Ouray Silver Mines Inc.
Revenue Mine

Material Containment Plan (MCP)

Date:
Prepared May 2021

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Introduction

Purpose

The Material Containment Plan (MCP) is to describe measures implemented by Ouray Silver Mines Inc., (OSMI) to provide guidance for the storage, use, cleanup, training, and reporting associated with the use of mill chemicals on site. In addition, the MCP prepares OSM to respond in a safe, effective, and timely manner to mitigate the impacts of a site emergency.

This MCP is used as a reference for chemical storage information and testing records, as a tool to communicate practices on preventing and responding to spill/releases with employees, as a guide to facility inspections, and as a resource during emergency response.

This Plan provides guidance on key actions that OSM must perform to ensure safety of the employees, facility, and environment:

- Complete monthly and annual site inspections as outlined in the Inspection, Tests, and Records section of this Plan (Section 3.6) using the inspection checklists.
- Perform preventive maintenance of equipment, secondary containment systems, and spill/release prevention systems described in this Plan as needed to keep them in proper operating conditions.
- Conduct annual employee training as outlined in the Personnel, Training, and Spill Prevention Procedures section of this Plan (Section 3.7) and document them on the log.
- Review the MCP Plan at least once every five (5) years and update, if necessary, it to include more effective prevention and control technology if such technology will significantly reduce the likelihood of a spill event and has been proven effective in the field at the time of the review. Plan amendments, other than administrative changes discussed above, must be recertified by a Professional Engineer on the certification page in Section 1.2 of this Plan.
- Amend the MCP Plan within six (6) months whenever there is a change in facility design, construction, operation, or maintenance that materially affects the facility's spill potential or materials stored onsite. The revised Plan must be recertified by a Professional Engineer (PE).

Review the Plan at least once every 5 years. Update the Plan to reflect any "administrative changes" that are applicable, such as personnel changes or revisions to contact information, such as phone numbers. Administrative changes must be documented in the Plan review log, but do not have to be certified by a PE.

Part 1: Plan Administration

1.1 Management Approval and Designated Person

Ouray Silver Mine Inc. (OSM) is committed to preventing discharges of chemicals to navigable waters and the environment, and to maintaining the highest standards for spill prevention control and countermeasures through the implementation and regular review and amendment to the Plan. This MCP Plan has the full approval of OSM management. OSM has committed the necessary resources to implement the measures described in this Plan.

The General Manager is the Designated Person Accountable for material and chemical release at the facility and has the authority to commit the necessary resources to implement this Plan.

Authorized Facility Representative (facility response coordinator):

Signature: _____

Title: Todd Jesse - Environmental Specialist

Date: 06/10/21

1.2 Location of MCP Plan

A complete copy of this MCP Plan is maintained at the facility in the Mill Building and also in the Control Room. The Control Room is manned around the clock (24/7) whenever the facility is operating.

1.3 Plan Review

1.3.1 Changes in Facility Configuration

OSM periodically reviews and evaluates this MCP Plan for change in the facility design, construction, operation, or maintenance that materially affects the facility's potential for a material or chemical release, including, but not limited to:

- Commissioning of containers;
- Reconstruction, replacement, or installation of piping systems;
- Construction or demolition that might alter secondary containment structures; or
- Changes of product or service, revisions to standard operation, modification of testing/inspection procedures, and use of new or modified industry standards or maintenance procedures.
- Addition or removal of chemicals listed in Section 2.2

Amendments to the Plan made to address changes of this nature are referred to as technical amendments . Non-technical amendments can be done (and must be documented in this section) by the facility owner and/or operator. Non-technical amendments include the following:

- Change in the name or contact information (i.e., telephone numbers) of individuals responsible for the implementation of this Plan; or
- Change in the name or contact information of spill response or cleanup contractors.

OSM must make the needed revisions to the MCP Plan as soon as possible, but no later than six months after the change occurs. The Plan must be implemented as soon as possible following any technical amendment, but *no later than six months* from the date of the amendment. The General Manager or Environmental Department is responsible for initiating and coordinating revisions to the MCP Plan.

1.3.2 Scheduled Plan Reviews

OSM reviews this MCP Plan at least once every five years. Revisions to the Plan, if needed, are made within six months of the five-year review. The last MCP review occurred on *November 15, 2016*. This Plan is dated May 25, 2021. The next plan review is therefore scheduled to take place on or prior to November 25*, 2026*.

1.3.3 Record of Plan Reviews

Scheduled reviews and Plan amendments are recorded in the Plan Review Log. This log must be completed even if no amendment is made to the Plan because of the review. Unless a technical or administrative change prompts an earlier review of the Plan, the next scheduled review of this Plan must occur by *November 1, 2021.*

Table 1-1: Plan Review Log

By	Date	Activity	PE certification required?	Comments
John Trujillo	3/30/2012	Prepare Plan	Yes	Initial MCP Plan
Crystal Fletcher	11/15/2016	Review & Edit	YES	New Ownership/Facility Changes
Michelle Robbins	5/25/2021	Review and Edit	YES	Facility Changes

Date	Scope	PE Name	Licensing State and Registration #
3/30/2012	Initial SPCC Plan Preparation	Greg Lewicki	CO 20335
11/15/2016	Revision to entire Plan/New Ownership	Brian Briggs	CO 31956
5/25/2021	Review and Edit	Michelle Robbins	CO 31956

Part 2: General Facility Information

Name:	Ouray Silver Mine Inc. - Revenue Mine
Address:	1900 Main Street PO Box 564 Unit 1 Ouray, CO 81427
Type:	Underground metal mine
Date of Initial Operations:	Mine Operations started in early 2013.
Owner/Operator:	Ouray Silver Mines Inc. 1900 Main Street PO Box 564 Unit 1 Ouray, CO 81427
Primary contact:	Todd Jesse, Environmental Specialist Work: 970-325-7241 Cell: 720-469-7557 Email: tjesse@ouraysilvermines.com Matt Juth, Mine General Manager Work: 970-325-7241 Ext. 1025 Email: mjuth@ouraysilvermines.com

2.1 Facility Description

The Revenue Mine is located along Sneffels Creek along Yankee Boy Basin Road, approximately five miles southwest of Ouray, CO. The permit facilities are not within a 100 year floodplain. The site is an underground metal mine and surface facility site. The Site Plan included shows the details of the surface facilities. As shown on the SPCC Plan Map the mill that processes the ore mined from the Revenue Mine is located underground onsite. The chemicals and materials listed in this Plan are used in the Revenue Mill. The main mill tunnel is be graded at a minimum of 1% away from the mill portal to contain spills. Sumps are in the following areas: Ball Mill, Flotation Circuit, Crushing Gallery, Filter Building and the Reagent Room. The Reagent Room has an epoxied concrete floor with vertical curbs to prevent releases of chemicals outside of the building.

2.2 Chemical List

Various chemicals will be stored on site for use in the milling operation. All powder/granular chemicals will eventually be mixed with water and stored in tanks on site. All chemicals are listed below in the form they are received from the manufacturer.

1. Aerofloat 242 Promoter	Liquid
2. Danafloat 067	Liquid
3. Aerophine 3418	Liquid
4. Copper Sulfate (CuSO4)	Granular
5. Hydrated Lime	Granular
6. Sodium Metabisulfite	Liquid/Granular
7. Oreprep 549	Liquid
8. Polyfroth W20	Liquid
9. Sodium Isopropyl Xanthate	Granular
10. NAX 31	Granular
11. Zinc Sulfate (ZnSO4)	Granular
12. Flocculant AF-309	Liquid (Totes)

For the solid chemicals, less than 2,000 pounds of each chemical will be stored onsite. The SDS sheets for these listed chemicals can be found in Appendix B.

2.3 Designated Chemicals

Of the chemicals listed above, the following are considered to be designated chemicals (i.e. toxic, alkaline, acidic, etc.):

1. Aerofloat 242 Promoter	100% Liquid
2. Danafloat 067	100% Liquid
3. Aerophine 3418	100% Liquid
4. Copper Sulfate (CuSO4)	Granular
5. Hydrated Lime	Granular
6. Sodium Metabisulfite	Liquid/Granular
7. Oreprep 549	100% Liquid
8. Polyfroth W20	100% Liquid
9. Sodium Iospropyl Xanthate	Granular
10. NAX 31	Liquid/Granular
11. Zinc Sulfate (ZnSO4)	Granular
12. Flocculant AF-309	Liquid (Totes)

The designated chemicals require extra care in handling and cleanup in the event of a spill or release. Details regarding each are listed in Part 3.

Part 3: Material Movement and Storage

3.1 Transportation

The chemicals used in the milling process will be delivered to the mine site by highway trucks. The chemicals used will be delivered to the warehouse in the town of Ouray and transported to the mill as needed in order to reduce the amount of reagents on site. Once onsite, the chemicals will be unloaded in the designated area. Currently there is a concrete apron with a sump in front of the mill filter building and an additional apron will be constructed in front of the new reagent room once it is constructed. The purpose of the pad/sump is to contain material or chemical releases or spills during the unloading of the truck. A small forklift or skid-steer will be used to unload the truck and transport the material underground into the mill. The overall process of unloading and transportation will occur as quickly as possible while maintaining safe operations. This will reduce the exposure to potential spills outside of containment.

3.2 Storage

Storage of chemicals will occur in the main warehouse in the town of Ouray. Once the materials have been transported to the mill facility, they will be brought into the reagent room for use. It is anticipated that the bulk granular chemicals will come in either 50 pound bags or 2,000 pound super-sacks. The storage of either is similar in that each will ship on pallets. The liquids are anticipated to ship in either totes or drums. Following is a discussion on the storage of each chemical:

3.2.1 Aerofloat 242 Promoter

Aerofloat-242 should be stored in a cool, dry place. It should not be heated or exposed to heat above 175 degree F.

Aerofloat-242 is stable. It liberates hydrogen sulfide on contact with acids or acidic material. Contact with oxidizing agents, free radical initiators, bases, amines, and chlorosulfonic acid should also be avoided. Strong mineral acids and/or strong oxidizers may cause exothermic reaction. If the Aerofloat-242 decomposes, it can produce ammonia, carbon monoxide, carbon dioxide, oxides of sulfur, hydrogen sulfide, phosphoric acid, oxides of phosphorus, and oxides of nitrogen.

3.2.2 Danafloat 067

Do not store below 0°C (32°F). Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage.

This product is stable. Under normal storage and use, no hazardous reactions will occur. Incompatible with acids. Under normal conditions, hazardous decomposition products should not be produced.

3.2.3 Aerophine 3418

Do not freeze. Recommended storage temperature: 32 - 95 °F (0 - 35 °C).

Chemically stable. Incompatible with mineral acids and strong oxiding agents. Contact with strong acids or bases may liberate toxic gases. Hazardous decomposition products Carbon dioxide (CO2), Carbon monoxide, Sulfur oxides

3.2.4 Copper Sulfate (CuSO4)

Copper Sulfate should be stored in tightly closed containers in a cool, dry, well-ventilated area away from incompatible substances. It should be protected from moisture.

Copper Sulfate is stable at room temperatures in closed containers. High temperatures, dust generations and exposure to moist air or water should be avoided. It is incompatible with strong bases, hydroxylamine, and magnesium. Decomposition may produce oxides of sulfur and copper fumes

3.2.5 Hydrated Lime

Store in a cool, dry, and well-ventilated location. Do not store near incompatible materials. Keep away from moisture. Do not store or ship in aluminum containers.

Hydrated Lime is chemically stable. Hydrated Lime should not be mixed or stored with the following materials, due to the potential for violent reaction and release of heat: Acids (unless in a controlled process), Reactive Fluoridated Compounds, Reactive Brominated Compounds, Reactive Powdered Metals, Organic Acid Anhydrides, Nitro-Organic Compounds, Reactive Phosphorous Compounds, Interhalogenated Compounds. No hazardous decomposition products.

3.2.6 Sodium Metabisulfite

Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Avoid the creation of dust when handling and avoid all possible sources of ignition (spark or flame). Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Prevent dust accumulation. Incompatible with oxidizing materials, acids, moisture.

3.2.7 Oreprep 549

Keep in a dry, cool and well-ventilated place. 41 - 95 °F (5 - 35 °C)

The product is stable. Hazardous decomposition products include Carbon monoxide and Carbon dioxide (CO2)

3.2.8 Polyfroth W20

Store between 15 to 30°C (59 to 86°F). Store in original container protected from direct sunlight in a dry, cool and well-ventilated area. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Under normal conditions of storage and use, hazardous reactions will not occur. The product is stable. Incompatible with oxidizing material, acids, alkalis.

3.2.9 Sodium Iospropyl Xanthate

Store solid xanthates under cool, dark, dry conditions.

This product is stable. Incompatible with strong acids oxidizing agents. Dust may explode. Decomposes to Carbon Disulphide, Trithiocarbonate, Isopropyl Alcohol. Exposure to heat causes decomposition.

3.2.10 NAX 31

Store solid xanthates under cool, dark, dry conditions.

This product is stable. Incompatible with strong acids oxidizing agents. Dust may explode. Decomposes to Carbon Disulphide, Trithiocarbonate, Isopropyl Alcohol.

3.2.11 Zinc Sulfate (ZnSO4)

Zinc Sulfate should be stored in a cool, dry, well-ventilated area away from incompatible substances.

Zinc Sulfate is stable under normal temperatures and pressures. It should be stored in a location that avoids excess heat. At temperatures more than 932 degrees F, it decomposes and produces oxides of sulfur and toxic fumes of zinc oxide. It is incompatible with strong bases.

3.2.12 Flocculant AF-309

Keep in a cool dry place. Keep container closed when not in use.

Stable under normal conditions. Incompatible with strong bases and oxidizing agents.

3.3 Containment

The unloading area, storage area and mill area all have been designed to maximize containment of a spill or release. The unloading pad construction is discussed in Section 3.1. The Mill Area includes the storage area for the chemicals. From both the portal and intersection with the Main Revenue

Drift, the tunnels slope at a 1% grade away from these intersections. Both tunnels slope to a common sump at the back of the Mill Area. This sump has a 3,000-gallon capacity to contain any potential release from the Mill. From the portal of the Mill Tunnel to the sump, the floor, walls, and roof are lined with concrete to seal the tunnel from water infiltration and chemical/material release or spill.

3.4 Handling and Release/Spill Response

As discussed in Section 3.3 the Mill tunnels are constructed to prevent any release of material from the Mill. Should a spill occur, the sump is pumped back into the process . Minor spills of chemicals and their safe handling are discussed below. Further detail on exposure levels and first aid measures can be found in the SDS sheets for each chemical located in Appendix A

3.4.1 Promoter Aerofloat-242 – Liquid

When handling Aerofloat-242, the following PPE should be used: tight fitting chemical safety goggles or face shield and protective gloves and clothing. A MSHA approved dust mask or respirator should be worn if conditions are dusty or if fumes are present. It is recommended that adequate ventilation or a local exhaust system be used. Wash thoroughly after handling.

In the event of a spill/release where level of exposure is unknown, a positive pressure, self-contained respirator is required. A two-piece PVC suit with hood or PVC overalls with hood is recommended during clean-up. The Aerofloat-242 can be covered with inert absorbent and swept up into containers for appropriate disposal. Water can be used to flush the spill area. If the spill is more than 100 pounds, it is considered reportable. Section 5 outlines the procedures for reporting.

3.4.2 Danafloat 067

When handling Danafloat 067, the following PPE should be used: chemical splash goggles, chemical-resistant, impervious gloves, appropriate footwear and clothing.

In the event of a spill/release avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations. Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product.

3.4.3 Aerophine 3418

When handling Aerophine 3418, the following PPE should be used: nitrile or fluorinated rubber gloves, impervious clothing, chemical resistant googles.

In the event of a spill/release where exposure level is not known, wear approved, positive pressure, self-contained respirator. Where exposure level is known, wear approved respirator suitable for level of exposure. In addition to the protective clothing/equipment, wear a two-piece

PVC suit with hood or PVC overalls with hood. Stop leak if safe to do so. Keep in properly labeled containers. Keep in suitable, closed containers for disposal. Wash nonrecoverable remainder with large amounts of water. Soak up with inert absorbent material and dispose of as hazardous waste. Decontaminate tools, equipment, and personal protective equipment in a segregated area. Dispose of in accordance with local regulations.

3.4.4 Copper Sulfate - Granular

When handling copper sulfate, the following PPE should be used: tight fitting chemical safety goggles or face shield and protective gloves and clothing. A MSHA approved dust mask or respirator should be worn if conditions are dusty or if fumes are present. It is recommended that adequate ventilation or a local exhaust system be used. Wash thoroughly after handling.

In the event of a spill/release where level of exposure is unknown, a positive pressure, self-contained respirator is required. The copper sulfate can be swept up into containers for appropriate disposal. Clean up spills immediately. Avoid generating dusty conditions. Spills or releases more than 10 pounds are reportable quantities. Section 5 outlines the procedures for reporting.

3.4.5 Hydrated Lime

When handling hydrated lime use MSHA approved respirators if airborne concentration exceeds PEL, safety glasses with side shields or safety goggles (contact lenses should not be worn when working with lime products), and if there is a risk of skin contact, wear appropriate clothing and gloves to
prevent contact.

In the event of a spill/release use proper PPE dry methods to collect spilled materials. Evacuate area downwind of clean-up operations to minimize dust exposure. Store spilled materials in dry, sealed plastic or metal containers.

3.2.6 Sodium Metabisulfite

When handling Sodium Metabisulfite the following PPE should be used: chemical splash goggles, chemical-resistant, impervious gloves, appropriate footwear and clothing.

In the event of a spill/release evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing dust. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Avoid creating dusty conditions and prevent wind dispersal. Dispose of via a licensed waste disposal contractor.

3.4.7 Oreprep 549

When handling Oreprep 549 the following PPE should be used: chemical-resistant, impervious gloves, safety glasses with side-sheilds.

In the event of a spill/release stop leak if without risk. Keep in properly labeled containers. Keep in suitable, closed containers for disposal. Wash nonrecoverable remainder with large amounts of water. Soak up with inert absorbent material and dispose of as hazardous waste. Decontaminate tools, equipment and personal protective equipment in a segregated area. Dispose of in accordance with local regulations.

3.4.8 Polyfroth W20

When handling Polyfroth W20 the following PPE should be used: chemical-resistant, impervious gloves, safety glasses with side-shields.

In the event of a spill/release stop leak if without risk. Move containers from spill area. Prevent entry into sewers, water courses, basements or confined areas. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations. Dispose of via a licensed waste disposal contractor.

3.4.9 Sodium Isopropyl Xanthate

When handling Sodium Isopropyl Xanthate the following PPE should be used: impervious gloves, rubber safety boots, protective clothing, face shield/chemical safety goggles, MSHA approved respirator for acid vapors.

In the event of a spill/release eliminate all sources of ignition. Restrict access to area until completion of clean-up. Ensure clean-up is conducted by trained personnel only. Do not touch spilled material. Do not use water on spilled material as heat will be generated. Vacuum or sweep up the material and place spilled material into approved salvage drums for disposal. Flush cleaned area with water, making sure no water enters xanthate containers.

3.4.10 NAX 31

When handling NAX 31 the following PPE should be used: impervious gloves, rubber safety boots, protective clothing, face shield/chemical safety goggles, MSHA approved respirator for acid vapors.

In the event of a spill/release eliminate all sources of ignition. Restrict access to area until completion of clean-up. Ensure clean-up is conducted by trained personnel only. Do not touch spilled material. Do not use water on spilled material as heat will be generated. Vacuum or sweep up the material and place spilled material into approved salvage drums for disposal. Flush cleaned area with water, making sure no water enters xanthate containers.

3.4.11 Zinc Sulfate

When handling zinc sulfate, the following PPE should be used: chemical splash goggles, and protective gloves and clothing. A MSHA approved respirator should be worn if irritation or other

symptoms are experienced. Wash thoroughly after handling. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Avoid breathing dust.

In the event of a spill/release, vacuum or sweep up the material and place in a suitable disposal container. Avoid generating dusty conditions and provide adequate ventilation. Zinc Sulfate is a water pollutant and should not be emptied into drains.

3.4.12 Flocculant AF-309

When handling Af-309 the following PPE should be used: safety glasses with side-shields, PVC or other plastic material gloves, and work clothing. Wash hands before breaks, at the end of the work day, and immediately after handling the product.

In the event of a spill/release vacuum or sweep up the material and place in a suitable disposal container. Avoid generating dusty conditions and provide adequate ventilation. Wear adequate PPE as described above. Renders surfaces extremely slippery when wet.

3.5 Spill Reporting

A spill or release notification form will be completed upon detection of spill/release of a chemical outside of containment by the Site Manger or the Environmental Department and prior to reporting a spill to the proper notification contacts.

3.6 Inspections, Tests, and Records

OSM performs the inspections, tests, and evaluations listed in the following Table 3-1. The table summarizes the various types of inspections and tests performed at the facility.

Table 3-1: Inspection and Testing Program

Facility Component	Action	Frequency/Circumstances
Aboveground container with all sides visible	Examine container integrity by conducting visual inspection. Inspect outside of container for signs of deterioration and discharges.	Following a regular schedule (monthly, annual, and during scheduled inspections) and whenever material repairs are made.
Container supports and foundation	Inspect container's supports and foundations.	Following a regular schedule (monthly, annual, and during scheduled inspections) and whenever material repairs are made.
Liquid level sensing devices (overfill)	Test for proper operation.	Monthly
Diked area, lined berms, and site berms	Inspect for signs of deterioration, discharges, or accumulation of oil inside diked areas. Visually inspect content for presence of oil.	Monthly Prior to draining
All aboveground valves, piping, and appurtenances	Assess general condition of items, such as flange joints, expansion joints, valve glands and bodies, catch pans, pipeline supports, locking of valves, and metal surfaces.	Monthly
Buried piping	Inspect for deterioration. Integrity and leak testing.	Whenever a section of buried line is exposed for any reason. At the time of installation, modification, construction, relocation, or replacement.

Note: If above ground containers are added to the site later, where all sides are not visible, alternative testing requirements will be needed and the plan will need to be modified.

