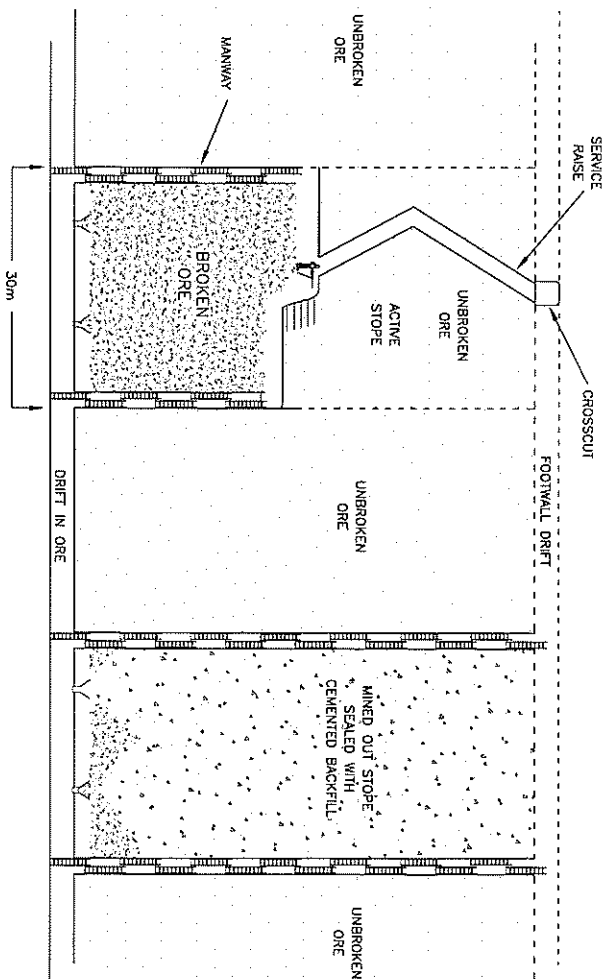
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

SHRINKAGE STOPPING

CROSS SECTION



LONGITUDINAL SECTION



Rhonda Miller

From: Tyree Mullaney [tyree@mvlwb.com]
Sent: Thursday, June 19, 2008 10:59 AM
To: 'Rhonda Miller'
Subject: FW: MV2008L2-0002, MV2008D0014
Attachments: Letter to MVLWB re WL APP Jun 2008.pdf; Letter to MVLWB re LUP APP Jun 2008.pdf; FuelSpillContPlan Jun 17 08.pdf; Shrinkage Stopping Fig.pdf; Fig Surface Leases - Proposed Activities.pdf; 03090 ARCTIC DIESEL MSDS.pdf; MSDS Pb & Zn Cons.PDF; MSDS's Reagents.pdf

Please post to the registry

Tyree Mullaney
Regulatory Officer

Mackenzie Valley Land and Water Board
Phone: 867-669-0506
Fax: 867-873-6610

-----Original Message-----

From: david@canadianzinc.com [mailto:david@canadianzinc.com]
Sent: June-19-08 10:52 AM
To: tyree@mvlwb.com
Cc: alan@canadianzinc.com
Subject: Re: MV2008L2-0002, MV2008D0014

Tyree,

Please find attached documents in response to your June 12 letters.

Regards.