3.6.1 Daily Inspection

OSM employees perform a complete walk-through of the facility each day during normal seasonal operation. This daily visual inspection involves looking for tank/piping damage or leakage, stained or discolored soils, or excessive accumulation of water in the containment. All types of secondary containment should be visually checked for damage.

3.6.2 Monthly Inspections

The checklist provided is used for monthly inspections by OSM personnel. The monthly inspections cover the following key elements:

- Observing the exterior of aboveground storage tanks, pipes, and other equipment for signs of deterioration, leaks, corrosion, and thinning.
- Observing the exterior of portable containers for signs of deterioration or leaks.
- Observing tank foundations and supports for signs of instability or excessive settlement.
- Observing the tank fill and discharge pipes for signs of poor connection that could cause a discharge, and tank vent for obstructions and proper operation.
- Verifying the proper functioning of overfill prevention systems.
- Checking the inventory of discharge response equipment and restocking as needed.
- Check all types of secondary containment on site for damage.

Problems regarding tanks, piping, containment, or response equipment must immediately be reported to an Immediate Supervisor. Immediate Supervisor will report to the Mill Manager, who will report to the General Manager and Environmental Specialist. Visible chemical leaks from tank walls, piping, or other components must be repaired as soon as possible to prevent a larger spill or a discharge to navigable waters or adjoining shorelines. Pooled chemicals are removed immediately upon discovery. The Monthly Inspection Checklist is included in this section and the inspection will be conducted during normal seasonal operation of the site.

Written monthly inspection records are signed by the Environmental Department or the General Manager and will be maintained with this MCP Plan for a period of five years.

Tank	Location	Inspection
Tails Thickener	NW of the Mill Building	M, A
Zinc Sulfate Mix Tank	Reagent Room (Mill Bldg.)	M, A
Zinc Sulfate Storage Tank	Reagent Room (Mill Bldg.)	M, A
Copper Sulfate Mix Tank	Reagent Room (Mill Bldg.)	M, A
Copper Sulfate Storage Tank	Reagent Room (Mill Bldg.)	M, A
Flocculent Storage Tote	Tails Thickener Containment	M

OURAY SILVER MINES

Above Ground Storage Tank Monthly Inspection Checklist

Tank ID:		Status Indicator	
Tank Description:		✓	Satisfactory, no action required
Time:		NA=	Not applicable
Inspector:		R=	Repair or action required
Inspector Signature:		C=	Additional comments on separate sheet

Inspection Items	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Inspection Date												
Tank labels are in place, in good condition with correct NFPA labels												
Emergency, bypass, or other unused drain valves are locked												
Egress pathways are clear												
Drainage pipes and valves are fit for continued service												
There is no evidence of tank or container settlement or foundation deterioration												
There is no significant cracking or spilling of secondary containment walls or floors												
Tank or container supports are in satisfactory condition												
External tank or container surfaces are not in contact with water												
Grounding straps are secured and in good condition												
Interstitial space of double wall tank is free of liquid												
Electrical wiring associated with level gauges, lights or other equipment is good condition												
Tank or container coatings are in good condition												
There is no noticeable tank shell/head distortions, buckling, denting or bulging												
There is no evidence of tank shell/head corrosion or cracking												
Tank vents are free of obstructions												
Tank liquid level sensing devices have been tested to ensure proper operation (annually)												
There are no visible signs of stress, leakage, corrosion, rusted support connections, or other potentially significant degradation.												
No evidence of spills or releases (pooling, staining, etc.)												
Unloading procedures are in place and have been communicated to appropriate personnel and haulers												
Lighting is sufficient for nighttime spill release detection												
All necessary spill response equipment is present												
Spill response materials are in good condition and have not passed expiration date(s)												
Inspector Initials												

3.6.3 Annual Inspections

OSM personnel will perform a more thorough inspection of facility equipment on an annual basis. This annual inspection complements the monthly inspection described above and is performed in March of each year using the checklist provided. The Annual Inspection Checklist is included in this section.

Written annual inspection records are signed by the General Manager and maintained with this MCP Plan for a period of five years.

Tank	Location	Inspection	Tank Material	Tank Spec.
Tails Thickener	NW of the Mill Building	M, A	Steel	Single Wall, Unlined, Elevated
Zinc Sulfate Mix Tank	Reagent Room (Mill Bldg.)	M, A	Stainless Steel	Shop-Built, 3" Elevated
Zinc Sulfate Storage Tank	Reagent Room (Mill Bldg.)	M, A	Stainless Steel	Shop-Built, 3" Elevated
Copper Sulfate Mix Tank	Reagent Room (Mill Bldg.)	M, A	Stainless Steel	Shop-Built, 3" Elevated
Copper Sulfate Storage Tank	Reagent Room (Mill Bldg.)	M, A	Stainless Steel	Shop-Built, 3" Elevated
Flocculent Storage Tote	Tails Thickener Containment	M	Poly Tote	Manufacturer's Container, Containers will not be refilled or reused.

Above Ground Storage Tank Yearly Inspection Checklist

Ouray Silver Mines

Tank ID: _____

Tank Description: _____

Time: _____

Inspector: _____

Inspector Signature: _____

Inspection Guidance:

- The annual aboveground storage tank (AST) inspection is intended for monitoring the external AST condition and its containment structure. This visual inspection shall be performed by the Mill Department, or other responsible representative designated by the Mill Manager, who is familiar with the site and can identify changes and developing problems.

- Complete this checklist on an annual basis supplemental to the monthly-performed inspection checklists. Multiple tanks may be included on this checklist—use the comment column to identify to which tanks noted non-conforming conditions apply.

- Inspect the following at all tanks identified within the MCP Plan:

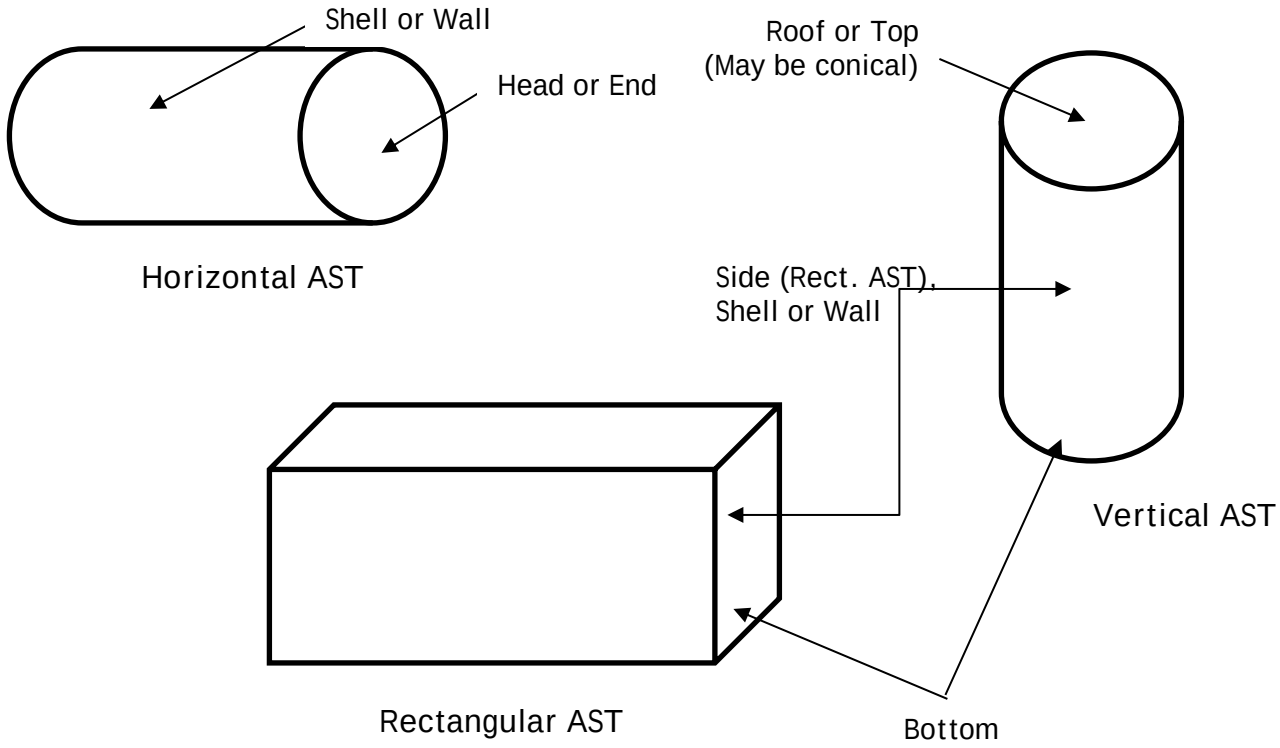
1. AST shell and associated piping, valves and pumps including inspection of coatings. Visually inspect all surfaces of the tank, including the bottom.
2. Containment structures including examination for holes, washout, and cracking in addition to liner degradation and tank settling.
3. Test liquid level sensing devices to ensure proper operation.
4. Inventory spill kits.

- A shaded cell designates an item in a non-conformance status and that action is required to address a problem.
- Retain the completed checklists for 5 years with the MCP Plan or in the Environmental Records file cabinet.

Item	Status			Comments
	Yes	No	N/A	
Is the containment structure in satisfactory condition?				
Drainage pipes/valves fit for continued service?				
Evidence of tank settlement or foundation washout?				
Cracking or spalling of concrete pad?				
Tank supports in satisfactory condition?				
Water able to drain away from tank?				
Grounding strap secured and in good condition				
Evidence of paint failure?				
Noticeable shell/head distortions, buckling, denting or bulging?				
Evidence of shell/head corrosion or cracking?				
Flanged connection bolts tight and fully engaged with no sign of wear or corrosion?				
Standing water on roof?				
Evidence of coating cracking, crazing, peeling, blistering on roof?				
Holes in roof?				
Vents free of obstructions?				
Emergency vent operable? (Lift as required)				
Insulation missing or exhibiting damage?				

Are there noticeable areas of moisture or mold on insulation?				
Is the insulation sufficiently protected from water intrusion?				
Does the tank liquid level sensing device operate as required?				
Are overfill prevention devices in proper working condition?				
Are tank grounding lines in good condition?				
Is electrical wiring for control boxes/lights in good condition?				
Are spill kits adequately stocked?				
Has a change occurred to the tank system or containment that may affect the MCP plan?				

Use the following diagrams to note locations of conditions observed that may require corrective action or continual monitoring:



Circle One: Shop-Built, Field-Erected, Skid- Mounted, Elevated, Equipped w/Liner, Double-Walled, Partially Buried

Paint Failure - significant peeling, cracking, spalling, blistering, pitting, and chipping etc. of the paint or coating on an AST resulting in the exposure of the metal surface and corrosion of the tank shell (STI SP001).

Failing conditions should be evaluated against the current plan requirement by the Environmental Department or a Professional Engineer knowledgeable in SPCC development and implementation.

3.7 Personnel, Training, and Spill/release Prevention Procedures

The General Manager is the facility designee and is responsible for spill/release prevention, control, and response preparedness activities at this facility.

OSM management has instructed chemical-handling facility personnel in the operation and maintenance of spill/release prevention equipment, spill/release procedure protocols, applicable pollution control laws, rules and regulations, general facility operations, and the content of this MCP Plan. Any new facility personnel with chemical-handling responsibilities are provided with this same training prior to being involved in any chemical operation.

Annual spill/release prevention briefings are held during Annual Refresher Training (ART) by the Environmental Dept. for all facility personnel. The briefings are aimed at ensuring continued understanding and adherence to the spill/release prevention procedures presented in the MCP Plan. The briefings also highlight and describe known spill/release events or failures, malfunctioning components, and recently implemented precautionary measures and best practices. Facility operators and other personnel will have the opportunity during the briefings to share recommendations concerning health, safety, and environmental issues encountered during facility operations.

Records of the briefings and spill/release prevention training are kept on the Training Form and maintained with this MCP Plan for a period of five years.

3.7.1 Briefings and Training

Briefings will be scheduled and conducted by the Environmental Department or General Manager at regular intervals to ensure adequate understanding of this MCP Plan. The briefings will also highlight and describe known spill/release events or failures, malfunctioning components, and recently implemented precautionary measures and best practices. Personnel will also be instructed in operation and maintenance of equipment to prevent the spill/release of chemicals, and in applicable pollution laws, rules, and regulations. Facility operators and other personnel will have an opportunity during the briefings to share recommendations concerning health, safety, and environmental issues encountered during facility operations.

Record of Annual Spill/Release Prevention Training Form

Date	Subjects Covered	Employees in Attendance	Instructor(s)

Part 4: Major Spill/Release Response

4.1 Response to a Major Spill/Release

Due to the containment of unloading pad, tunnel slope and sump, the possibility of a major chemical spill/release outside of the Mill Area is very unlikely. However, the possibility is addressed below.

A "major" spill/release is defined as one that exceeds a Reportable Quantity in accordance with (40 CFR Part 302) for a given chemical and cannot be safely controlled or cleaned up by facility personnel, such as when:

- The spill/release exceeds a Reportable Quantity (RQ)
- The spill/release is large enough to spread beyond the immediate spill/release area.
- The spill/released material enters water.
- The spill/release requires special equipment or training to clean up.
- The spill/released material poses a hazard to human health or safety.
- The spill is more than reportable quantities; or
- There is a danger of fire or explosion.

In the event of a major spill/release from the site, the following guidelines apply:

- If there is a chance of an ignition or any other condition that would put site personnel at risk, all workers must immediately evacuate the spill/release site via the designated access road.
- If the General Manager is not present at the facility, the senior on-site person notifies the General Manager of the spill/release and has authority to initiate notification and response. Certain notifications are dependent on the circumstances and type of spill/release. For example, if chemical reaches a sanitary sewer, the publicly owned treatment works (POTW) should be notified immediately. A spill/release that threatens Sneffels Creek may require immediate notification to downstream users such as the Ouray town drinking water plant. The General Manager (or senior on-site person) must call for medical assistance if workers are injured.
- The General Manager (or senior on-site person) must notify the Fire Department or Police Department.
- The General Manager (or senior on-site person) must call the spill response and cleanup contractors listed in the Emergency Contacts list in this section.
- The General Manager (or senior on-site person) must immediately contact the CDPHE Colorado Office of Emergency Management: 303-273-1778 and the National Response Center (888-424-8802).
- The General Manager (or senior on-site person) must record the call on the Spill/release Notification form in this section and attach a copy to this MCP Plan.
- The General Manager (or senior on-site person) coordinates cleanup and obtains assistance from a cleanup contractor or other response organization, as necessary.

If the General Manager is not available at the time of the spill/release, then the next highest person in seniority assumes responsibility for coordinating response activities.

4.2 Waste Disposal

Wastes resulting from a minor spill response will be containerized in impervious bags, drums or buckets. The waste will be properly characterized and disposed of in accordance with Colorado Hazardous Waste Regulations. Wastes resulting from a major spill response will be removed and disposed of by a cleanup contractor in accordance with Colorado Hazardous Waste Regulations.

4.3 Spill Notification Forms and Spill/release Notification

If a minor spill exists and can be contained by site personnel, after the appropriate phone calls are made and the spill is contained, a Spill Notification Form shall be completed and submitted to the General Manager. This form is included in the following pages. The Spill Notification Form includes a checklist to document the proper notification of state and federal agencies. The form shall be filed and maintained for five years.

Any size spill/release that threatens to affect navigable waters or adjoining shorelines must be reported immediately to the National Response Center (1-800-424-8802). The Center is staffed 24 hours a day.

A summary sheet is included in this section to facilitate reporting. The person reporting the spill/release must provide the following information:

- Name, location, organization, and telephone number
- Name and address of the party responsible for the incident
- Date and time of the incident
- Location of the incident
- Source and cause of the release or spill/release
- Types of material(s) released or spill/released.
- Quantity of materials released or spill/released.
- Danger or threat posed by the release or spill/release.
- Number and types of injuries (if any).
- Media affected or threatened by the spill/release (i.e., water, land, air).
- Weather conditions at the incident location.
- Any other information that may help emergency personnel respond to the incident.

4.4 Cleanup Contractors and Equipment Suppliers

Contact information for specialized spill response and cleanup contractors are provided in this section. These contractors have the necessary equipment to respond to a spill/release of chemical that affects Sneffels Creek, including floating booms and oil skimmers.

Spill kits are located in the material storage Connex, waste storage pad, reagent room, mill portal, underground shop, fuel storage area, and the underground loci barn. The inventory of response supplies and equipment is typical of a large spill kit, which includes booms, pillow, socks, pads, over-pack container with screw lid, bags, gloves, boots, goggles, floor-dry and instructions. The inventory is verified monthly. Additional supplies and equipment may be ordered from the following sources:

Spill 911	(800) 474 5911
Creative Safety Supply	(866) 754-0160

Contractors for Significant Spills and/or Significant Discharges

Custom Environmental Services, Inc.
Arvada, CO 80002
Tel+1 (303) 423-9949
Tel+1 (800) 310-7445
Fax+1 (303) 423-1854
Environmental contractor incl. oil spill, HAZMAT, and asbestos.

Custom Environmental Services, Inc.
Colorado Springs, CO 80907
Tel+1 (719) 598-1557
Tel+1 (800) 310-7445
Fax+1 (719) 598-2687

Environmental Restoration LLC
Commerce City, CO 80022
Tel +1 (303) 382-1258
Tel +1 (888) 814-7477
Fax +1 (303) 382-1285

Veolia ES Special Services
Henderson, CO 80640
Tel +1 (303) 371-7600
Tel +1 (800) 688-4005
Fax +1 (303) 371-7678

Emergency Contacts	
Spill Reporting	Telephone Number
EPA	(800) 424-8802
Colorado Dept. of Public Health and Environment (CDPHE)	(877) 518-5608
Colorado DRMS	(303) 866-3567
Health Department (Local)	(970) 325-4670
MSHA	(303) 231-5465
Local Emergency Agencies	Telephone Number
Fire Department	911/(970) 325-7069
Sheriff/Police	911(970) 325-7272
Owner/Operator	Telephone Number
Ouray Silver Mines Inc.	(970) 325-9830
Brian Briggs, CEO P.E.	(970) 325-9830 Ext.1101
Matt Juth, General Manager	(970) 325-7241 Ext.1025/(303) 907-2709
John Thiel, Mill Manager	(970) 325-7241 Ext.1014 /(775)997-4281
Charlie Millican, Mine Manager	(970) 325-7241 Ext.1001
Todd Jesse, Environmental Specialist	(970) 325-9830 /(720) 469-7557
Spill Response Contractor	Telephone Number
Adequate heavy equipment kept onsite for rapid spill response.	

Spill Notification/Documentation Form

(Spills 10 gallons or greater)

OURAY SILVER MINES

Part A: Basic Spill Information	
Spill Type: Major / Minor [ ] Major [ ] Minor	Spill Date:
Type of Spilled Substance:	Spill Time:
Quantity Spilled:	Spill Duration:
Facility Name: **Revenue Mine**	Location of Spill:
Owner / Company Name: **Ouray Silver Mines Inc.**	Release to: [ ] Containment [ ] River [ ] Pond [ ] Soil [ ] Air [ ] Ground water [ ] Other
Spill ongoing: YES NO	[ ] Injuries [ ] Fatalities
Nature of spill and any environmental or health effects:	
Measures taken to contain/reduce and/or clean up spill:	
PART A: Name/title of person(s) reporting spill:	
Signature:	**Date:**
Corrective Action/Follow-up:	

Report to SUPERVISOR IMMEDIATELY. Form must be filled out and emailed to environmental@ouraysilvermines.com. A copy must be retained on-site and included with the MCP Plan.

Part B: Notification Checklist (spills greater than 25 gallons) **To be completed by Environmental, Site/Dept. Manager**		
Spill of greater than 25 gallons of petroleum product or Mill Chemicals above RQ:	**Notification Date and Time**	**Name of Person that Received Call**
Colorado Department of Public Health and Environment Spill Hotline (877) 518-5608		
Ouray County Health Department (970) 325-4670		
Colorado Division of Reclamation, Mining and Safety (303) 866-3567		
Spill reaches ground water or surface water:		
EPA National Response Center (800) 424-8802		
Part B: Name/Title of person(s) completing notification		
Signature:		**Date:**

Discharge Notification Form

Part A: Discharge Information

General information when reporting a spill to outside authorities:

Name: Ouray Silver Mines Inc.
Address: 1900 Main St. Suite 1
Ouray, CO 81427

Telephone: (970) 325-9830
Owner/Operator: Ouray Silver Mines Inc.
Primary Contact: Matt Juth General Manager
Work: (970) 325-7241 Ext. 1025

Type of oil:	Discharge Date and Time:
Quantity released:	Discovery Date and Time:
Quantity released to a waterbody:	Discharge Duration:

Location/Source:

Actions taken to stop, remove, and mitigate impacts of the discharge:

Affected media:

___ air
___ water
___ soil
___ storm water sewer/POTW
___ dike/berm/oil-water separator
___ other: _____

Notification person:	Telephone contact: Business: 24-hr:

Nature of discharges, environmental/health effects, and damages:

Injuries, fatalities or evacuation required?

Part B: Notification Checklist

	Date and time	Name of person receiving call
Discharge in any amount		

Matt Juth, General Manager (970) 325-7241 Ext. 1025/ (303)907-2709		
Discharge in amount exceeding 10 gallons and *not affecting a waterbody or groundwater*		
Local Fire Department Fire Chief: Trevor Latta (970) 325-7069 or 911		
Colorado Department of Public Health and Environment (877) 518-5608		
Discharge in any amount and affecting (or threatening to affect) a waterbody		
Local Fire Department Fire Chief: Trevor Latta (970) 325-7069 or 911		
Colorado Department of Public Health and Environment (877) 518-5608		
National Response Center (800) 424-8802		
*City of Ouray Water Department Dennis Erickson 970-325-7074		
Custom Environmental Services, Inc. Arvada, CO 80002 Tel+1 (303) 423-9949		

* The City of Ouray Water Department should be notified of a discharge only if chemicals has reached or threatens the intake system along Sneffels Creek.

Appendix A – SDS Sheets

Emergency Response Plan

RULE 8 - EMERGENCY RESPONSE PLAN

As part of compliance with Subsection 6.4.19 of the Hard Rock/Metal Mining Rules set forth bythe Colorado Mined Land Reclamation act, Ouray Silver Mines, Inc. has assembled this emergency response plan for the Revenue Mine.

8.3.2(a) Personnel

General Manager
Matt Juth
Cell: (303) 907-2709
Office: (970) 325-7241 ext. 1025

Safety/Emergency Coordinators
Tony Bilunka
Office: (970)-325-7241 ext. 1024
Cell: (970) 275-1490

Surface Facilities Coordinator
Charles Cordova
Cell: (970) 589-0083
Office (970)-325-7241 ext. 1016

Mill Superintendent
John Thiel
Cell 775-997-4281
Office: (970)-325-7241 ext. 1014

Environmental Specialist
Todd Jesse
Cell: (720) 469-7557
Office: (970) 325-7241 ext. 1018

8.3.2(b) Response Procedures

The emergency response procedures are intended for use during an emergency situation at the Revenue Mine surface facilities. Underground emergency procedures are covered under MSHA requirements. An emergency situation on the surface can include but is not limited to: spills of hazardous materials, fires, accidents involving personnel and/or material transport, or any combination of the above. These procedures are not to be used for responding to alarms associatedwith routine operational problems that occur within the site process and monitoring systems, unlessthose problems result in an emergency situation. Examples of routine operational problems include intrusion alarms and routine process alarms at the mill.

Any emergency situation will be successfully resolved by a phased response consisting of notification, operations, and remediation. These three phases will be implemented in concert or sequentially depending upon the specific situation and available personnel.

Phase 1 - Notification

The first person to arrive at the location of an emergency situation becomes the First Responder to the incident and assumes responsibility for the subsequent emergency response until they are relieved by an Emergency Coordinator, or voluntarily relinquish their authority to a more qualified person. The First Responder can be any Ouray Silver Mines employee or contractor's employee (e.g. chemical delivery contractor).

The primary responsibility of the First Responder in an emergency situation is the prompt notification of other site personnel. The First Responder shall immediately relay an incident evaluation to at least one other person prior to initiating the operations phase during an emergency response. The incident evaluation must include the following information, at a minimum.

a) The location of the incident.
b) The nature of the incident.
c) The extent of injury, if applicable.
d) The type of material spilled, if known and applicable.
e) The physical extent of the spill area, if applicable.
f) The First Responder's intended course of action.
g) Available communication devices if communication must be maintained.

1.1 Internal Notification

The first person contacted by a First Responder notes the information provided in the incident evaluation and is then responsible for notifying the General Manager. Notification procedures for work hours and off shift are detailed below.

1.1.1 Work Hours

During normal mine site work hours internal notification by the First Responder shall be made directly in person, or by utilizing the telephone or mine-phone page systems, if available.

The first person contacted by the First Responder shall notify the General Manager and then ensure that the emergency alarm horn (Fire Alarm) is sounded to notify all other personnelon the surface that an emergency situation exists.

Note: Directions on the location and use of these communications systems are attached tothis procedure as subsection 1.1.5.

1.1.2 Off-Work Hours ·

Off-hours notification of response personnel is initiated by the First Responder, who notifies the General Manager and other available response personnel. The General Manager carries a cell phone/pager and is on call for responding to abnormal process system conditions. If the General Manage is not available, the Mine Manager, Mill Manager, or Surface Manager must be notified. A current list of on-call emergency response personnel is provided in 1.2.1.

1.1.3 Incident Command

The first Emergency Coordinator shall assume the responsibility of Incident Command until officially relieved by someone of higher authority. The Incident Commander shall ensure that the Emergency Alarm Horn is sounded to alert all site surface personnel that an emergency situation exists. The Incident Commander shall then proceed to the designated response assembly point to coordinate field operations.

Note: Once a response operation is under way, a change in Incident Command should only occur if the change would significantly improve the response to the emergency situation.

1.1.4 Emergency Coordinator

The Mine Manager should first and foremost act as the Emergency Coordinator during an

emergency situation at the Revenue Mine surface facilities. If mine manager is not available, the next senior person will act as coordinator.

The Emergency Coordinator will perform the following duties:

a. Maintain contact with and coordinate site operations and personnel with the incidentresponse operation.
b. Evaluate the incident on an ongoing basis and coordinate the site incident responseoperation with the Corporate Management and any outside emergency response organizations, such as medical and fire services, responding to the mine site.
c. Designate a suitable alternate during their absence.

1.1.5 Emergency Response Communications Systems

The following communications systems are available for use during an emergency responsesituation at the Revenue Mine

- MinePhone
    - Office
    - Mill
    - Shop
    - Underground
- Landline telephones
    - Office
    - Shop
    - Mill
- Leaky Feeders
    - Underground

1.2 Notification and Coordination with External Entities

Notification and coordination with external emergency response organizations, potentially affected off site entities, and regulatory agencies may be necessary

during an emergency situation at the Revenue Mine.

1.2.1 External Emergency Response Organizations

The Emergency Coordinator will evaluate the need for assistance from external emergencyresponse organizations, such as medical and fire services, at the earliest possible moment during an incident response. Notification of external response organizations must be done promptly, when necessary.

The current external medical and fire service organizations available for assistance during an emergency situation at the Revenue Mine are listed in below.

Ouray County Emergency Medical Services - (970) 325-
7275Ouray Fire Department - (970) 325-7069
Mountain Medical Center - (970) 626-5123 (Ridgway
CO) Montrose Memorial Hospital- (970) 249-2211
(Montrose, CO)
Ouray County Health Department - Elizabeth Loaczeck - (970)-325-
4670.Ouray County Emergency Manager - Glen Boyd - (970)-325-4670
Ouray County Sheriffs Office - (970) 325-7272
Tri State Care Flight (Airlift EMS) - (928) 704-7025

In the case of emergency requiring mine rescue, the following entities will be contacted forassistance and to provide preliminary information.

San Juan Mine Rescue Coop, Ridgway,
CO

Jess Fulbright, Coordinator
(970)865-2415 Ext. 24;
Cell: (970)428-7001;
Home: (970)864-2116

MSHA Mine Emergency1-800-746-1553

MSHA Rocky Mountain District Office, Denver,
CO(303) 231-5465

1.2.2 Non-Emergency Response Off-Site Entities and Regulatory Agencies

The Mine Manager will evaluate the emergency on an ongoing basis to determine whether the notification of non-emergency response off-site entities or regulatory agencies is necessary. The Mine Manager will be responsible for the notification of non-emergency off-site entities or regulatory agencies, when necessary.

A list of off-site entities and regulatory agencies that may be notified during an emergencysituation at the Revenue Mine is included below. Those agencies that must be notified within 24-Hours of the occurrence are noted as such.

For Reportable Quantity (RQ) spills under five gallons:

- Colorado Division of Reclamation, Mining, and Safety
  (24-hour)o (303) 866-3567
- Colorado Department of Public Health and Environment (24-hour)
  - (303) 692-3500

For Reportable Quantity (RQ) spills over five gallons:

- The State of Colorado Emergency Management Unit (24-hour)
  - (720) 852-6600
- The USEPA National Response Center (24-hour)
  - (800) 424-8802
- Quray County Public Health Department (24-hour)
  - (970) 325-4670 Elizabeth Lowaczeck
- CDPHE Water Quality Control Division
  - (303) 692-3500

For any fire at the surface facilities

- Ouray Fire Department ***(Immediately)***
    - (970) 325-7069 or 911
- US Mine Safety and Health Administration (within 2 hours)
    - (303) 234-5465
- Ouray County Health Department (Situation dependent)
    - (970) 325-4670

Phase 2 - Operations

The limiting factors of terrain and distance dictate that many emergency situations that occur at the surface facilities of the Revenue Mine will have to be successfully resolved or controlled by on-site personnel before external agencies or organizations will be able to mobilize and arrive on-site.

On-site personnel involved in responding to an emergency scene must carefully evaluate the situation prior to committing themselves and others to action. The severity of any injury, the quantity and concentration of any hazardous material released, the presence or absence of fire and/or energized electrical circuits, and the location of the incident are some of the primary factors used in determining an operations strategy both before and during an incident response. Responders should always perform a thorough initial and ongoing incident evaluation that accounts for these factors and adjust their actions accordingly. A thorough incident evaluation should include the following aspects:

I) The presence of physical and electrical hazards, or hazardous materials.
2) The physical layout of the incident area.
3) The extent of injury, if applicable.
4) The type and quantity of materials spilled, if any.
5) Any actions already taken.
6) The number and skills of available personnel.
7) The type and quantity of available equipment and supplies.
8) The type and availability of both internal and external support.

9) Alternate courses of action.

Response operations will usually occur in two distinct, but often overlapping, stages once the incident evaluation and subsequent notification is complete. The first stage consists of those actions taken by the First Responder immediately after the notification phase. The second stage of operations consists of coordinated site-wide actions taken to successfully resolve a situation by multiple response personnel or external support services. Actions taken by the First Responder may or may not, successfully resolve the emergency at the Stage I level of operations. If the First Responder can successfully resolve the situation, then the second stage of operations will terminate with the mobilization of site personnel during the notification phase. If the First Responder cannot successfully resolve the situation, or if the situation is beyond the First Responder's capabilities toresolve, then the second stage of response operations will continue through field response actions until a successful resolution of the emergency situation has occurred.

General guidelines for First Responder and multiple responder operations are provided below. Operational guidelines for specific types of incidents are attached as appendices to this section with HazMat response guidelines organized according to the respective USDOT hazard class of the material. The hazardous materials in use and stored on-site are listed in the HazMat Table attached to this procedure.

Responders should always attempt to de-energize electrical equipment and eliminate ongoing leak or spill sources (re: closing valves, etc.), both prior to and during operations, if the responder(s) will not be exposed to an unwarranted level of risk while doing so.

The prompt containment of spilled materials, or the containment of fires to a limited area, is a primary goal of any field response action during these types of emergency situations. Limiting thearea impacted by a spill or a fire will significantly reduce the level of cleanup required after the response is over.

The use of proper personal protection equipment (PPE) is mandatory during response operations.The type of PPE used will depend on the type of HazMat involved and the

potential for contact with a hazardous material. A listing of available response equipment and its location on site is provided in 8.3.2(a) of this procedure.

2.1 Stage 1 Operations - First Responder

The first person to arrive at the location of an emergency situation becomes the First Responder to the incident and assumes responsibility for the subsequent emergency response until they are relieved by a more qualified person. The First Responder can be any Ouray Silver Mines employee or a contractor's employee (eg. truck driver).

Stage 1 response operations are coordinated individual operations undertaken by a single personupon encountering an emergency situation. The First Responder will proceed through the two distinct activity phases of Notification and Field Response Action when responding to an emergency situation.

2.1.1. Stage 1 Notification

The primary responsibility of the first responder in an emergency situation is the prompt notification of other site personnel. The First Responder shall immediately relay an incidentevaluation to one other person prior to taking any other action during an emergency response.

2.1.2 Stage 1 Field Action

After notification the First Responder will proceed to the Field Action Phase of response. The type of action taken by the First Responder during an emergency situation will dependon an ongoing evaluation of the incident and the First Responder's capability to respond.

First Responders should always make an initial response to incidents that are within the capabilities of a single person to correct, or control, until help arrives. Generally, a single person can successfully correct or control small fires, small HazMat spills, and minor accidents that do not represent an unwarranted health hazard to a single responder. The FirstResponder must always be prepared to retreat and monitor the

situation from a safe distanceuntil help arrives if the initial incident evaluation, or the responder's ongoing evaluation, indicates that an unwarranted hazard exists or may develop.

2.2 Stage 2 Operations - Multiple Responder

Stage 2 response operations are coordinated site-wide operations involving multiple personnel. Stage 2 response operations are initiated during the notification phase of any emergency responseand proceed through the three distinct Stage 2 activity phases of Alert, Mobilization, and Field Actions.

2.2.1 Stage 2 Alert

Sounding of the Emergency Alarm Horn (Fire Alarm) during the Notification Phase of an emergency situation constitutes the Alert phase of a Stage 2 response operation and signals the beginning of a Stage 2 site response. All EFR and non-EFR personnel on the surface areto immediately proceed to a designated assembly point when the Emergency Alarm Horn (Fire Alarm) is sounded. ·

2.2.2 Stage 2 Mobilization

All emergency responses to an emergency situation at the Revenue Mine will continue through Stage 2.Mobilization. Mobilization for Stage 2 response operations consists of the assembly and organization of site surface personnel for coordinated response operations andwill terminate at the end of mobilization if the emergency situation is successfully resolved at the First Responder level. The site will demobilize and the Remediation Phase of the Emergency Response Plan will be executed if the situation is resolved at the First Responder level.

- Mobilization: Assembly

  All surface personnel are required to report to a designated assembly point when thealert signal is sounded. The primary assembly point for EFR personnel during a surface emergency situation is the Fire Alarm Control Panel located on the outside wall of the mine office. The primary assembly point for non-EFR personnel is the area outside the mine portal. The area

outside the Filter Building is the alternative assembly area if the primary assembly points are inaccessible.

- Mobilization: Basic PPE Requirements

  All personnel reporting for Stage 2 response operations will first don hard hats, safety glasses, and steel-toed safety shoes. This is the minimum personnel protectiveequipment (PPE) required during response operations. EFR personnel who are not wearing the minimum PPE listed above will be restricted to support functions only during Stage 2 operations.

- Mobilization: Mine Foreman (Emergency Coordinator EC)
  - Provide an initial situation report to all response personnel at the primary assembly point.
  - Review the incident evaluation, determine a preliminary course of action, and delegate specific duties to response personnel.
  - Establish an incident command post at a secure location near the incident location.
  - Establish a site command post with secure communication links to off-site entities at a location unaffected by the incident and ensure that communications with the incident command post and off-site entities are functional.
  - Organize response personnel for deployment based upon the initial situation report and the projected course of action. Response organization will include the delineation of responsibilities or duties; the provision of proper PPE; the collection of specialized equipment; and the establishment of a support base, including communications.
  - Establish a preliminary field response plan based upon the initial situation report and the projected course of action.

2.2.3 Stage 2 Field Action

A Stage 2 Field Action is a coordinated field response to an emergency situation by multiple

personnel. A Stage 2 Field Action occurs when an emergency situation cannot be successfully resolved at the First Responder level. Stage 2 field actions consist of operations undertaken in the field by multiple personnel that are designed and implemented in order tocontrol or abate an emergency situation. A coordinated Stage 2 field response operation willcontinue until the situation has been successfully resolved.

Field Action: Operations

General guidelines for responding to incidents that involve specific hazardous materials classes or accident scenarios are provided below. The specific course of action taken during a Stage 2 Field Response Action will be determined by the ongoing incident evaluation. Rescue is the primary duty of any field response. Emergency response equipment locations are located in 8.3.2 (d).

After notification the Responder will proceed to the Operations Phase of response. The type of action taken in the operations phase will depend on the incident and the Responder's capability. All other site personnel have response training and should immediately begin Stage 2 operations when notification is complete. The quantity and concentration of hazardous material released and the presence or absence of fire will be the primary factor in determining operations strategy. Proper personal protection equipment (PPE) is mandatory during response operations. Choice of PPE will depend on the type of material involved and the potential for contact with the material.

Suggested operational strategies and PPE requirements are listed below for potential HazMat incidents. Every effort should be made, that does not involve an unwarranted risk to responders, to eliminate ongoing leak or spill sources (re: closing valves, etc.) prior to beginning operations.

Corrosives (No Fire) [Lime, Sodium Metabisulfate, Zinc Sulfate]

PPE: Chemical splash protection; respirator required; face-shield; rubber gloves; and rubber boots.

Response:

- Evaluate situation.
- Secure area.
- Rescue & First Aid, if necessary & possible.
- Dam or dike ahead of the spill; heavy equipment is available for earthmoving.
- Cleanup with water is allowed; contain all runoff, excavate an emergency catch basin, if possible.

Remediation:

- Evaluate situation.
- Absorb spilled materials, if possible, with earth or other suitable material.
- Transport contaminated soils to the Revenue waste pile storage area for temporary storage until a permanent disposal site is determined.

Corrosives (fire) [Lime, Sodium Metabisulfate, Zinc Sulfate, Copper Sulfate]

PPE: Full-coverage acid suit; self-contained breathing apparatus (alternately full-face respirator with combination cartridges for very small fires that can be quickly knocked down); face-shield; rubber gloves and boots.

Response:

- Evaluate situation.
- Secure area.
- All electrical equipment must be de-energized.
- Rescue & First Aid, if necessary & possible.
- For a small fire use available dry-chemical fire extinguisher to knock down

the fire. Do not use water.

- For large fire, concentrate on protecting adjacent structures and slowly flood area with water from a safe distance.
- Direct extinguishing agent in a manner to avoid splashing spilled material.
- Dam and dike water used to fight the fire at a safe distance to control runoff, excavate an emergencycatch basin, if possible.
- Perform overhaul, if spilled material can be avoided.

Remediation:

- Evaluate situation.
- Certify fire was extinguished.
- Absorb spilled materials, if possible, with earth or other suitable material.
- Transport contaminated soils to the Waste Dump storage area for temporary storage until a permanent disposal site is determined.
- Characterized water used to fight fire to assess proper disposal options in accordance with Colorado Hazardous Waste Regulations.

Flammable Materials *(No* Fire) [Sodium Isopropyl Xanthate, NAX 31]

PPE: Work clothes; rubber gloves; and rubber boots (chemical cartridge air-purifying respirator if available).

Response:

- Evaluate situation.
- Secure area.
- Rescue & First Aid, if necessary & possible.
- Remove ignition sources
- Locate fire extinguisher and keep near at hand.
  Dam or dike to contain material.
- Watch for flammable or explosive vapors.
- Coat surface of spilled liquid with dry chemical extinguishing agent, if enough is available. Save enough extinguishing agent for firefighting. Do

not add water.

Remediation:

- Evaluate situation.
- Do not add water.
- Pick up liquids if proper equipment is available, or absorb spilled materials with compatible material if liquid retrieval is not possible.
- Transport contaminated soils to the temporary tailings storage area for temporary storage until an appropriate permanent disposal method and site is determined.

Flammable Materials (Fire) [Sodium Isopropyl Xanthate, NAX 31]

PPE: Work clothes; self-contained breathing apparatus (alternatively, no respirator or full-face respirator for small fires that can be quickly knocked down); eye protection; gloves; and boots (rubber is best).

Response:

- Evaluate situation.
- Secure area.
- De-energize electrical equipment.
- Rescue & First Aid, if necessary & possible.
- For small fire use available dry-chemical fire extinguishers to knock down the fire as quickly as possible. Avoid water.
- Keep area well ventilated.
- For a large fire, protect adjacent structures, use water from a safe distance.
- Direct extinguishing agent in a manner to avoid splashing spilled material.
- Dam and dike water used to fight the fire at a safe distance to control runoff. Contain collected runofflocally, when possible. Perform overhaul.

Remediation:

- Evaluate situation.
- Certify fire was extinguished.
- Absorb spilled materials, if possible, with earth or other suitable material.
- Transport contaminated soils to the temporary tailings storage area for temporary storage until an appropriate permanent disposal method and site is determined.
- Characterized water used to fight fire to assess proper disposal options in accordance with Colorado Hazardous Waste Regulations.

Other Materials (No fire) [AeroFloat 242, Danafloat 067, Aerophine 3418, Oreprep 549, Polyfroth W20, Floc AF-309]

PPE: Chemical resistant, tightly fitting goggles, impervious gloves – nitrile or fluorinated rubber gloves; impervious clothing

Response:

- Evaluate situation.
- Secure area.
- Rescue & First Aid, if necessary & possible.
- Dam or dike ahead of the spill; heavy equipment is available for earthmoving.
- Cleanup with water is allowed; contain all runoff, excavate an emergency catch basin, if possible.

Remediation:

- Evaluate situation.
- Absorb spilled materials, if possible, with earth or other suitable material.
- Transport contaminated soils to the Revenue waste pile storage area for temporary storage until a permanent disposal site is determined.

Other Materials (fire) [AeroFloat 242, Danafloat 067, Aerophine 3418, Oreprep 549, Polyfroth W20, Floc AF-309]

PPE: Ful protective suit; self-contained breathing apparatus (alternately full- face respirator with combination cartridges for very small fires that can be quicklyknocked down); face-shield; rubber gloves and boots.

Response:

- Evaluate situation.
- Secure area.
- Rescue & First Aid, if necessary & possible.
- Dam or dike ahead of the spill; heavy equipment is available for earthmoving.
- Cleanup with water is allowed; contain all runoff, excavate an emergency catch basin, if possible.
- Create a temporary holding pond to collect water used to fight the fire by laying down a liner over earthen berms to create containment.

Remediation:

- Evaluate situation.
- Certify fire was extinguished.
- Absorb spilled materials, if possible, with earth or other suitable material.
- Transport contaminated soils to the Revenue waste pile storage area for temporary storage until a permanent disposal site is determined.
- Characterized water used to fight fire to assess proper disposal options in accordance with Colorado Hazardous Waste Regulations.

Field Action: Specified Personnel Duties

The Emergency Coordinator is the only member of the emergency response team who currently has specific duties listed in the Operations Phase section of the Emergency Response Plan. The Emergency Coordinator can be the initial First Responder or the person of higher authority who relieves the First Responder of Incident Command. The Mine

Foreman will usually be the Emergency Coordinator for the Revenue Mine facility.

The Emergency Coordinator shall:

- Act first and foremost to prevent unwarranted occupational and environmental exposures from occurring during emergency incidents involving hazardous materials.
- Monitor response activities and suspend any response activity that creates, or may create, an unwarranted exposure risk.
- Oversee and coordinate all field response actions until the emergency situation is successfully resolved.
- Perform an ongoing incident evaluation and determine an appropriate course of action for the response activity, in coordination with other relevant personnel.
- Coordinate incident response activities with external emergency responders when they are deployed in the field.
- Ensure that communications with the incident command post and off-site entities are maintained.
- Ensure that the incident response action is provided with resources that are adequate to sustain the response activity.
- Coordinate on-site response actions with off-site response activities.
- Ensure that site response personnel are in a condition suitable for field operations, including the provision of proper PPE, sufficient quality and quantities of equipment, and adequate numbers of personnel for both operations and b ck-up.

Phase 3 - Remediation

A successful resolution to the operations phase of an emergency situation at the surface facilities of the Revenue Mine will be followed by remediation actions designed to both mitigate the adverse effects of the emergency and reduce the potential for a recurrence of a similar situation. Remediation actions consist of clean-up activities at fire and spill locations, and formal and informal reviews of the emergency and the emergency response plan implementation.

3.1 Clean-Up

General guidelines for clean-up activities at spill and fire locations are listed below. Specific clean-up guidelines for each material or type of incident are included with the field response operational guidelines detailed in subsection 2.2.3, the SPCC plan and the Materials Containment Plan (MCP) for the site.

3.1.1 Clean-up: General

The General Manager upon the successful conclusion of field response operations will perform evaluation of cleanup requirements at fire or spill site. Thisevaluation will include the following considerations, at a minimum.

1) Type of material spilled.
2) Type of material(s) or structures affected by the incident.
3) Affected area (physical extent of contamination).
4) Physical configuration of the spilt or fire area.
5) Personnel requirements and availability.
6) Equipment requirements and availability.
7) Disposal requirements.

The Safety Director will be responsible for coordinating cleanup activities in accordance with the post-field operations evaluation.

3.2 Review

The final stage in any emergency response activity is a complete review of the circumstances leading to the emergency, the response actions taken during the emergency and post-response remediation activities.

The General Manager will coordinate the requisite review and issue a report to corporate management summarizing the findings, including necessary corrective actions. The Safety Director shall be responsible for preparing any requisite reports to the Federal Mine Safety & Health Administration. The General Manager will prepare any necessary five or thirty-day post- incident reviews for distribution and review to corporate management and relevant government agencies.

8.3.2(c) Designated Chemicals

Please see the below for a list of designated chemicals that will be stored on site and the appropriate handling procedures. Specifics about these chemicals are found in the Material Containment Plan.

1. Aerofloat 242 Promoter	Liquid
2. Danafloat 067	Liquid
3. Aerophine 3418	Liquid
4. Copper Sulfate (CuSO4)	Granular
5. Hydrated Lime	Granular
6. Sodium Metabisulfite	Liquid/Granular
7. Oreprep 549	Liquid
8. Polyfroth W20	Liquid
9. Sodium Isopropyl Xanthate	Granular
10. NAX 31	Granular
11. Zinc Sulfate (ZnSO4)	Granular
12. Flocculant AF-309	Liquid

8.3.2(d) Response and Clean Up Material

Emergency Response Equipment

This list contains the equipment on site that may be used in responding to an emergency situation at the surface facilities of the Revenue Mine. All of this equipment will be stored in the surface shop unless specified otherwise below.

Medical equipment:

- First aid kit (w/stretcher)

- Locations: Mine portal, office, and Yellow Rose Drift intersection, Mill

Chemical Handling Equipment:

- PVC Rain Suits
- Respirators (Half & Full-face)
- Rubber Gloves
- Steel-Toed Rubber Boots

- Hydrocarbon Absorbent Booms

Fire-fighting Equipment:

- Fire Extinguishers (dry chemical, manual 10 & 20 lbs)
- Equipment for fire line clearing (includes all earthmoving equipment)

Earthmoving Equipment:

- Wheel Loader

  (3+yd.)

- Skid Steer Loader

  Track Excavator

- 3 to 10 Ton Haul Trucks
- Hand Tools (Picks, Shovels, etc)

Other Equipment:

- Pickup and Cargo Trucks
- Snow Plow Truck with Sander
- Emergency Response Vehicle
- Spill Kits?

Reagent	Manufacturer	Purpose of use	Alt Names	Human Health §2: SDS HCS 2012 (29CFR 1910.1200)		Environmental Impacts §12: SDS		PPE §8: SDS	NFPA - Classification §16 SDS	EPA List of Lists §12 SDS	Corrosivity	Incompatible Materials
AeroFloat 242 Promoter	Solvay (distributor for Cytec Industries Inc.)	This is the ammonium salt of AEROFLOAT 31 promoter. Widely used for flotation of Pb from Pb/Zn ores and Cu/Pb from Cu/Pb/Zn ores. Improves Ag recovery from these ores.	NA	Acute toxicity, Category 4 → Acute toxicity, Category 3 → Skin Corrosion, Category 1B → Serious eye damage, Category 1 → Skin Sensitization, Category 1 → Reproductive toxicity, Category 2 → Specific target organ toxicity - repeated exposure, Category 2 →	H302: Harmful if swallowed H311: Toxic in contact with skin H314: Causes severe skin burns and eye damage H318: Causes serious eye damage H317: May cause an allergic skin reaction H361: Suspected of damaging fertility or the unborn child H373: May cause damage to organs through prolonged or repeated exposure.	Acute toxicity to fish Acute toxicity to daphnia and other aquatic invertebrates Toxicity to aquatic plants Toxicity to microorganisms M-Factor Ammonium hydroxide Biodegradibility Toxicity to benthic organisms Toxicity to soil dwelling organisms Toxicity to terrestrial plants Toxicity to above ground organisms	LC50 - 96 h: ca.66mg/L Rainbow trout Not tested Not tested Not tested Acute aquatic toxicity = 1 < 70% - 28 Days Not tested Not tested Not tested Not tested	Chemical resistant, tightly fitting goggles Impervious clothing Change working clothes after each shift Handle in accordance with good industrial hygiene and safety practice Wash hands before breaks/at the end of workday When using do not eat, drink or smoke Eye wash bottles/stations in compliance with applicable standards Ensure that eyewash stations and showers are close to the workstation location	Health - 3 Serious Flammability - 1 Slight Instability or Reactivity - 0 Minimal	Ammonium HydroxideCAS - No. 1336-21-6 1000lb	Not classified re: corrosion of metals	Oxidizing agents, strong acids or bases, and amines
Danafloat 067 (alternative to AeroFloat 242)	Quadra Chemicals Inc.	Floatation Agent	NA	Acute toxicity, Category 4 → Acute toxicity, Category 3 → Skin Corrosion, Category 1 → Serious eye damage, Category 1 →	H302: Harmful if swallowed H311: Toxic in contact with skin H314: Causes severe skin burns and eye damage H318: Causes serious eye damage	Acute EC50 5 to 10ppm Marine Water - Species: Algae -macrocystic pyrifera - young Acute EC50 7000 µg/l fresh water - Crustaceans - Grammarus fasciatus Acute LC50 10000 µg/l fresh water Fish - lepomis macrochirus	Exposure 4 days 48 Hours 96 Hours	Chemical resistant, tightly fitting goggles Impervious clothing Change working clothes after each shift Handle in accordance with good industrial hygiene and safety practice Wash hands before breaks/at the end of workday When using do not eat, drink or smoke Eye wash bottles/stations in compliance with applicable standards Ensure that eyewash stations and showers are close to the workstation location	Health - 3 Flammability - 0 Phsyical Hazards - 0	Ammonium O, O-bis(methylphenyl) dithiophosphate 49-51 % CAS -No. 587373-83-4 mix-cresol 0-7% CAS No. 1319-77-3 amoonia 0-7% CAS No. 1336-21-6	Corrosive to the respiratory system and digestive tract	Acids
Aerophine 3418 Promoter	Solvay (distributor for Cytec Industries Inc.)	AEROPHINE 3418A has application in flotation of copper- and lead-sulfide minerals, particularly where these are found in complex sulfide ores containing sphalerite zinc mineralization, and ores with high levels of pyrite and/or pyrrhotite.	NA	Serious eye damage, Category 1 → Skin sensitization, Sub - Category 1B → Health hazards not otherwise classified, Category 1 →	H318: Causes serious eye damage H317: May cause an allergic skin reaction Contact with acids liberates toxic gases	Acute toxicity to fish Acute toxicity to daphnia and other aquatic invertebrates Toxicity to aquatic plants Toxicity to microorganisms Chronic toxicity to fish Chronic to daphnia and other aquatic invertebrates Toxicity to benthic organisms Toxicity to soil dwelling organisms Toxicity to terrestrial plants Toxicity to above ground organisms	Not harmful (LC LL50>100mg/L) Not harmful (EC/EL50>100mg/L) Not harmful (EC/EL50>100mg/L) Not tested Not tested Not tested Not tested Not tested Not tested Not tested	Impervious gloves - Nitrile or fluorinated rubber gloves Chemical resistant goggles, tightly fitting Impervious clothing Full protective suit Change working clothes after each shift contaminated work clothing should not be allowed out of the workplace Handle in accordance with good industrial hygiene and safety practice Wash hands before breaks and at the end of workday When using do not eat, drink, smoke Eye wash bottles/stations in compliance with applicable standards Ensure that eyewash stations and safety showers are close to the work station location.	Health - 3 Serious Flammability - 1 Slight Instability or Reactivity - 0 Minimal	N/A	Not corrosive to metals	Mineral acids, strong oxidizing agents, strong acids or bases
Copper Sulfate Pentahydrate	Quadra Chemicals LTD.	Used in Zinc flotation as an activator of sphalerite	cupric sulfate, blue vitriol, bluestone	Acute Toxicity - Oral Category 4 → Skin Corrosion/Irritation Category 2 → Eye damage/Irritation Category 2 →	Harmful if swallowed Harmful in contact with skin Eye damage/Irritation	Ecotoxicity Persistence and degradability Bioaccumulation Mobility Other Adverse Effects	Very toxic to aquatic life with long lasting effects Not determined Not determined May be mobile due to water solubility Not Determined	Safety glasses with side shields/goggles Long sleeved shirt, long pants, and shoes plus socks Water proof gloves Discard clothing and other absorbent materials that have been drenched or heavily contaminated with products concentrate Wash PPE Separately from other laundry. Wear an approved respirator for dusts or mists Handle in accordance with good industrial hygiene and safety practices.	Health - 3 Serious Flammability - 0 Instability or Reactivity - 0 Minimal	CAS/313 Category Codes N100 & (CERCLA) 313	Mildly corrosive to steel	Aluminum powder, acetylene gas, hydroxylamine, magnesium and moisture
Hyperfloc AF 309	SNF, Inc.	Used as a settling agent, A flocculant causes the suspended mineral to form into small masses. This will make the thickener load settle.	NA	No known hazards to humans Aqueous solutions or powders that become wet render surfaces extremely slippery		Acute toxicity to fish Acute toxicity to invertebrates Acute toxicity to algae Chronic toxicity to fish Chronic toxicity to invertebrates Toxicity to microorganisms Effects on terrestrial organisms Sediment toxicity	LC50/Dario rerio/96 hours > 100mg/L (OECD 203) LC50/Fathead minnow/96 hours > 100mg/L (OECD 203) LC50/Scenedesmus subspicatus/72 hours > 100mg/L (OECD 201) No Data No Data No Data No known effects No Data	Safety glasses with side shields Plastic material gloves Work clothes protecting arms, legs and body Dust safety masks recommended where working powder concentration is more than 10 mg/m3. Wash hands before breaks and immediately after handling the product.	Health - 0 Flammability - 0 Instability - 0	CERCLA - Hazardous substances list (40 CFR 302.4) - RQ - Not concerned	Not classified re: corrosion of metals	Strong bases, oxidizing agents
Hydrated Lime	Lhoist North America	Lime is used to adjust the pH to aid in the collector adsorption by controlling the pulp chemistry. It also aids in the depression of certain minerals	NA	Eye damage Category 1 → Carcinogen Category 1 → Skin Irritation Category 2 → Specific Target Organ Toxicity Single Exposure Category 3 → Specific Target Organ Toxicity Repeat Exposure Category 1 →	Serious eye damage Skin irritation Respiratory irritation Damage to lungs through prolonged or repeated exposure when inhaled Cancer potential through inhalation Hydrated lime is not listed as a carcinogen, however this product contains crystalline silica, which is classified as carcinogenic to humans when inhaled.	Reacts with atmospheric CO2 overtime to form calcium carbonate No bioaccumulation effect or food chain concentration toxicity Minimal mobility in soil. Reacts with clay portion of soil to form calcium silicates and calcium aluminates This material is alkaline and if released into water or moist soil will cause an increase in pH.	Calcium Hydroxide 13mg/m305-62-0 OSHA PEL: 15 mg/m3 (total) 5 mg/m3 (respirable) ACGIH TLV: 5 mg/m3 Magnesium Oxide 1309-48-4 OSHA PEL: 15 mg/m3 ACGIH TLV: 10 mg/m3 Crystalline Silica 14808-60-7 OSHA PEL: 0.050mg/m3 as an 8 hr. TWA (respirable) ACGIH TLV: 0.025 mg/m3 (respirable)	NIOSH Approved respirators if airborne concentration exceeds PEL Safety Glasses with side shields or safety goggles. Contact lenses should not be work when working with the lime products. Wear appropriate clothing and gloves to prevent contact Eye wash fountain and emergency showers close to work station location	N/A	N/A	Not classified re: corrosion of metals	Acids, reactive fluoridated or brominated compounds, reactive powdered metals, organic acid anhydrides, nitro-organic compounds, reactive phosphorous compounds, interhalogenated compounds
Oreprep F-549 Frother	Solvay (distributor for Cytec Canada Inc.)	A frothing agent used to create a stable surface for sulfide mineral to adhere.	NA	Skin irritation Category 2 → Eye irritation Category 2A →	H315: Causes skin irritation H319: Causes serious eye irritation	Acute toxicity to fish Acute toxicity to daphnia and other aquatic invertebrates Toxicity to aquatic plants Toxicity to microorganisms Chronic toxicity to fish Chronic toxicity to daphnia and other aquatic invertebrates Abiotic degradation physical and photo-chemical elimination Biodegradation Adsorption potential Known distribution to environmental compartments Results of PBT and vPvB assessment Other adverse effects	No Data No Data No Data No Data No Data No Data No Data No Data No Data No Data No Data No Data No Data	Store in a well ventilated area Chemical resistant goggles tightly fitting Impervious clothing Change work clothes after each work shift Contaminated work clothing should not be allowed out of the workplace Handle in accordance with good industrial hygiene and safety practice Wash hands before breaks and at end of workday Do not eat, drink or smoke while using this product.	Health - 2 Moderate Flammability - 1 Instability or reactivity - 0 or Minimal.	N/A	Not corrosive to metals	Strong oxidizing agents
Polyfroth W20 (Alternative to Oreprep)	Quadra Chemicals Inc.	A frothing agent used to create a stable surface for sulfide mineral to adhere.	NA	While this material is not considererd hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200), this SDS contains valuable informaiton critical to the safe handling and proper us o fthe product. This SDS should be retained and available for employee's and other users of this product. No known significant effects or ciritcal hazards.		No known significant effects or ciritical hazards. Ecotoxicity - Not available Persistence and degradeability - Not available.		Chemical resistat, impervioud gloves, complying with an approved standard should be worn at tall times when handling chemical products if a risk assessment indicates this is necessary	Health - 0 Flammability - 0 Instability - 0	NA	NA	No specific test data related to reactivity available for this product or it's ingredients. The product is stable Under normal conditions of storage and use, hazardous reactions will not occur.
Sodium Isopropyl Xanthate Flottec SIPX Collector	Charles Tennant & Copmany	Xanthate is commonly used in the flotation process of sulfide minerals. Xanthate is a combination of alcohol, sodium hydroxide and carbon dioxide, which is an anionic collector.	NA	Sodium Isopropylxanthate → Self heating substances and mixtures Category 1 → Acute toxicity (oral) Category 4 → Acute toxicity (dermal) Category 4 → Skin irritation Category 2 → Eye irritation Category 2A → Catches Fire spontaneously if exposed to air → Harmful if swallowed or in contact with skin → Causes skin irritation →	Proxan Sodium (Synonym) H251: Self Heating; may catch fire H302: Harmful if swallowed H315: Causes skin Irritation	Acute Aquatic Toxicity Category 2 → Chronic Aquatic Toxicity Category 2 → Do not allow to enter soil, water ways or waste water. This product may be harmful to aquatic life Biodegradability All waste from this product including all empty containers must be disposed of in accordance with municipal, provincial and federal regulations.	H411: Toxic to aquatic life long lasting effects	Wear impervious gloves when there is greater exposure risk If respiratory protection is required institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection. NIOSH or MSHA approved respirator for acidic vapors Face shield, safety glasses with side shields. Safety Boots Adequate protective clothing An eye wash station/safety shower should be near the work station Explosion proof mechanical ventilation to limit vapor concentration below T.L.V.	Health - 2 Flammability - 0 Instability - 2	CAS/313 Category Codes 7440-23-5 CERCLA RQ 10	Not classified re: corrosion of metals	Strong oxidizing agents, strong acids, strong bases, flammable liquids, heat, moisture
NAX 31 (Sodium Isopropyl Xanthate alternative)	Prospec Chemicals (Charels Tennant & CO 3rd party supplier of Xanthate. Cascade columbia is a Distributor for Charles Tennant).	Xanthate is commonly used in the flotation process of sulfide minerals. Xanthate is a combination of alcohol, sodium hydroxide and carbon dioxide, which is an anionic collector.	NA	Acute Toxicity Oral Category 1 → Acute Toxicity Dermal Category 4 → Acute Toxicity Skin Irritation → Eye irritation Category 2 → Danger Catergory 2 →	Harmful if swallowed Harmful in contact with skin Wash with plenty of soap and water Eye damage/Irritation NA	NA	NA	Wear impervious gloves. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection. Refer tot eh CAS standard Z94.4-m1982 Selection, care and use of respirators. If vapors are present, use a NIOSH or MSHA approved respirator for acidic vapours or a self contained breathing apparatus. Face shield, safety goggles. Rubber safety boots, adequate protective clothing. Eye wash station and safety shower should be near the work area.	NA	NA	Not classified re: corrosion of metals	Strong oxidizing agents, strong acids, strong bases, flammable liquids, heat, moisture
Sodium Metabisulfite	Quadra Chemicals LTD. (Prospect Chemicals 2nd/3rd party distributor/supplier)	Sodium Metabisulfite aka MBS is used for pH control in froth flotation to control Pyrite depression. ... It is also used to prevent flotation of sphalerite by copper activation in the presence of Tennantite/Covellite in the ore.	Sodium Pyrosulfite, Disodium Pyrosulfite, Pyrosulfurous Acid, Disodium Salt, Sodium Disulphite.	Acute Toxicity Oral Category 4 → Acute Toxicity Dermal Category 5 → Serious Eye Irritant Category 1 →	Harmful if swallowed Harmful in contact with skin Eye damage/Irritation	Ecotoxicity: Sodium Metabisulfite is a non hazardous solid commonly used as a waste water dechlorination agent. High concentrations will contribute to elevated chemical oxygen demand in aquatic environments.		General and local exhaust ventilation systems to maintain airborne concentrations If necessary, wear and MSHA/NIOSH approved respirator. Protective boots, gloves, and clothing to prevent excessive skin contact. Protective eye glasses, safety glasses with side shields, or goggles. emergency eye wash stations, showers, and washing facilities available in the work area. Remove this material from PPE as needed. Do not eat, drink or smoke in work areas.	Health - 2 Serious Flammability - 0 Instability or Reactivity - 0 Minimal	Hazardous Substance (40 CFR 302.4) RQ N/A	Not classified re: corrosion of metals	Acid and water produce sulfure oxides. Powdered potassium, sodium metal, alkali agents, oxidizing agents, and chlorates.
Zinc Sulphate Monohydrate	Zinc Nacional	The established lead-zinc ore flotation processing scheme is to add zinc sulphate (ZnSO4) to the grind to control metal ion activation (sphalerite depression) ... Sphalerite that is rejected into the lead flotation tails is then floated in a second flotation step after activation with copper sulphate.	**White vitriol**, Goslarite	Acute aquatic toxicity Category 1 → Skin corrosion/irritation Category 2 → Serious eye damage Category 1 → Specific target organ toxicity, single exposure, Respiratory tract irritation Category 3 → Hazardous to the aquatic environment, long-term hazard Category 1 →	H302: Harmful if swallowed H315: Causes skin irritation H318: Causes serious eye damage H335: May cause respiratory irritation H410: Very toxic to aquatic life with long lasting effects	LC50 24 Hours fish (rainbow trout) 1.24 mg/L LC50 48 Hours fish (rainbow trout) 2.4 - 5mg/L LC50 96 Hours fish (rainbow trout) .24 - .83 mg/L LC50 96 Hours Daphnia 7.4 mg/L	Zinc Sulphate has a high water solubility and its zinc and manganese contents are directly bio available. The zinc may be toxic to aquatic organism, especially fish, with water hardness\, pH and dissolved organic carbon levels being regulating factors.	Gloves and long-sleeved work clothes or disposable coveralls may be necessary. Eye protection should be worn where dust is generated and there is a potential that eye contact may occur. Use adequate local or general ventilation where necessary to maintain the concentrations of dust well below the recommended occupation exposure limits for general Particulates, not otherwise specified. Where dud fumes are generated and cannot be controlled to within acceptable levels by engineering means, use appropriate NIOSH approved respiratory protection equipment.	Does not burn or support combustion § 5 Fire Fighting Measures SDS	CERCLA RQ 1000 Section 313c	Not classified re: corrosion of metals	Strong oxidizers, acids, strong bases

Lime

SAFETY DATA SHEET

SECTION 1	IDENTIFICATION

Product

Name: Hydrated Lime

Other Names: Hydrate; High-Calcium Hydrated Lime

Recommended Uses: Water Treatment; pH adjustment; FGT; Construction

Company Identification:

US Operations:

Lhoist North America, Inc.
5600 Clearfork Main St, Ste. 300
Fort Worth, TX 76109
817-732-8164

Canadian Operations:

Lhoist North America of Canada, Inc.
20303-102B Ave.
Langley, BC V1M 3H1
604-888-4333

Emergency Phone Number:

Chemtrec 1-800-424-9300

SECTION 2	HAZARDS(S) IDENTIFICATION

Classification

Eye Damage – Category 1

Carcinogen – Category 1

Skin Irritation – Category 2

Specific Target Organ Toxicity Single Exposure – Category 3 (Respiratory System)

Specific Target Organ Toxicity Repeat Exposure – Category 1 (Respiratory System)

Labeling:

Pictograms:

Signal Word(s): Danger

Hazard Statements: Causes serious eye damage.

Causes skin irritation.

May cause respiratory irritation.

Causes damage to lungs through prolonged or repeated exposure when inhaled.

May cause cancer through inhalation.

Precautionary Statements:

Wear protective gloves and eye protection. Wash exposed skin thoroughly after handling. Do not breathe dust. Use only outdoors or in a well-ventilated area. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not eat, drink or smoke when using this product.

If on skin: wash exposed skin with plenty of water. If skin irritation occurs: Get medical attention. Take off contaminated clothing and wash it before reuse.

If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing. Seek medical attention immediately. If inhaled: Remove person to fresh air and keep comfortable for breathing. Seek medical attention if you feel unwell.

If exposed or concerned: Get medical advice

Dispose of contents or containers in accordance with applicable regulations.

Other Hazards: None.

SECTION 3	COMPOSITION/ INFORMATION ON INGREDIENTS

Chemical Name: Calcium hydroxide

Common names and synonyms: Hydrate; High-Calcium Hydrated Lime

Chemical Identity	CAS #	Concentration, % Wt.
Calcium Hydroxide	1305-62-0	> 90%
Magnesium Oxide	1309-48-4	< 3%
Crystalline Silica	14808-60-7	< 2%

SECTION 4	FIRST AID MEASURES

Eye Contact: Contact can cause severe irritation or burning of eyes, including permanent damage. Immediately flush eyes with generous amounts of water for as long as needed. This may take several minutes. Pull back the eyelid to ensure that all lime dust has been washed out. Seek medical attention immediately. Do not rub eyes.

Inhalation: This product can cause severe irritation of the respiratory system. Move victim to fresh air. Seek medical attention if necessary. If breathing has stopped, give artificial respiration.

Skin Contact: Contact can cause severe irritation or burning of skin, especially in the presence of moisture. Wash exposed area with large amounts of water. Seek medical attention immediately.

Ingestion: This product can cause severe irritation or burning of gastrointestinal tract if swallowed. Do not induce vomiting. Seek medical attention immediately. Never give anything by mouth unless instructed to do so by medical personnel.

Most important symptoms and effects, both acute and delayed: Irritation of skin, eyes, gastrointestinal tract or respiratory tract. Long-term exposure by inhalation may cause permanent damage. This product contains crystalline silica, which has been classified by IARC as (Group I) carcinogenic to humans when inhaled. Inhalation of silica can also cause a chronic lung disorder, silicosis.

Note to Physician: Provide general supportive measures and treat symptomatically.

SECTION 5	FIREFIGHTING MEASURES

Extinguishing Media

Appropriate Extinguishing Media: Use dry chemical fire extinguisher

Inappropriate Extinguishing Media: Do not use halogenated compounds.

Firefighting

Fire Hazards: Hydrated Lime is not combustible or flammable. Hydrated Lime is not considered to be an explosive hazard, although reaction with incompatible materials may rupture containers.

Hazardous Combustion Products: None

Special Protective Equipment and Fire Fighting Instructions: Keep personnel away from and upwind of fire. Wear full fire-fighting turn-out gear (full Bunker gear), and respiratory protection (SCBA).

SECTION 6	ACCIDENTAL RELEASE MEASURES

Personal Precautions: Use proper protective equipment.

Environmental Precautions: For large spills, as much as possible, avoid the generation of dusts. Prevent release to sewers or waterways.

Methods and Materials for Containment and Cleaning Up:

Small Spills: Use dry methods to collect spilled materials. Avoid generating dust. Do not clean up with compressed air. Store collected materials in dry, sealed plastic or metal containers. Residue on surfaces may be washed with water or dilute vinegar.

Large Spills: Use dry methods to collect spilled materials. Evacuate area downwind of clean-up operations to minimize dust exposure. Store spilled materials in dry, sealed plastic or metal containers.

SECTION 7	HANDLING AND STORAGE

Precautions for Safe Handling: Keep in tightly closed containers. Protect containers from physical damage. Avoid direct skin contact with the material.

Conditions for Safe Storage, Including any Incompatibilities: Store in a cool, dry, and well-ventilated location. Do not store near incompatible materials (see Section 10 below). Keep away from moisture. Do not store or ship in aluminum containers.

SECTION 8	EXPOSURE CONTROLS/ PERSONAL PROTECTION

Control Parameters:

Component	CAS #	Exposure Limits
Calcium Hydroxide	1305-62-0	OSHA PEL: 15 mg/m3 (total) 5 mg/m3 (respirable) ACGIH TLV: 5 mg/m3
Magnesium Oxide	1309-48-4	OSHA PEL: 15 mg/m3 ACGIH TLV: 10 mg/m3
Crystalline Silica	14808-60-7	OSHA PEL: 0.050 mg/m3 as an 8 hr. TWA (respirable) ACGIH TLV: 0.025 mg/m3 (respirable)

Appropriate Engineering Controls: Provide ventilation adequate to maintain PELs.

Personal Protection

Respiratory Protection: Use NIOSH approved respirators if airborne concentration exceeds PEL.

Eye Protection: Use safety glasses with side shields or safety goggles. Contact lenses should not be worn when working with lime products.

Skin Protection: If there is a risk of skin contact, wear appropriate clothing and gloves to prevent contact.

Other: Eye wash fountain and emergency showers are recommended.

SECTION 9	PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Physical State:	Solid
Color:	White
Odor:	Odorless
Odor Threshold:	N/ A
pH:	12.44 @ 25° C when made into a saturated solution
Melting Point:	N/ AF
Initial Boiling Point:	N/ A
Freezing Point:	N/ A
Flash Point:	N/ A
Evaporation Rate:	N/ A

Flammability (solid, gas): Non-flammable

Explosion Limits:	N/ A
Vapor Pressure:	N/ A
Vapor Density:	N/ A
Relative Density:	0.4 – 0.7 g/ cm^3 (apparent)
Solubility(ies):	Solubility is 1.6 g/L at 25° C

Partition coefficient: Relatively insoluble

Auto-ignition Temperature: N/ A

Decomposition Temperature: 580º C / 1076º F

Viscosity: N/A

SECTION 10	STABILITY AND REACTIVITY

Reactivity:

Chemical Stability: Hydrated Lime is chemically stable.

Possibility of Hazardous Reactions: See reactivity above

Conditions to Avoid: Do not allow Hydrated Lime to come into contact with incompatible materials.

Incompatible Materials: Hydrated Lime should not be mixed or stored with the following materials, due to the potential for violent reaction and release of heat:

Acids (unless in a controlled process)
Reactive Fluoridated Compounds
Reactive Brominated Compounds
Reactive Powdered Metals
Organic Acid Anhydrides
Nitro-Organic Compounds
Reactive Phosphorous Compounds
Interhalogenated Compounds

Hazardous Decomposition Products: None

SECTION 11	TOXICOLOGICAL INFORMATION

Health Effects: see First Aid discussion in Section 4

Routes of Exposure: see First Aid discussion in Section 4

Symptoms Related to Exposure: see First Aid discussion in Section 4

Carcinogen Listing: Hydrated Lime is not listed by MSHA, OSHA, or IARC as a carcinogen, but this product contains crystalline silica, which has been classified by IARC as (Group I) carcinogenic to humans when inhaled.

SECTION 12	ECOLOGICAL INFORMATION

Ecotoxicity: Because of the high pH of this product, it would be expected to produce significant ecotoxicity upon exposure to aquatic organisms and aquatic systems in high concentrations.

Persistence and Degradability: Reacts with atmospheric CO_2 over time to form calcium carbonate

Bioaccumulation Potential: This material shows no bioaccumulation effect or food chain concentration toxicity.

Mobility in Soil: Minimal mobility in soil. Reacts with clay portion of soil to form calcium silicates and calcium aluminates

Other Adverse Effects: This material is alkaline and if released into water or moist soil will cause an increase in pH

SECTION 13	DISPOSAL CONSIDERATIONS

Disposal Recommendations: Dispose of in accordance with all applicable federal, state, and local environmental regulations.

Regulatory Disposal Information: If this product as supplied, and unmixed, becomes a waste, it will not meet the criteria of a hazardous waste as defined under the Resource Conservation and Recovery Act.

SECTION 14	TRANSPORT INFORMATION

UN Number: Not Regulated

UN Proper Shipping Name: Not Regulated

Transport Hazard Class(es): Not Regulated

Packing Group: Not Regulated

Marine Pollutant (y/n): This material is alkaline and if released into water or moist soil will cause an increase in pH.

Special Precautions: None

SECTION 15	REGULATORY INFORMATION

National Chemical Inventory Listings:

All chemical ingredients are listed on the USEPA TSCA Inventory List.

US Regulations:

RCRA Hazardous Waste Number: not listed (40 CFR 261.33)
RCRA Hazardous Waste Classification (40 CFR 261): not classified
CERCLA Hazardous Substance (40 CFR 302.4) unlisted specific per RCRA, Sec. 3001; CWA, Sec. 311 (b) (4); CWA, Sec. 307(a), CAA, Sec. 112
CERCLA Reportable Quantity (RQ) not listed.
SARA 311/312 Codes: not listed.
SARA Toxic Chemical (40 CFR 372.65): not listed.
SARA EHS (Extremely Hazardous Substance) (40 CFR 355): Not listed, Threshold Planning Quantity (TPQ): not listed

Specific State Regulations: ⚠WARNING: This product can expose you to chemicals, including crystalline silica, which is known to the State of California to cause cancer. For more information, go to www.P65Warnings.ca.gov
These naturally occurring impurities may also be regulated by other States.

Canadian DSL: Listed

Canadian NPRI: None of the components are listed

CEPA Toxic Substances: None of the components are listed

SECTION 16	OTHER INFORMATION

Prepared By: Lhoist North America Technical Services

Date Prepared: January 27, 2020

Revision: 2020-1

Abbreviations:

N/A	Not Available or Not Applicable
IARC	International Agency for Research on Cancer
IATA	International Air Transport Association
ACGIH	ACGIH American Conference of Governmental Industrial Hygienists
TWA	Time Weighted Average
PEL	Permissible Exposure Limit
TLV	Threshold Limit Value
REL	Recommended Exposure Limit

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Danafloat 067

Quadra

SAFETY DATA SHEET

DANAFLOAT™ 067

Section 1. Identification

Product identifier as used on the label : DANAFLOAT™ 067

Product code : Q10795

Other means of identification : Not available.

Product type : Liquid.

Recommended use of the chemical and restrictions on use

Identified uses
Flotation agent

Supplier's details : Quadra Chemicals Inc.
21 Waterway Ave., Suite 200
The Woodlands, TX
United States (US) 77380
1-800-665-6553

Emergency telephone number (with hours of operation) : **Transportation Emergency - 24Hrs/Day - In US - Call 1-800-633-8253**

Section 2. Hazards identification

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

Classification of the substance or mixture : ACUTE TOXICITY (oral) - Category 4
ACUTE TOXICITY (dermal) - Category 3
SKIN CORROSION - Category 1
SERIOUS EYE DAMAGE - Category 1

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Toxic in contact with skin.
Harmful if swallowed.
Causes severe skin burns and eye damage.

Precautionary statements

Prevention : Wear protective gloves. Wear eye or face protection. Wear protective clothing. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling.

Response : IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or physician. IF SWALLOWED: Immediately call a POISON CENTER or physician. Rinse mouth. Do NOT induce vomiting. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. Wash contaminated clothing before reuse. Immediately call a POISON CENTER or physician. IF ON SKIN: Take off immediately all contaminated clothing and wash it before reuse. Wash with plenty of soap and water. Call a POISON CENTER or physician if you feel unwell. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Section 2. Hazards identification

Immediately call a POISON CENTER or physician.

Storage : Store locked up.

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

Supplemental label elements : Keep container tightly closed. Do not breathe vapor or spray. Do not taste or swallow. Use only with adequate ventilation. Wash thoroughly after handling.

Hazards not otherwise classified : Causes respiratory tract burns. Causes digestive tract burns.

Ingredients of unknown toxicity : Percentage of the mixture consisting of ingredient(s) of unknown inhalation toxicity: 57.9%

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Other means of identification : Not available.

Ingredient name	%	CAS number
ammonium O,O-bis(methylphenyl) dithiophosphate	49 - 51	58373-83-4
mix-cresol	0 - 7	1319-77-3
ammonia	0 - 1	1336-21-6

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

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

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

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

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Get medical attention immediately. Call a poison center or physician. Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician.

Inhalation : Get medical attention immediately. Call a poison center or physician. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Skin contact : Get medical attention immediately. Call a poison center or physician. Wash with plenty of soap and water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Chemical burns must be treated promptly by a physician. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Chemical burns must be treated promptly by a physician. Never give anything by mouth to an unconscious person. If unconscious, place in

Section 4. First aid measures

recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Causes serious eye damage.

Inhalation : Corrosive to the respiratory system.

Skin contact : Causes severe burns. Toxic in contact with skin.

Ingestion : May cause burns to mouth, throat and stomach. Harmful if swallowed. Corrosive to the digestive tract. Causes burns.

Over-exposure signs/symptoms

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

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing

Skin contact : Adverse symptoms may include the following:
pain or irritation
redness
blistering may occur

Ingestion : Adverse symptoms may include the following:
stomach pains

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

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

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

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : In a fire or if heated, a pressure increase will occur and the container may burst.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides
sulfur oxides
phosphorus oxides

Section 5. Fire-fighting measures

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

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

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Do not breathe vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

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

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

Methods and materials for containment and cleaning up

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

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

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

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

Conditions for safe storage, including any incompatibilities : Do not store below the following temperature: 0°C (32°F). Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
ammonium O,O-bis(methylphenyl) dithiophosphate Cresol	None. **OSHA PEL 1989 (United States, 3/1989).** **Absorbed through skin.** TWA: 5 ppm 8 hours. TWA: 22 mg/m³ 8 hours. **OSHA PEL (United States, 5/2018).** **Absorbed through skin.** TWA: 5 ppm 8 hours. TWA: 22 mg/m³ 8 hours. **ACGIH TLV (United States, 3/2018).** **Absorbed through skin.** TWA: 20 mg/m³ 8 hours. Form: Inhalable fraction and vapor

Appropriate engineering controls : Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

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

Individual protection measures

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

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles and/or face shield. If inhalation hazards exist, a full-face respirator may be required instead.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

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

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 9. Physical and chemical properties

Appearance

Physical state : Liquid.

Color : Reddish brown.

Odor : Tar-like.

Odor threshold : Not available.

pH : 9 to 10.5

Melting point : -5 to -1°C (23 to 30.2°F)

Boiling point : 99°C (210.2°F)

Flash point : Not available.

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Not available.

Vapor pressure : Not available.

Vapor density : Not available.

Relative density : Not available.

Density : 1.11 to 1.15 g/cm³ [20°C (68°F)]

Solubility : Not available.

Solubility in water : Not available.

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

Auto-ignition temperature : Not available.

Decomposition temperature : Not available.

Viscosity : Not available.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : No specific data.

Incompatible materials : acids

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Cresol	LD50 Dermal LD50 Oral	Rabbit Rat	200 mg/kg 1454 mg/kg	- -

Irritation/Corrosion

Not available.

Sensitization

Section 11. Toxicological information

Not available.

Mutagenicity

Not available.

Carcinogenicity

No components known to Quadra, present at or above the cut-off value/concentration limit (≥0.1%), are listed as carcinogens by IARC, OSHA or NTP.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Routes of entry anticipated: Oral, Inhalation.

Potential acute health effects

Eye contact : Causes serious eye damage.

Inhalation : Corrosive to the respiratory system.

Skin contact : Causes severe burns. Toxic in contact with skin.

Ingestion : May cause burns to mouth, throat and stomach. Harmful if swallowed. Corrosive to the digestive tract. Causes burns.

Symptoms related to the physical, chemical and toxicological characteristics

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

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing

Skin contact : Adverse symptoms may include the following:
pain or irritation
redness
blistering may occur

Ingestion : Adverse symptoms may include the following:
stomach pains

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

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Section 11. Toxicological information

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral Dermal	937 mg/kg 567.4 mg/kg

Section 12. Ecological information

Ecotoxicity

Product/ingredient name	Result	Species	Exposure
Cresol	Acute EC50 5 to 10 ppm Marine water	Algae - Macrocystis pyrifera - Young	4 days
	Acute EC50 7000 µg/l Fresh water	Crustaceans - Gammarus fasciatus	48 hours
	Acute LC50 10000 µg/l Fresh water	Fish - Lepomis macrochirus	96 hours

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Cresol	2.33	17 to 20	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

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

Section 13. Disposal considerations

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

Section 13. Disposal considerations

and sewers.

United States - RCRA Toxic hazardous waste "U" List

Ingredient	CAS #	Status	Reference number
Cresol	1319-77-3	Listed	U052

Section 14. Transport information

DOT Classification

UN number : UN2927

UN proper shipping name : Toxic liquid, corrosive, organic, n.o.s. (mix-cresol, ammonium O,O-bis(methylphenyl) dithiophosphate)

Transport hazard class(es) : 6.1 (8)

Packing group : II

Environmental hazards : No.

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

Additional information : **Reportable quantity** 1443 lbs / 655.12 kg [153.15 gal / 579.75 L]. Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.

Transport in bulk according to Annex II of MARPOL and the IBC Code : Not available.

Section 15. Regulatory information

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

State regulations

Massachusetts : The following components are listed: CRESOL

New York : The following components are listed: Cresol(s)

New Jersey : The following components are listed: CRESOLS (mixed isomers); CRESYLIC ACID

Pennsylvania : The following components are listed: PHENOL, METHYL-

California Prop. 65

None of the components are listed.

Section 16. Other information

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

Health	/	3
Flammability		0
Physical hazards		0

Section 16. Other information

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings and the associated label are not required on SDSs or products leaving a facility under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered trademark and service mark of the American Coatings Association, Inc.

The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.

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

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Procedure used to derive the classification

Classification	Justification
ACUTE TOXICITY (oral) - Category 4	Calculation method
ACUTE TOXICITY (dermal) - Category 3	Calculation method
SKIN CORROSION - Category 1	Calculation method
SERIOUS EYE DAMAGE - Category 1	Calculation method

History

Date of issue/Date of revision : 6/4/2020

Date of previous issue : No previous validation

Version : 1

Prepared by Regulatory Affairs

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

Indicates information that has changed from previously issued version.

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.

Aerofloat 242

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

1.1 Product identifier

- Trade name AEROFLOAT® 242 PROMOTER

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

Uses of the Substance / Mixture

- Mining chemicals

1.3 Details of the supplier of the safety data sheet

Company

CYTEC INDUSTRIES INC.
504 CARNEGIE CENTER
PRINCETON, NJ 08540 USA
Telephone: +1-973-357-3193

1.4 Emergency telephone

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

Disclaimer

The ® indicates a Registered Trademark in the United States and the ™ indicates a trademark in the United States. The mark may also be registered, subject of an application for registration, or a trademark in other countries.

SECTION 2: Hazards identification

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

2.1 Classification of the substance or mixture

HCS 2012 (29 CFR 1910.1200)

Acute toxicity, Category 4	H302: Harmful if swallowed.
Acute toxicity, Category 3	H311: Toxic in contact with skin.
Skin corrosion, Category 1B	H314: Causes severe skin burns and eye damage.
Serious eye damage, Category 1	H318: Causes serious eye damage.
Skin sensitization, Category 1	H317: May cause an allergic skin reaction.
Reproductive toxicity, Category 2	H361: Suspected of damaging fertility or the unborn child.
Specific target organ toxicity - repeated exposure, Category 2	H373: May cause damage to organs through prolonged or repeated exposure. (Thyroid)

2.2 Label elements

HCS 2012 (29 CFR 1910.1200)

Pictogram

Signal Word

- Danger

Hazard Statements

- H302	Harmful if swallowed.
- H311	Toxic in contact with skin.
- H314	Causes severe skin burns and eye damage.
- H317	May cause an allergic skin reaction.
- H361	Suspected of damaging fertility or the unborn child.
- H373	May cause damage to organs (Thyroid) through prolonged or repeated exposure.

Precautionary Statements

Prevention

- P201	Obtain special instructions before use.
- P202	Do not handle until all safety precautions have been read and understood.
- P260	Do not breathe dust/ fume/ gas/ mist/ vapors/ spray.
- P264	Wash skin thoroughly after handling.
- P270	Do not eat, drink or smoke when using this product.
- P272	Contaminated work clothing must not be allowed out of the workplace.
- P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response

- P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
- P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
- P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
- P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.
- P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.
- P308 + P313	IF exposed or concerned: Get medical advice/ attention.
- P333 + P313	If skin irritation or rash occurs: Get medical advice/ attention.
- P362	Take off contaminated clothing and wash before reuse.

Storage

- P405	Store locked up.

Disposal

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

2.3 Other hazards which do not result in classification

- H402: Harmful to aquatic life.
- H412: Harmful to aquatic life with long lasting effects.

SECTION 3: Composition/information on ingredients

3.1 Substance

- Not applicable, this product is a mixture.

3.2 Mixture

- Chemical nature Mixture of cresol and ammonium salt of aryldithiophosphoric acid in water

Hazardous Ingredients and Impurities

Chemical name	Identification number CAS-No.	Concentration [%]
Dithiophosphate salt	*****	60 - 80
Phenol, methyl-	1319-77-3	<= 10
Thiourea, N,N'-diphenyl-	102-08-9	<= 10
Ammonium hydroxide ((NH4)(OH))	1336-21-6	<= 1

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

SECTION 4: First aid measures

4.1 Description of first-aid measures

In case of inhalation

- Quickly move the person away from the contaminated area. Make the affected person rest.
- Immediate medical attention is required.
- Show this sheet to the doctor.
- Be prepared to provide first aid or medical support if necessary.

In case of skin contact

- Wash off immediately with plenty of water for at least 15 minutes.
- Use appropriate protective equipment when treating a contaminated person.
- Immediate medical attention is required.
- Show this sheet to the doctor.
- Be prepared to provide first aid or medical support if necessary.

In case of eye contact

- Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
- Keep eye wide open while rinsing.
- Show this sheet to the doctor.
- Always obtain medical advice, even if there are no symptoms.
- Be prepared to provide first aid or medical support if necessary.

In case of ingestion

- Do NOT induce vomiting.
- Immediate medical attention is required.
- Show this sheet to the doctor.
- Do not give anything to drink.
- Be prepared to provide first aid or medical support if necessary.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms

- Symptoms will depend on the target organs.
- Inhalation may provoke the following symptoms:
- Cough
- Breathing difficulties
- Irritation
- Redness

- Swelling of tissue
- Ingestion may provoke the following symptoms:
- Nausea
- Diarrhea
- Abdominal pain
- May cause respiratory tract irritation.
- allergic rhinitis
- Severe allergic skin reactions, bronchiospasm and anaphylactic shock
- Itching
- Dermatitis
- Causes skin burns.
- Lachrymation
- Conjunctivitis
- Causes eye burns.
- The gas deadens the sense of smell. Do not depend on odor to detect presence of gas.

Effects

- Serious effects on health can appear after exposure.
- Effects on health may appear after prolonged or repeated exposure.
- The effects will depend on target organs.
- Chronic exposure is suspected of causing effects on fertility or on the unborn child on basis of animal data. Effects on human have not been proven.
- Chronic exposure may cause allergic dermatitis.
- Exposure may cause allergic rhinitis, conjunctivitis, asthma or shock.
- If ingested, severe burns of the mouth and throat, as well as a danger of perforation of the esophagus and the stomach.
- In case of inhalation, irritation/corrosion of the respiratory tract.
- Risk of respiratory disorder
- May cause irreversible skin damage.
- Chronic exposure may cause dermatitis.
- May cause irreversible eye damage.
- Loss of the eye

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician

- Be aware to maintain life support if necessary.
- Take victim immediately to hospital.
- Immediate medical attention is required.
- Consult with an ophthalmologist immediately in all cases.
- Burns must be treated by a physician.
- Treat symptomatically.
- Contact a poison control center.
- Keep under medical supervision for at least 48 hours.
- Contact the occupational physician in case of exposure.

SECTION 5: Firefighting measures

Flash point	closed cup No flash up to boiling point
Autoignition temperature	No data available
Flammability / Explosive limit	No data available

5.1 Extinguishing media

Suitable extinguishing media

- Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

Specific hazards during fire fighting

- Under fire conditions:
- Will burn
- On combustion, toxic gases are released.

Hazardous combustion products:

- Sulfur dioxide or hydrogen sulfide may be formed under fire conditions.

5.3 Advice for firefighters

Special protective equipment for fire-fighters

- In the event of fire, wear self-contained breathing apparatus.
- Personal protective equipment comprising: suitable protective gloves, safety goggles and protective clothing
- Wear a positive-pressure supplied-air respirator with full facepiece.
- For further information refer to section 8 "Exposure controls / personal protection."

Specific fire fighting methods

- Cool containers/tanks with water spray.
- Do not use a solid water stream as it may scatter and spread fire.

Further information

- Do not flush to sewer which may contain acid.
- This could result in generation of toxic and flammable hydrogen sulfide.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

- Where exposure level is not known, wear approved, positive pressure, self-contained respirator.
- Where exposure level is known, wear approved respirator suitable for level of exposure.
- Avoid contact with the skin and the eyes.
- In addition to the protective clothing/equipment in Section 8, wear a two piece PVC suit with hood or PVC overalls with hood.

6.2 Environmental precautions

- Stop the leak. Turn leaking containers leak-side up to prevent the escape of liquid.
- Contain the spilled material by diking.
- Do not let product enter drains.
- Do not allow uncontrolled discharge of product into the environment.

- Spills may be reportable to the National Response Center (800-424-8802) and to state and/or local agencies

6.3 Methods and materials for containment and cleaning up

- Stop leak if safe to do so.
- Keep in properly labeled containers.
- Keep in suitable, closed containers for disposal.

- Wash nonrecoverable remainder with large amounts of water.
- Soak up with inert absorbent material and dispose of as hazardous waste.
- Decontaminate tools, equipment and personal protective equipment in a segregated area.
- Dispose of in accordance with local regulations.
- Never return spills in original containers for re-use.

6.4 Reference to other sections

- 7. HANDLING AND STORAGE
- 8. EXPOSURE CONTROLS/PERSONAL PROTECTION
- 13. DISPOSAL CONSIDERATIONS

SECTION 7: Handling and storage

7.1 Precautions for safe handling

- Large quantities of undiluted product should not be mixed with acids, since evolution of toxic and flammable hydrogen sulfide could result. In particular, precautions must be taken to avoid the accidental discharge of large volumes of the product in acid storage tanks or any tank or containment containing acidic materials. This precaution does not, of course, apply to addition of this reagent to flotation pulps in amounts customarily used in flotation, where the reagent amounts are small and instantly diluted to concentrations well below the solubility limits.

Hygiene measures

- Handle in accordance with good industrial hygiene and safety practice.
- Wash hands before breaks and at the end of workday.
- When using do not eat, drink or smoke.
- Eye wash bottles or eye wash stations in compliance with applicable standards.
- Ensure that eyewash stations and safety showers are close to the workstation location.

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage rooms and vessels

Recommended storage temperature: 32 - 95 °F (0 - 35 °C)

- To guarantee the quality and properties of the product keep according to Storage temperature and conditions.

7.3 Specific end use(s)

- no data available

SECTION 8: Exposure controls/personal protection

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

8.1 Control parameters

Components with workplace occupational exposure limits

Components	Value type	Value	Basis
Phenol, methyl-	TWA	20 mg/m3	American Conference of Governmental Industrial Hygienists
	Form of exposure : Inhalable fraction and vapor Danger of cutaneous absorption		

Phenol, methyl-	TWA	5 ppm 22 mg/m3	Occupational Safety and Health Administration - Table Z-1 Limits for Air Contaminants
	Skin designation, The value in mg/m3 is approximate.		
Phenol, methyl-	PEL	5 ppm 22 mg/m3	
	Skin		
Ammonium hydroxide ((NH4)(OH))	TWA	50 ppm 35 mg/m3	Occupational Safety and Health Administration - Table Z-1 Limits for Air Contaminants
	The value in mg/m3 is approximate.		
Ammonium hydroxide ((NH4)(OH))	TWA	25 ppm	American Conference of Governmental Industrial Hygienists
	Expressed as :Ammonia		
Ammonium hydroxide ((NH4)(OH))	STEL	35 ppm	American Conference of Governmental Industrial Hygienists
	Expressed as :Ammonia		
Ammonium hydroxide ((NH4)(OH))	TWA	25 ppm 18 mg/m3	National Institute for Occupational Safety and Health
	Often used in an aqueous solution.Expressed as :Ammonia		
Ammonium hydroxide ((NH4)(OH))	ST	35 ppm 27 mg/m3	National Institute for Occupational Safety and Health
	Often used in an aqueous solution.Expressed as :Ammonia		

NIOSH IDLH (Immediately Dangerous to Life or Health Concentrations)

Components	CAS-No.	Concentration
Phenol, methyl-	1319-77-3	250 parts per million

8.2 Exposure controls

Control measures

Engineering measures

- Ensure adequate ventilation.
- Apply technical measures to comply with the occupational exposure limits.

Individual protection measures

Respiratory protection

- Keep in a well-ventilated place.

Hand protection

- Take note of the information given by the producer concerning permeability and break through times, and of special workplace conditions (mechanical strain, duration of contact).
- Impervious gloves

Suitable material

- Nitrile or fluorinated rubber gloves.

Eye protection
- Chemical resistant goggles must be worn.
- Tightly fitting safety goggles

Skin and body protection
- Impervious clothing
- Full protective suit
- Change working clothes after each work-shift.
- Contaminated work clothing should not be allowed out of the workplace.

Hygiene measures
- Handle in accordance with good industrial hygiene and safety practice.
- Wash hands before breaks and at the end of workday.
- When using do not eat, drink or smoke.
- Eye wash bottles or eye wash stations in compliance with applicable standards.
- Ensure that eyewash stations and safety showers are close to the workstation location.

SECTION 9: Physical and chemical properties

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

9.1 Information on basic physical and chemical properties

Appearance	Physical state: liquid Color: Yellow-brown
Odor	Ammonia sulfur
Odor Threshold	No data available
Molecular weight	Mixture
pH	> 10.0 (77 °F (25 °C))
Melting point/freezing point	Freezing point: -4.5 °F (-20.3 °C)
Initial boiling point and boiling range	212 °F (100 °C)
Flash point	closed cup No flash up to boiling point
Evaporation rate (Butylacetate = 1)	No data available
Flammability (solid, gas)	No data available
Flammability (liquids)	No data available
Flammability / Explosive limit	No data available
Autoignition temperature	No data available
Vapor pressure	No data available

Vapor density	No data available
Density	1.159 g/cm3 (77 °F (25 °C))
Relative density	No data available
Solubility	Water solubility: completely soluble
Partition coefficient: n-octanol/water	No data available
Decomposition temperature	No data available
Viscosity	No data available
Explosive properties	No data available
Oxidizing properties	No data available

9.2 Other information

Corrosion of Metals	Not classified due to data which are conclusive although insufficient for classification.
Reactions with water / air	Contact with acids liberates toxic gas.

SECTION 10: Stability and reactivity

10.1 Reactivity

- no data available

10.2 Chemical stability

- Stable

10.3 Possibility of hazardous reactions

- no data available

10.4 Conditions to avoid

- Keep away from oxidizing agents, strongly acid or alkaline materials and amines.
- Free radical initiators

10.5 Incompatible materials

- Strong acids and oxidizing agents

10.6 Hazardous decomposition products

Hazardous decomposition products
- Ammonia
- Carbon dioxide (CO2)

Thermal decomposition
- Carbon monoxide
- Sulfur oxides
- Phenol
- toluene
- Benzene
- Methane

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Acute oral toxicity	This product is classified as acute toxicity category 4 According to the available data on the components. According to the classification criteria for mixtures. Unpublished reports and/or published data.
Acute inhalation toxicity	Not classified as hazardous for acute inhalation toxicity according to GHS. According to the available data on the components. According to the classification criteria for mixtures. Unpublished reports and/or published data.
Acute dermal toxicity	
Dithiophosphate salt	Rabbit This product is classified as acute toxicity category 3
Phenol, methyl-	LD50 : 301 mg/kg - Rabbit This product is classified as acute toxicity category 3 Unpublished reports According to the available data on the constituents
Thiourea, N,N'-diphenyl-	LD50 : > 2,000 mg/kg - Rat , male and female Method: OECD Test Guideline 402 Not classified as hazardous for acute dermal toxicity according to GHS.
Acute toxicity (other routes of administration)	Not applicable
Skin corrosion/irritation	Corrosive to skin According to the available data on the components. According to the classification criteria for mixtures. Unpublished reports and/or published data.
Serious eye damage/eye irritation	Risk of serious damage to eyes. According to the available data on the components. According to the classification criteria for mixtures. Unpublished reports and/or published data.

Respiratory or skin sensitization

Thiourea, N,N'-diphenyl-	Maximization Test - Guinea pig ≥ 30 % responding at ≤ 0,1 % intradermal induction dose Method: OECD Test Guideline 406 Unpublished reports

Mutagenicity

Genotoxicity in vitro	Product is not considered to be genotoxic According to the available data on the components. According to the classification criteria for mixtures. Unpublished reports and/or published data.
Genotoxicity in vivo	Product is not considered to be genotoxic According to the available data on the components. According to the classification criteria for mixtures. Unpublished reports and/or published data.
Carcinogenicity	The product is not considered to be carcinogenic. According to the available data on the components. According to the classification criteria for mixtures. Unpublished reports and/or published data.

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

NTP
IARC
OSHA

Toxicity for reproduction and development

Toxicity to reproduction / fertility

Ammonium hydroxide ((NH4)(OH))	By analogy Reproduction / developmental toxicity screening test - Rat, male and female, Oral General Toxicity Parent NOAEL: 1,500 mg/kg bw/day OECD Test Guideline 422 Gavage, No toxicity to reproduction, Published data

Developmental Toxicity/Teratogenicity

Thiourea, N,N'-diphenyl-	Developmental Toxicity - Rat, male and female, Oral General Toxicity Maternal NOAEL: > 200 mg/kg bw/day Teratogenicity NOAEL F1:> 200mg/kg bw/day Developmental Toxicity NOAEL F1: 100 mg/kg bw/day Embryo-fetal toxicity. NOAEL F1: 50 mg/kg bw/day Method: OECD Test Guideline 414 Published data
Ammonium hydroxide ((NH4)(OH))	By analogy Reproduction / developmental toxicity screening test - Rat, male and female, Oral General Toxicity Maternal NOAEL: 1,500 mg/kg bw/day Method: OECD Test Guideline 422 Gavage, The product is not considered to be toxic for development., Unpublished reports By analogy

reproductive and developmental toxicity study - Rabbit, female, Oral Gavage, The product is not considered to be embryotoxic / fetotoxic., Published data

STOT

STOT-single exposure

The substance or mixture is not classified as specific target organ toxicant, single exposure according to GHS criteria.
According to the available data on the components.
According to the classification criteria for mixtures.
Unpublished reports and/or published data.

STOT-repeated exposure

The substance or mixture is classified as specific target organ toxicant, repeated exposure, category 2 according to GHS criteria.
According to the available data on the components.
According to the classification criteria for mixtures.
Unpublished reports and/or published data.

The product itself has not been tested.

Experience with human exposure

Experience with human exposure : Inhalation

In contact with acid

Symptoms: Released substances:
Hydrogen sulphide
Inhalation may provoke the following symptoms:
Irritating to the respiratory system and mucous membranes.
Coma
cardiorespiratory failure
Neurological disorders
Gastrointestinal disturbance

Experience with human exposure : Skin contact

No data is available on the product itself.

Experience with human exposure : Eye contact

No data is available on the product itself.

Experience with human exposure : Ingestion

No data is available on the product itself.

CMR effects

Teratogenicity

Thiourea, N,N'-diphenyl- — Suspected of damaging the unborn child.

Aspiration toxicity

No aspiration toxicity classification, According to the available data on the components, According to the classification criteria for mixtures.

SECTION 12: Ecological information

12.1 Toxicity

Aquatic Compartment

Acute toxicity to fish	LC50 - 96 h : ca.66 mg/l - Oncorhynchus mykiss (rainbow trout) static test Method: OECD Test Guideline 203 Published data
Acute toxicity to daphnia and other aquatic invertebrates	The product itself has not been tested.
Toxicity to aquatic plants	The product itself has not been tested.
Toxicity to microorganisms	The product itself has not been tested.
Chronic toxicity to fish	The product itself has not been tested.
Chronic toxicity to daphnia and other aquatic invertebrates	The product itself has not been tested.

Sediment compartment

Toxicity to benthic organisms	The product itself has not been tested.

Terrestrial Compartment

Toxicity to soil dwelling organisms	The product itself has not been tested.
Toxicity to terrestrial plants	The product itself has not been tested.
Toxicity to above ground organisms	The product itself has not been tested.

M-Factor

Ammonium hydroxide ((NH4)(OH))	Acute aquatic toxicity = 1 (according to the Globally Harmonized System (GHS))

12.2 Persistence and degradability

Abiotic degradation

Stability in water	Conclusion is not possible for a mixture as a whole.
Photodegradation	Conclusion is not possible for a mixture as a whole.
Other Physicochemical reactions	Conclusion is not possible for a mixture as a whole.

Physical- and photo-chemical elimination

Physico-chemical removability	Conclusion is not possible for a mixture as a whole.

Biodegradation

Biodegradability	< 70 % - 28 Days Information given is based on data obtained from similar products Expert judgment
Ratio BOD / COD	Conclusion is not possible for a mixture as a whole.

Ratio BOD / ThOD	Conclusion is not possible for a mixture as a whole.
Biochemical Oxygen Demand (BOD)	Conclusion is not possible for a mixture as a whole.
Dissolved organic carbon (DOC)	Conclusion is not possible for a mixture as a whole.
Chemical Oxygen Demand (COD)	Conclusion is not possible for a mixture as a whole.
Adsorbed organic bound halogens (AOX)	Conclusion is not possible for a mixture as a whole.

Degradability assessment

Phenol, methyl-	The product is considered to be rapidly degradable in the environment
Thiourea, N,N'-diphenyl-	The product is not considered to be rapidly degradable in the environment
Ammonium hydroxide ((NH4)(OH))	The product is considered to be rapidly degradable in the environment Expert judgment

12.3 Bioaccumulative potential

Partition coefficient: n-octanol/water	Conclusion is not possible for a mixture as a whole.
Bioconcentration factor (BCF)	As bioaccumulation is not relevant for mixtures, all the components of the mixture were assessed individually. Conclusion is not possible due to incomplete or heterogeneous data on the components Unpublished reports Published data

12.4 Mobility in soil

Adsorption potential (Koc)	Conclusion is not possible for a mixture as a whole.
Known distribution to environmental compartments	Conclusion is not possible due to incomplete or heterogeneous data on the components

12.5 Results of PBT and vPvB assessment	This mixture contains no substance considered to be persistent, bioaccumulating and toxic (PBT). This mixture contains no substance considered to be very persistent and very bioaccumulating (vPvB). According to the available data on the components

12.6 Other adverse effects

Ecotoxicity assessment

Short-term (acute) aquatic hazard	Harmful to aquatic life. According to the available data on the components. According to the classification criteria for mixtures. Unpublished reports and/or published data.
Long-term (chronic) aquatic hazard	Harmful to aquatic life with long lasting effects. According to the available data on the components. According to the classification criteria for mixtures. Unpublished reports and/or published data.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product Disposal

- The Company encourages the recycle, recovery and reuse of materials, where permitted. If disposal is necessary, The Company recommends that organic materials, especially when classified as hazardous waste, be disposed of by thermal treatment or incineration at approved facilities. All local and national regulations should be followed.

SECTION 14: Transport information

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

DOT

14.1 UN number	UN 2922
14.2 Proper shipping name	CORROSIVE LIQUIDS, TOXIC, N.O.S. (Dithiophosphate salt, CRESOL (CRESYLIC ACID))
14.3 Transport hazard class	8
Subsidiary hazard class	6.1
Label(s)	8 (6.1)
14.4 Packing group	
Packing group	II
ERG No	154
14.5 Environmental hazards	NO
Marine pollutant	

14.6 Special precautions for user

This product contains one or more ingredients identified as a hazardous substance in Appendix A of 49 CFR 172.101.

Reportable quantities	:	RQ substance: CRESOL (CRESYLIC ACID) RQ limit for substance: 100 lb

TDG

14.1 UN number	UN 2922
14.2 Proper shipping name	CORROSIVE LIQUID, TOXIC, N.O.S. (Dithiophosphate salt, CRESOL (CRESYLIC ACID))
14.3 Transport hazard class	8
Subsidiary hazard class	6.1
Label(s)	8 (6.1)
14.4 Packing group	
Packing group	II

ERG No	154
14.5 Environmental hazards **Marine pollutant**	NO

NOM

14.1 UN number	UN 2922
14.2 Proper shipping name	CORROSIVE LIQUID, TOXIC, N.O.S. (Dithiophosphate salt, CRESOL (CRESYLIC ACID))
14.3 Transport hazard class	8
Subsidiary hazard class	6.1
Label(s)	8 (6.1)
14.4 Packing group	
Packing group	II
ERG No	154
14.5 Environmental hazards **Marine pollutant**	NO

IMDG

14.1 UN number	UN 2922
14.2 Proper shipping name	CORROSIVE LIQUID, TOXIC, N.O.S. (Dithiophosphate salt, Cresol (Cresylic Acid))
IMDG Code segregation group	Alkalis (SGG18)
14.3 Transport hazard class	8
Subsidiary hazard class	6.1
Label(s)	8 (6.1)
14.4 Packing group	
Packing group	II
14.5 Environmental hazards **Marine pollutant**	NO
14.6 Special precautions for user	
EmS	F-A , S-B

For personal protection see section 8.

14.7 Transport in bulk vessels according to IMO instruments

No data available

IATA

14.1 UN number	UN 2922
14.2 Proper shipping name	CORROSIVE LIQUID, TOXIC, N.O.S. (Dithiophosphate salt, Cresol (Cresylic Acid))
14.3 Transport hazard class	8
Subsidiary hazard class:	6.1
Label(s):	8 (6.1)
14.4 Packing group	
Packing group	II
Packing instruction (cargo aircraft)	855
Max net qty / pkg	30.00 L
Packing instruction (passenger aircraft)	851
Max net qty / pkg	1.00 L
14.5 Environmental hazards	NO

14.6 Special precautions for user
For personal protection see section 8.

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

SECTION 15: Regulatory information

15.1 Notification status

Inventory Information	Status
United States TSCA Inventory	- All substances listed as active on the TSCA inventory
EU. European Registration, Evaluation, Authorisation and Restriction of Chemical (REACH)	- When purchased from a Solvay legal entity based in the EEA ("European Economic Area"), this product is compliant with the registration provisions of the REACH Regulation (EC) No. 1907/2006 as all its components are either excluded, exempt, and/or registered. When purchased from a legal entity outside of the EEA, please contact your local representative for additional information.
Canadian Domestic Substances List (DSL)	- Listed on Inventory
Australia Inventory of Chemical Substances (AICS)	- Listed on Inventory
Japan. CSCL - Inventory of Existing and New Chemical Substances	- Listed on Inventory
Korea. Korean Existing Chemicals Inventory (KECI)	- Listed on Inventory
China. Inventory of Existing Chemical Substances in China (IECSC)	- Listed on Inventory
Philippines Inventory of Chemicals and Chemical Substances (PICCS)	- Listed on Inventory
Taiwan Chemical Substance Inventory (TCSI)	- One or more components not listed on inventory
New Zealand. Inventory of Chemical Substances	- All components are listed on the NZIOC inventory. The HSNO status of the product has not been assessed.

15.2 Federal Regulations

US. EPA EPCRA SARA Title III

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

Acute toxicity (any route of exposure)	Yes
Skin corrosion or irritation	Yes
Serious eye damage or eye irritation	Yes
Respiratory or skin sensitization	Yes
Reproductive toxicity	Yes
Specific target organ toxicity (single or repeated exposure)	Yes

The categories not mentioned are not relevant for the product.

Section 313 Toxic Chemicals (40 CFR 372.65)
The following components are subject to reporting levels established by SARA Title III, Section 313:

Components	CAS-No.	Concentration
Phenol, methyl-	1319-77-3	<= 10%

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

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

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

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

Components	CAS-No.	Reportable quantity
Ammonium hydroxide ((NH4)(OH))	1336-21-6	1000 lb
Phenol, methyl-	1319-77-3	100 lb

15.3 State Regulations

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

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

SECTION 16: Other information

NFPA (National Fire Protection Association) - Classification

Health	3 serious
Flammability	1 slight
Instability or Reactivity	0 minimal

Further information

- Distribute new edition to clients
- Update
- See section 2

Date Prepared: 09/20/2019

Key or legend to abbreviations and acronyms used in the safety data sheet

- PEL	Permissible exposure limit
- ST	STEL - 15-minute TWA exposure that should not be exceeded at any time during a workday
- STEL	Short-term exposure limit
- TWA	8-hour, time-weighted average
- ACGIH	American Conference of Governmental Industrial Hygienists
- OSHA	Occupational Safety and Health Administration
- NTP	National Toxicology Program
- IARC	International Agency for Research on Cancer
- NIOSH	National Institute for Occupational Safety and Health

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

Polyfroth W20

Quadra

SAFETY DATA SHEET

POLYFROTH® W20

Section 1. Identification

Product identifier as used on the label : POLYFROTH® W20

Product code : Q10575

Other means of identification : Not available.

Product type : Liquid.

Recommended use of the chemical and restrictions on use

Identified uses
Industrial applications.

Supplier's details : Quadra Chemicals Inc.
21 Waterway Ave., Suite 200
The Woodlands, TX
United States (US) 77380
1-800-665-6553

Emergency telephone number (with hours of operation) : **Transportation Emergency - 24Hrs/Day - In US - Call 1-800-633-8253**

Section 2. Hazards identification

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

Classification of the substance or mixture : Not classified.

GHS label elements

Signal word : No signal word.

Hazard statements : No known significant effects or critical hazards.

Precautionary statements

Prevention : Not applicable.

Response : Not applicable.

Storage : Not applicable.

Disposal : Not applicable.

Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Other means of identification : Not available.

Ingredient name	%	CAS number
[(methylethylene)bis(oxy)]dipropanol	98 - 100	24800-44-0

Section 3. Composition/information on ingredients

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

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

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

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

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention if symptoms occur.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur.

Ingestion : Wash out mouth with water. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Do not induce vomiting unless directed to do so by medical personnel. Get medical attention if symptoms occur.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Ingestion : No known significant effects or critical hazards.

Over-exposure signs/symptoms

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

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

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

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

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : In a fire or if heated, a pressure increase will occur and the container may burst.

Section 5. Fire-fighting measures

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

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

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

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Put on appropriate personal protective equipment.

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

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

Methods and materials for containment and cleaning up

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

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

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8).

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

Conditions for safe storage, including any incompatibilities : Store between the following temperatures: 15 to 30°C (59 to 86°F). Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
[(methylethylene)bis(oxy)]dipropanol	None.

Appropriate engineering controls : Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

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

Individual protection measures

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

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

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

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 9. Physical and chemical properties

Appearance

Physical state : Liquid. [Clear.]

Color : Colorless.

Odor : Not available.

Odor threshold : Not available.

pH : 8.5 to 9.5 [Conc. (% w/w): 50%]

Melting point : -45°C (-49°F)

Boiling point : 269.5 to 270.5°C (517.1 to 518.9°F)

Flash point : Closed cup: 145°C (293°F)

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Not available.

Vapor pressure : 0.013 kPa (0.0999 mm Hg) [room temperature]

Section 9. Physical and chemical properties

Vapor density : 6.6 [Air = 1]

Relative density : Not available.

Density :

Solubility : Easily soluble in the following materials: cold water.

Solubility in water : Not available.

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

Auto-ignition temperature : 232°C (449.6°F)

Decomposition temperature : Not available.

Viscosity : Kinematic (room temperature): 0.773 cm^2/s (77.3 cSt)
Kinematic (40°C (104°F)): 0.234 cm^2/s (23.4 cSt)

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : No specific data.

Incompatible materials : oxidizing materials
acids
alkalis

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
[(methylethylene)bis(oxy)] dipropanol	LD50 Oral	Rat	3 g/kg	-

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

No components known to Quadra, present at or above the cut-off value/concentration limit (≥0.1%), are listed as carcinogens by IARC, OSHA or NTP.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Section 11. Toxicological information

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Routes of entry anticipated: Oral, Inhalation.

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Ingestion : No known significant effects or critical hazards.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

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

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral	3000.6 mg/kg

Section 12. Ecological information

Ecotoxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
[(methylethylene)bis(oxy)] dipropanol	-0.379	<5.7	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

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

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

DOT Classification

UN number : Not regulated.

UN proper shipping name : -

Transport hazard class(es) : -

Packing group : -

Environmental hazards : No.

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

Additional information : Not available.

Transport in bulk according to Annex II of MARPOL and the IBC Code : Not available.

Section 15. Regulatory information

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

State regulations

Massachusetts : None of the components are listed.

New York : None of the components are listed.

New Jersey : None of the components are listed.

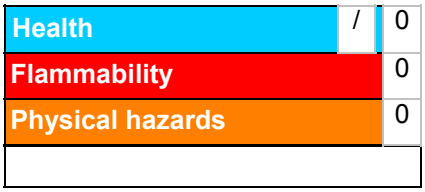
Pennsylvania : None of the components are listed.

California Prop. 65

None of the components are listed.

Section 16. Other information

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



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings and the associated label are not required on SDSs or products leaving a facility under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered trademark and service mark of the American Coatings Association, Inc.

The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.

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

Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Procedure used to derive the classification

Classification	Justification
Not classified.	

History

Date of issue/Date of revision : 12/11/2019

Date of previous issue : No previous validation

Version : 1

Prepared by Regulatory Affairs

Section 16. Other information

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

Indicates information that has changed from previously issued version.

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.

Oreprep 549

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

1.1 Product identifier

- Trade name OREPREP® F-549 FROTHER

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

Uses of the Substance / Mixture

- Frother

1.3 Details of the supplier of the safety data sheet

Company

CYTEC CANADA INC.
9061 Garner Road, Niagara Falls,
Ontario, Canada L2H 0Y2
Tel:+1-905-356-9000

1.4 Emergency telephone

FOR EMERGENCIES INVOLVING A SPILL, LEAK, FIRE, EXPOSURE OR ACCIDENT, CONTACT CHEMTREC (24-Hour Number): +1-800-424-9300 within the United States and Canada, or +1-703-527-3887 for international collect calls.

Disclaimer

The ® indicates a Registered Trademark in the United States and the ™ indicates a trademark in the United States. The mark may also be registered, subject of an application for registration, or a trademark in other countries.

SECTION 2: Hazards identification

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

2.1 Classification of the substance or mixture

Hazardous Products Regulations (WHMIS 2015)

Skin irritation, Category 2	H315: Causes skin irritation.
Eye irritation, Category 2A	H319: Causes serious eye irritation.

2.2 Label elements

Hazardous Products Regulations (WHMIS 2015)

Pictogram

Signal Word

- Warning

Hazard Statements

- H315 Causes skin irritation.

- H319 Causes serious eye irritation.

Precautionary Statements

Prevention

- P264 Wash skin thoroughly after handling.
- P280 Wear protective gloves/ eye protection/ face protection.

Response

- P302 + P352 IF ON SKIN: Wash with plenty of water.
- P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- P332 + P313 If skin irritation occurs: Get medical advice/ attention.
- P337 + P313 If eye irritation persists: Get medical advice/ attention.
- P362 + P364 Take off contaminated clothing and wash it before reuse.

2.3 Other hazards which do not result in classification

None identified

SECTION 3: Composition/information on ingredients

3.1 Substance

- Chemical nature Mixture of polyglycols

WHMIS Hazardous Ingredients and Impurities

Chemical name	Identification number CAS-No.	Concentration [% wt/wt or V/V]
Mixed glycol ethers	*****	60 - 100

3.2 Mixture

Not applicable, this product is a substance.

SECTION 4: First aid measures

4.1 Description of first-aid measures

In case of inhalation

- Quickly move the person away from the contaminated area. Make the affected person rest.
- Obtain medical attention.
- Show this sheet to the doctor.
- Be prepared to provide first aid or medical support if necessary.

In case of skin contact

- Wash off immediately with plenty of water for at least 15 minutes.
- Use appropriate protective equipment when treating a contaminated person.
- In case of inflammation (redness, irritation, ...) obtain medical attention.
- Show this sheet to the doctor.
- Be prepared to provide first aid or medical support if necessary.

In case of eye contact

- Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
- Keep eye wide open while rinsing.
- Show this sheet to the doctor.

- Always obtain medical advice, even if there are no symptoms.
- Be prepared to provide first aid or medical support if necessary.

In case of ingestion

- Do NOT induce vomiting.
- Obtain medical attention.
- Show this sheet to the doctor.
- Do not give anything to drink.
- Be prepared to provide first aid or medical support if necessary.

4.2 Most important symptoms and effects, both acute and delayed

Effects

- If ingested, severe burns of the mouth and throat, as well as a danger of perforation of the esophagus and the stomach.
- In case of inhalation, irritation/corrosion of the respiratory tract.
- May cause irreversible skin damage.
- Chronic exposure may cause dermatitis.
- May cause irreversible eye damage.
- Loss of the eye

Symptoms

- Irritation
- Redness
- Swelling of tissue
- May cause respiratory tract irritation.
- Causes skin burns.
- Lachrymation
- Conjunctivitis
- Causes eye burns.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician

- Take victim immediately to hospital.
- Immediate medical attention is required.
- Consult with an ophthalmologist immediately in all cases.
- Burns must be treated by a physician.
- Contact a poison control center.
- Keep under medical supervision for at least 48 hours.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media

- Water spray
- Foam
- Carbon dioxide (CO2)
- Multipurpose powders

Unsuitable extinguishing media

- High volume water jet

5.2 Special hazards arising from the substance or mixture

- Under fire conditions:

- Will burn
- On combustion, toxic gases are released.

5.3 Advice for firefighters

Special protective equipment for fire-fighters

- In the event of fire, wear self-contained breathing apparatus.
- Personal protective equipment comprising: suitable protective gloves, safety goggles and protective clothing
- For further information refer to section 8 "Exposure controls / personal protection."

Specific fire fighting methods

- Cool containers/tanks with water spray.
- Do not use a solid water stream as it may scatter and spread fire.

Further information

- Standard procedure for chemical fires.
- Collect contaminated fire extinguishing water separately. This must not be discharged into drains.
- Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

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

6.2 Environmental precautions

- Stop the leak. Turn leaking containers leak-side up to prevent the escape of liquid.
- Contain the spilled material by diking.
- Do not let product enter drains.
- Do not allow uncontrolled discharge of product into the environment.

6.3 Methods and materials for containment and cleaning up

- Stop leak if safe to do so.
- Keep in properly labeled containers.
- Keep in suitable, closed containers for disposal.
- Wash nonrecoverable remainder with large amounts of water.
- Soak up with inert absorbent material and dispose of as hazardous waste.
- Decontaminate tools, equipment and personal protective equipment in a segregated area.
- Dispose of in accordance with local regulations.
- Never return spills in original containers for re-use.

6.4 Reference to other sections

- 7. HANDLING AND STORAGE
- 8. EXPOSURE CONTROLS/PERSONAL PROTECTION
- 13. DISPOSAL CONSIDERATIONS

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Hygiene measures

- Handle in accordance with good industrial hygiene and safety practice.
- Wash hands before breaks and at the end of workday.
- When using do not eat, drink or smoke.
- Eye wash bottles or eye wash stations in compliance with applicable standards.
- Ensure that eyewash stations and safety showers are close to the workstation location.

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage rooms and vessels

Recommended storage temperature: 41 - 95 °F (5 - 35 °C)

- Keep in a dry, cool and well-ventilated place.
- To guarantee the quality and properties of the product keep according to Storage temperature and conditions.

7.3 Specific end use(s)

- no data available

SECTION 8: Exposure controls/personal protection

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

8.1 Control parameters

- Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Control measures

Engineering measures
- Ensure adequate ventilation.
- Apply technical measures to comply with the occupational exposure limits.

Individual protection measures

Respiratory protection
- Keep in a well-ventilated place.

Hand protection
- Take note of the information given by the producer concerning permeability and break through times, and of special workplace conditions (mechanical strain, duration of contact).
- Impervious gloves

Eye protection
- Chemical resistant goggles must be worn.
- Tightly fitting safety goggles

Skin and body protection
- Impervious clothing
- Change working clothes after each work-shift.
- Contaminated work clothing should not be allowed out of the workplace.

Hygiene measures
- Handle in accordance with good industrial hygiene and safety practice.
- Wash hands before breaks and at the end of workday.
- When using do not eat, drink or smoke.

- Eye wash bottles or eye wash stations in compliance with applicable standards.
- Ensure that eyewash stations and safety showers are close to the workstation location.

SECTION 9: Physical and chemical properties

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

9.1 Information on basic physical and chemical properties

Physical state	liquid
Color	Yellow-brown
Odor	mild, ether-like
Odor Threshold	No data available
Melting point/freezing point	Freezing point: ca. -31 °F (-35 °C)
Initial boiling point and boiling range	Boiling point/boiling range: > 399.9 °F (> 204.4 °C)
Flammability (solid, gas)	No data available
Flammability (liquids)	No data available
Flammability / Explosive limit	Lower flammability/explosion limit: Type: Lower flammability limit Not applicable Upper flammability/explosion limit: Type: Upper flammability limit Not applicable
Flash point	> 230 °F (110 °C) Pensky-Martens closed cup
Autoignition temperature	No data available
Decomposition temperature	No data available
pH	Not applicable
Viscosity	Viscosity, dynamic : ca. 28 mPa.s (77 °F (25 °C))
Solubility	Water solubility: completely soluble
Partition coefficient: n-octanol/water	No data available
Vapor pressure	< 0.02 mmHg (< 0.03 hPa) (77 °F (25 °C))
Density	0.99 - 1.05 g/cm3
Relative density	No data available
Relative vapor density	Very low
Particle characteristics	No data available

Evaporation rate (Butylacetate = 1)	< 0.01

9.2 Other information

Oxidizing properties	Not considered as oxidizing.
Peroxides	The substance or mixture is not classified as organic peroxide.
Corrosion of Metals	Not corrosive to metals.
Molecular weight	Mixture

SECTION 10: Stability and reactivity

10.1 Reactivity

- no data available

10.2 Chemical stability

- Stable

10.3 Possibility of hazardous reactions

- no data available

10.4 Conditions to avoid

- no data available

10.5 Incompatible materials

- Strong oxidizing agents

10.6 Hazardous decomposition products

Hazardous decomposition products

- Carbon monoxide
- Carbon dioxide (CO_2)

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Acute oral toxicity	No data available
Acute inhalation toxicity	No data available
Acute dermal toxicity	No data available
Acute toxicity (other routes of administration)	No data available

Skin corrosion/irritation

Mixed glycol ethers	Skin irritation

Serious eye damage/eye irritation

Mixed glycol ethers	Eye irritation
Respiratory or skin sensitization	No data available

Mutagenicity

Genotoxicity in vitro	No data available
Genotoxicity in vivo	No data available
Carcinogenicity	No data available

Toxicity for reproduction and development

Toxicity to reproduction / fertility	No data available
Developmental Toxicity/Teratogenicity	No data available

STOT

STOT-single exposure	No data available
STOT-repeated exposure	No data available
Experience with human exposure	No data available
Aspiration toxicity	No data available

SECTION 12: Ecological information

12.1 Toxicity

Aquatic Compartment

Acute toxicity to fish	No data available
Acute toxicity to daphnia and other aquatic invertebrates	No data available
Toxicity to aquatic plants	No data available
Toxicity to microorganisms	No data available
Chronic toxicity to fish	No data available
Chronic toxicity to daphnia and other aquatic invertebrates	No data available

12.2 Persistence and degradability

Abiotic degradation	No data available
Physical- and photo-chemical elimination	No data available
Biodegradation	No data available

12.3 Bioaccumulative potential

Partition coefficient: n-octanol/water	No data available
Bioconcentration factor (BCF)	No data available

12.4 Mobility in soil

Adsorption potential (Koc)	No data available
Known distribution to environmental compartments	No data available

12.5 Results of PBT and vPvB assessment No data available

12.6 Other adverse effects No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product Disposal

- The Company encourages the recycle, recovery and reuse of materials, where permitted. If disposal is necessary, The Company recommends that organic materials, especially when classified as hazardous waste, be disposed of by thermal treatment or incineration at approved facilities. All local and national regulations should be followed.

SECTION 14: Transport information

TDG
not regulated

DOT
not regulated

NOM
not regulated

IMDG
not regulated

IATA
not regulated

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

SECTION 15: Regulatory information

15.1Notification status

Inventory Information	Status
United States TSCA Inventory	- All substances listed as active on the TSCA inventory
Canadian Domestic Substances List (DSL)	- Listed on Inventory
Australia Inventory of Chemical Substances (AICS)	- Listed on Inventory
Japan. CSCL - Inventory of Existing and New Chemical Substances	- Listed on Inventory
Korea. Korean Existing Chemicals Inventory (KECI)	- Listed on Inventory
China. Inventory of Existing Chemical Substances in China (IECSC)	- Listed on Inventory
Philippines Inventory of Chemicals and Chemical Substances (PICCS)	- Listed on Inventory
Taiwan Chemical Substance Inventory (TCSI)	- Listed on Inventory

New Zealand. Inventory of Chemical Substances	- All components are listed on the NZIoC inventory. Additional HSNO obligations may apply. Please refer to Section 15 of SDS for New Zealand.
EU. European Registration, Evaluation, Authorization and Restriction of Chemical (REACH)	- When purchased from a Solvay legal entity based in the EEA ("European Economic Area"), this product is compliant with the registration provisions of the REACH Regulation (EC) No. 1907/2006 as all its components are either excluded, exempt, and/or registered. When purchased from a legal entity outside of the EEA, please contact your local representative for additional information.

15.2 National Regulations

Canada. CEPA 1999 Significant New Activity (SNAc) List:

- No substances are subject to a Significant New Activity Notification.

SECTION 16: Other information

Revision Date:

03/19/2021

NFPA (National Fire Protection Association) - Classification

Health	2 moderate
Flammability	1 slight
Instability or Reactivity	0 minimal

Further information

- Distribute new edition to clients

Key or legend to abbreviations and acronyms used in the safety data sheet

- ACGIH: American Conference of Governmental Industrial Hygienists
- OSHA: Occupational Safety and Health Administration
- NTP: National Toxicology Program
- IARC: International Agency for Research on Cancer
- NIOSH: National Institute for Occupational Safety and Health
- ADR: European Agreement on International Carriage of Dangerous Goods by Road.
- ADN: European Agreement on the International Carriage of Dangerous Goods by Inland Waterways.
- RID: European Agreement concerning the International Carriage of Dangerous Goods by Rail.
- IATA: International Air Transport Association.
- ICAO-TI: Technical Specification for Safe Transport of Dangerous Goods by Air.
- IMDG: International Maritime Dangerous Goods.
- TWA: Time weighted average
- ATE: Estimated value of acute toxicity
- EC: European Community number
- CAS: Chemical Abstracts Service.
- LD50: Substance that causes 50% (half) death in the test animals group (Median Fatal Dose).
- LC50: Substance concentration causing 50% (half) death in the test animals group.
- EC50: Effective Concentration of the substance causing the maximum of 50%.

- PBT: Persistent, Bioaccumulative and Toxic substance.
- vPvB: Very Persistent and Very Bioaccumulative.
- SEA: Classification, labeling, packaging regulation
- DNEL: Derived No Effect Level
- PNEC: Predicted No Effect Concentration
- STOT: Specific Target Organ Toxicity

Not all acronyms listed above are referenced in this SDS.

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

CuSO4

SAFETY DATA SHEET

CUPRIC SULPHATE (B)

Section 1. Identification

Product identifier : CUPRIC SULPHATE (B)

Product code : Q04613

Relevant identified uses of the substance or mixture

Identified uses
Industrial applications

Supplier's details : QUADRA CHEMICALS LTD.
3901 F.X Tessier
Vaudreuil-Dorion, QC
CANADA J7V 5V5
1-800-665-6553

Emergency telephone number (with hours of operation) : **TRANSPORTATION EMERGENCY - 24HRS/DAY - 7 DAYS/WEEK IN CANADA - CALL 1-888-922-3330**

Section 2. Hazard identification

Classification of the substance or mixture : ACUTE TOXICITY (oral) - Category 4
EYE IRRITATION - Category 2A

GHS label elements

Hazard pictograms :

Signal word : Warning

Hazard statements : Harmful if swallowed.
Causes serious eye irritation.

Precautionary statements

Prevention : Wear eye or face protection. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling.

Response : IF SWALLOWED: Call a POISON CENTER or physician if you feel unwell. Rinse mouth. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

Storage : Not applicable.

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

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Ingredient name	% (w/w)	CAS number
Sulfuric acid copper(2+) salt (1:1), hydrate (1:5)	98 - 100	7758-99-8

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

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

Section 4. First-aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. If necessary, call a poison center or physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the nose, throat and lungs.

Skin contact : No known significant effects or critical hazards.

Ingestion : Harmful if swallowed.

Over-exposure signs/symptoms

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

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing

Section 4. First-aid measures

Skin contact : No specific data.

Ingestion : No specific data.

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

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

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

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

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

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : No specific fire or explosion hazard.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
sulfur oxides
metal oxide/oxides

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

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

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing dust. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

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

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

Methods and materials for containment and cleaning up

Section 6. Accidental release measures

Small spill : Move containers from spill area. Avoid dust generation. Using a vacuum with HEPA filter will reduce dust dispersal. Place spilled material in a designated, labeled waste container. Dispose of via a licensed waste disposal contractor.

Large spill : Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Avoid creating dusty conditions and prevent wind dispersal. Dispose of via a licensed waste disposal contractor. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

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

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

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Sulfuric acid copper(2+) salt (1:1), hydrate (1:5)	-

Appropriate engineering controls : Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

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

Individual protection measures

Section 8. Exposure controls/personal protection

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

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles. If operating conditions cause high dust concentrations to be produced, use dust goggles.

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

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

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 9. Physical and chemical properties

Physical state : Solid. [Crystals or powder.]

Color : Blue.

Odor : Odourless.

Odor threshold : Not available.

pH : Not available.

Melting point : Not available.

Boiling point : Not available.

Flash point : Not available.

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Not available.

Vapor pressure : Not available.

Vapor density : Not available.

Relative density : 2.284

Density : 2.284 g/cm³ [20°C (68°F)]

Solubility : Soluble in the following materials: cold water and methanol.

Dispersibility properties : Not available.

Section 9. Physical and chemical properties

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

Auto-ignition temperature : Not available.

Decomposition temperature : >110°C (>230°F)

Viscosity : Not available.

Volatility : Not available.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : No specific data.

Incompatible materials : metals

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Sulfuric acid copper(2+) salt (1:1), hydrate (1:5)	LD50 Oral	Rat	960 mg/kg	-

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Section 11. Toxicological information

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Routes of entry anticipated: Oral, Inhalation.

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the nose, throat and lungs.

Skin contact : No known significant effects or critical hazards.

Ingestion : Harmful if swallowed.

Symptoms related to the physical, chemical and toxicological characteristics

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

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing

Skin contact : No specific data.

Ingestion : No specific data.

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

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

General : Repeated or prolonged inhalation of dust may lead to chronic respiratory irritation.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral	960.2 mg/kg

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Sulfuric acid copper(2+) salt (1:1), hydrate (1:5)	Acute EC50 182 ppb Fresh water Acute LC50 0.032 ppm Fresh water	Daphnia - Daphnia magna Fish - Oncorhynchus mykiss	48 hours 96 hours

Persistence and degradability

Not available.

Bioaccumulative potential

Not available.

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

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

Section 13. Disposal considerations

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

Section 14. Transport information

	TDG Classification
UN number	3077
UN proper shipping name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Sulfuric acid copper(2+) salt (1:1), hydrate (1:5))
Transport hazard class(es)	9 
Packing group	III
Additional information	Not available.

Section 14. Transport information

Section 15. Regulatory information

Canada inventory : All components are listed or exempted.

Section 16. Other information

History

Date of issue/Date of revision : 6 November 2019

Prepared by : Regulatory Affairs

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
LogPow = logarithm of the octanol/water partition coefficient
UN = United Nations
HPR = Hazardous Products Regulations

Procedure used to derive the classification

Classification	Justification
ACUTE TOXICITY (oral) - Category 4 EYE IRRITATION - Category 2A	Calculation method Calculation method

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.

ZnSO4

ZINC NACIONAL	SAFETY DATA SHEET			
	Date Previous Revision: 18.07.2016	Date of this revision: 23.04.2018	Revision Number: 7	Página 1 de 2

1. CHEMICAL PRODUCT – COMPANY IDENTIFICATION.

GHS Product name:	Zinc Sulphate Monohydrate
Common / Trade names.	Zinc Sulphate Monohydrate. Zinc Sulphate Maximum 360 / 361 / 362 / 363 / 365
Application.	Fertilizers, intermediates, laboratory chemicals, processing aid not otherwise listed, pharmaceutical substance, surface active agents, lubricants and lubricant additives, fillers, some grades of this substance are available for food/feedstuff additives.
Company Identification.	Zinc Nacional, S.A. Serafín Peña 938 Sur, Monterrey N.L. Mexico, C.P. 64000 Phone: +52 (81) 8345-4078 Fax +52 (81) 8344-3446
Emergency telephone.	Business Hours: +52 (81) 8345-4078 24 Hours: +52 (81) 8378-5730.

2. HAZARDS IDENTIFICATION.

- **Classification of the substance:** GHS Classification.

Acute aquatic toxicity (Category 1) H400; Chronic aquatic toxicity (Category 1) H410
Acute Tox. 4, H302; Eye Damage 1, H318

- **GHS label elements:**

Pictogram	Signal Word	Hazard Statements	Precautionary Statements
	Danger	H302 H318 H400 H410	P273 P301 + P312 P351

* For the full meaning of the phrases H and P: see section 16

3. COMPOSITION AND INFORMATION ON INGREDIENTS.

Component	CE N°	CAS N°	% (w/w)
Zinc Sulphate, $ZnSO_4$	231-793-3	7446-19-7	97.4

4. FIRST-AID MEASURES.

Description of first aid measures.

- **Ingestion:** Have victim rinse mouth thoroughly with water. "Do not induce vomiting". Immediately give large amounts of water. If vomiting occurs, rinse mouth and repeat administration of water. Obtain medical advice. Never give anything by mouth to an unconscious or convulsing person.
- **Inhalation:** If symptoms are experienced, remove source of contamination or move victim to fresh air. In case of breathing difficulties administer oxygen. If symptoms persist, obtain medical advice immediately.
- **Contact with eyes:** In case of eye contact, keep eyelid open and flush with plenty of water for 15 minutes. If irritation should persist subsequently consult an ophthalmologist. Protect the eye that is not injured.
- **Contact with skin:** After contact with skin, wash immediately with: Water. Subsequently wash again with: Water and soap. Take off immediately all contaminated clothing. If irritation persists, seek medical attention.

5. FIRE-FIGHTING MEASURE

- **Suitable extinguishing media:** Water sprays jet, water mist, foam and carbon d oxide (CO_2).
- **Unsuitable extinguishing media:** Full water jet.
- **Special hazards.** In case of fire may be liberated sulphur dioxide (SO_2) and Sulphur trioxide (SO_3).
- **Combustion decomposition products:** Sulphur dioxide (SO_2) and sulphur trioxide (SO_3) are generated.
- **Advice for firefighters:** Heating of container(s) will cause pressure rise with risk of bursting and subsequent explosion gives of toxic and irritant fumes when heated or burning. The vapor may be invisible and is heavier than air. It spreads along the ground and may enter sewers and basements. Keep container(s) cool with water. Extinguish with water fog (spray). Do not use water jet to extinguish. Use water spray to knock down fire fumes if possible. Avoid unnecessary run-off of extinguishing media which may cause pollution.
- **Personal protective equipment:** Wear self-contained breathing apparatus.

6. ACCIDENTAL RELEASE MEASURES.

- **Personal precautions:** Use personal protective equipment (see section 8).
- **Environmental precautions:** Stop leaks if possible. Contain spillage by any means available. Cover drains. Do not allow to enter into soil/subsoil. Do not empty into drains or the aquatic environment.
- **Methods and material for containment and cleaning up:** Sweep spilled substance into containers. Carefully collect remainder, and then remove to safe place. Dispose according to regulations (see section 13).

7. HANDLING AND STORAGE.

- **Precautions for safe handling.**
  - Avoid spilling, skin and eye contact.
  - Use mechanical ventilation in case of handing which causes formation of dust.
  - Avoid inhalation of dust.
- **Conditions for safe storage, including any incompatibilities:**
  - Keep in the original container.
  - Keep in a fresh, dry and vented place.
  - Store away of strong acids or alkaline substances.
  - Store away of oxidizing or reducing materials.
  - Keep the container free of leaks.
  - Store away from hot surfaces and ask flame places.

8. EXPOSURE CONTROL / PERSONAL PROTECTION.

- **Exposure limits.**

Component	Mexico	USA	Europe
Zinc Sulphate	NOM-010-STPS (Mexico, 4/2014). LMPE-PPT: 10 mg/m³ 8 hours (powder). LMPE-CT: 10 mg/m³ 15 min (smoke). LMPE-PPT: 2 mg/m³ 8 hours (vapor).	OSHA PEL (2/2013). TWA: 5 mg/m³ 8 hours (Respirable fraction). TWA: 15 mg/m³ 8 hours (Total dust).	TWA 10 mg / m³ 8 hours (Total dust). TWA 4 mg / m³ 8 hours (Respirable fraction).

- **Exposure Controls:** Local and general ventilation, to ensure that concentration does not exceed the limits for occupational exposure. Consider enclosing the process. Ensuring control of process conditions. Replacement air supply to supply air continuously removed. Provide showers and eyewash stations.

- **Individual protection**

Eye Protection: Safety goggles are recommended.

Hand protection: Natural rubber gloves are recommended. Wash hands and face before eating, drinking or smoking.

Respiratory Equipment: P2 filter respirator for inert particles. Use NIOSH approved particulate respirator if dust generation occurs.

Other protection: Wear appropriate clothing to prevent reasonably probable skin contact. Chemical resistant safety shoes.

9. PHYSICAL AND CHEMICAL PROPERTIES.

- **Appearance:** Solid powder or granule.
- **Color:** White.
- **Odor:** Odorless.
- **Molecular weight (g./mol):** 179.47.
- **Relative density (g./cm3):** 3.35 20°C.
- **Melting point:** 100°C (212°F).
- **Boiling point:** 500°C (932 °F).
- **Ph:** 4.5 – 6.5.
- **Solubility in water:** 45 g. of Zinc Sulfate in 100 g. (100 ml) of water at 78°F.
- **Flash Point:** Not applicable.

10. STABILITY AND REACTIVITY.

Reactivity: Stable.

Chemical stability: Stable under ordinary conditions and storage.

Possibility of hazardous reactions: Reacts with peroxides and other radical forming substances.

Conditions to avoid: High temperatures and moisture.

Incompatible materials: Oxidizers (strong), Acids.

Hazardous decomposition products: In case of fire, sulfur oxides (Sox) are produced.

11. TOXICOLOGICAL INFORMATION.

Information on toxicological effects.

- **Acute toxicity.** Oral: LD50 = 564 to 2949 mg/kg bw, (Rat). Dermal: LD50 > 2000 mg/kg bw, (Rat).
- **Skin corrosion/irritation.** Not irritant.
- **Carcinogenicity.** Not carcinogen.
- **Serious eye damage/irritation.** Strong irritant
- **Reproductive toxicity.** Not toxic for reproduction.
- **Respiratory or skin sensitization.** No sensitizing.
- **Germ cell mutagenicity.** Not mutagenic.
- **STOT-single exposure.** Not toxic.
- **STOT-repeated exposure.** Not toxic.
- **Aspiration hazard.** Not available.

12. ECOLOGICAL INFORMATION.

Toxicity.

- **Ecotoxicity.** Aquatic invertebrates. For pH <7: 1.13 mg Zn/l (based on 48 h. Ceriodaphnia dubia test) Algae. For pH >7-8.5: 3.73 mg Zn/l (based on 72 h. Selenastrum capricornutum test)
- **Bioaccumulation.** Not available.
- **Mobility in soil.** Not available.
- **Results of PBT and mPmB.** Not available.
- **Persistence / degradability.** Not available.
- **Other adverse effects.** Not available.

13. DISPOSAL INFORMATION.

Waste treatment methods.

SUBSTANCE DISPOSAL: Dispose of in accordance with all applicable local and national regulations. Use recovery/recycling where feasible.

CONTAINER DISPOSAL: Empty containers may contain hazardous residues. Do not cut, puncture or weld on or near to the container. Labels should not be removed from containers until they have been cleaned. Contaminated containers must not be treated as household waste. Containers should be cleaned by appropriate methods.

14. TRANSPORT INFORMATION.

- **Latin America**

This material is not regulated.

- **USA**

No DOT regulated in domestic (USA ground) transportation in package sizes less than 1000 lbs (454 kg). The DOT transportation information below is for shipments with package sizes equal to or exceeding this value. IMDG Regulated Marine Pollutant.

DOT

Basic shipping requirements:

UN number	UN 3077
Proper shipping name	Environmentally Hazardous Substance, Solid, N.O.S. (Zinc Sulphate Monohydrate RQ = 1000lbs.)
Hazard class	9
Packing group	III
Special precautions	Read safety instructions, SDS and emergency procedures before handling.
Additional information:	
Special provisions	8, 146, 335, A112, B54, IB8, IP3, N20; T1, TP33
Packaging exceptions	155
Packaging non bulk	213
Packaging bulk	240
Reportable quantity	1000

- **European Union:**

Type of transport	Classification	UN Number	Proper shipping name	Class	Group Packing	Label
Land Road Railroad	ADR RID	UN 3077	Environmentally Hazardous Substance, Solid, N.O.S. (Zinc Sulphate Monohydrate)	9	III	
Sea	IMO / IMDG					
Air	IATA / DGR					

15. REGULATORY INFORMATION.

- **Mexico.**

This material is not regulated.

- **USA**

SARA 302: RQ=None, TPQ=None.
SARA 311/312: Yes (Acute).
SARA 313: Zn and Pb Compounds.
RCRA 261: No
TSCA: No.

TSCA 8(d): No
TSCA 12 (b): No
Prop. 65: Yes (Pb, Cd).
CDTA: No

Florida: Yes
Pennsylvania: Yes
Minnesota: No
Massachusetts: Yes
New Jersey: Yes
California: Yes

- **Canada:**

Clasificación WHMIS: Not controlled
Lista de Sustancias Domesticas (DSL): No

- **Unión Europea:**

EINECS: No.
ELINCS: No.
REACH: Yes (01-2119474684-27-0023).

16. OTHER INFORMATION.

Hazard statements

H302: Harmful if swallowed.
H318: Causes serious eye damage.
H400: Very toxic to aquatic life
H410: Very toxic to aquatic life with long lasting effects.

Precautionary statements

P351: Rinse cautiously with water for several minutes.
P301+P312: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.
P273: Avoid release to the environment.

- **Hazardous Materials Identification System, (HMIS)**

Health: 2 **Fire:** 0 **Reactivity:** 0 **Personal Protection:** E

Personal Protection: E (recommended only for bulk powder) = Gloves + Mask + Glasses

Definitions Classifications.

0 = Minimum 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

This information is based upon calculated data. The company holds no responsibility for damage suffered by the purchaser or other persons handling these goods if safety instructions are not observed. The company holds no responsibility for the wrong use of this material, even if safety instructions have been followed. The purchaser is solely responsible for the use of this material.

NAX 31

PROSPEC CHEMICALS
P.O. BOX 3478
176 STURGEON DRIVE
STURGEON COUNTY, ALBERTA, T8L 2T4
CANADA

PRODUCT: NAX 31

SECTION 01: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURERS.....	PROSPEC CHEMICALS P.O. BOX 3478 176 STURGEON DRIVE STURGEON COUNTY, ALBERTA T8L 2T4 (780) 992-1522
PRODUCT NAME.....	NAX 31
CHEMICAL NAME:.....	SODIUM ISOPROPYL XANTHATE.
CHEMICAL FAMILY:.....	SALTS OF CARBONIC ACID DITHIO ESTERS.
CHEMICAL FORMULA:.....	NOT APPLICABLE.
MOLECULAR WEIGHT:.....	NOT APPLICABLE.
MATERIAL USE:.....	ORE PROCESSING.

SECTION 02: HAZARDS IDENTIFICATION

HAZARD CLASSIFICATION.....	SELF-HEATING SUBSTANCES AND MIXTURES — CATEGORY 1 . ACUTE TOXICITY (ORAL) — CATEGORY 4. ACUTE TOXICITY (DERMAL) — CATEGORY 4. SKIN IRRITATION — CATEGORY 2. EYE IRRITATION — CATEGORY 2A.
SIGNAL WORD.....	DANGER.
HAZARD STATEMENT	
PREVENTION.....	P235+P410 KEEP COOL. PROTECT FROM SUNLIGHT. P264 WASH SKIN AREA THOROUGHLY AFTER HANDLING. P270 DO NO EAT, DRINK OR SMOKE WHEN USING THIS PRODUCT. P280 WEAR PROTECTIVE GLOVES/PROTECTIVE CLOTHING/EYE PROTECTION/FACE PROTECTION.
RESPONSE.....	P301+P310 IF SWALLOWED: IMMEDIATELY CALL A POISON CENTER OR DOCTOR/PHYSICIAN. P330 RINSE MOUTH. P302+P352 IF ON SKIN: WASH WITH PLENTY OF SOAP AND WATER. P332+P313 IF SKIN IRRITATION OCCURS: GET MEDICAL ADVICE/ATTENTION. P362+P364 TAKE OFF CONTAMINATED CLOTHING AND WASH BEFORE REUSE. P305+P351+P338 IF IN EYES: RINSE CAUTIOUSLY WITH WATER FOR SEVERAL MINUTES. REMOVE CONTACT LENSES, IF PRESENT AND EASY TO DO. CONTINUE RINSING.
STORAGE.....	P407 MAINTAIN AIR GAP BETWEEN STACKS/PALLETS. P420 STORE SEPARATELY.
DISPOSAL.....	P501 DISPOSE OF CONTENTS AND CONTAINER IN ACCORDANCE WITH LOCAL REGULATORY REQUIREMENTS. .
OTHER HAZARDS.....	NONE.

SECTION 03: COMPOSITION/INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENTS	CAS #	WT. %
SODIUM ISOPROPYL XANTHATE	140-93-2	65-80
ISOPROPANOL	67-63-0	1-5
SODIUM HYDROXIDE	1310-73-2	1-5

SECTION 04: FIRST AID MEASURES

SKIN:.....	SEEK MEDICAL ATTENTION IMMEDIATELY. REMOVE ALL CONTAMINATED CLOTHING. WASH SKIN AREAS FOR 60 MINUTES OR UNTIL CHEMICAL IS REMOVED WITH SOAP AND WATER. DO NOT USE SOLVENTS. LAUNDER CLOTHES BEFORE RE-USE.
EYE:.....	CHECK FOR AND REMOVE ANY CONTACT LENSES. FLUSH CONTINUOUSLY WITH WATER FOR 15 MINUTES. FORCIBLY HOLD EYELIDS APART TO ENSURE IRRIGATION OF ALL EYE TISSUE. IF IRRITATION PERSISTS GET MEDICAL ATTENTION.

PRODUCT: NAX 31

SECTION 04: FIRST AID MEASURES

INHALATION:.....	REMOVE TO FRESH AIR. GIVE ARTIFICIAL RESPIRATION, OR CARDIOPULMONARY RESUSCITATION (CPR) IF REQUIRED. IF BREATHING IS DIFFICULT, GIVE OXYGEN. KEEP WARM AND QUIET, AND OBTAIN MEDICAL ATTENTION.
INGESTION:.....	IF CONSCIOUS:. DO NOT INDUCE VOMITING. HAVE VICTIM RINSE MOUTH THOROUGHLY WITH WATER. GIVE A MINIMUM OF 500 mL WATER. IF INGESTION OF A LARGE AMOUNT DOES OCCUR SEEK MEDICAL ATTENTION. IF VOMITING OCCURS NATURALLY, HAVE VICTIM LEAN FORWARD TO REDUCE RISK OF ASPIRATION. IF UNCONSCIOUS:. IF INGESTION OF A LARGE AMOUNT DOES OCCUR SEEK MEDICAL ATTENTION.
NOTES TO PHYSICIAN:.....	THERE IS NO SPECIFIC ANTIDOTE. TREATMENT OF EXPOSURE SHOULD BE DIRECTED AT THE CONTROL OF SYMPTOMS AND THE CLINICAL CONDITION OF THE PATIENT.
GENERAL ADVICE:.....	CONSULT A PHYSICIAN AND/OR THE NEAREST POISON CONTROL CENTRE FOR ALL BUT MINOR INSTANCES OF INHALATION OR SKIN CONTACT. AVOID HIGH LEVELS OF DUST, USE DUST MASK OR RESPIRATOR WHEN NECESSARY. PRECAUTIONS SHOULD ALWAYS BE TAKEN TO AVOID SKIN/EYE CONTACT WITH ANY CHEMICAL SUBSTANCE.

SECTION 05: FIRE FIGHTING MEASURES

MEANS OF EXTINCTION:.....	CARBON DIOXIDE. DRY CHEMICAL. WATER.
HAZARDOUS COMBUSTION PRODUCTS.	CARBON DISULPHIDE. CARBONYL SULPHIDE. SODIUM SULPHIDE. ISOPROPYL ALCOHOL.
FLAMMABLE LIMITS IN AIR.....	VAPOURS FROM DECOMPOSITION (CARBON DISULPHIDE) ARE EXTREMELY FLAMMABLE.
IF YES, UNDER WHICH CONDITIONS?.....	SOLID XANTHATE WHEN EXPOSED TO HEAT AND/OR MOISTURE CAUSES DECOMPOSITION, AND VAPOURS ARE VERY FLAMMABLE AND SPONTANEOUS COMBUSTION CAN RESULT.
T.D.G. FLAMMABLE CLASS:.....	CLASS 4.2, SELF-HEATING SUBSTANCES.
SPECIAL PROCEDURES:.....	SELF-CONTAINED, POSITIVE PRESSURE BREATHING APPARATUS AND PROPER PROTECTIVE CLOTHING SHOULD BE WORN IN FIGHTING FIRES INVOLVING ANY CHEMICAL SUBSTANCE. HEAT WILL DECOMPOSE BOTH SOLID AND LIQUID XANTHATES YIELDING CARBON DISULPHIDE WHICH IS EXTREMELY FLAMMABLE AND TOXIC.

SECTION 06: ACCIDENTAL RELEASE MEASURES

CLEAN-UP PROCEDURES, LEAK/SPILL:...	IF IN THE LIQUID STATE:. STOP SPILL AT SOURCE. CONTAIN ANY SPILLED MATERIAL TO PREVENT DISCHARGE INTO THE ENVIRONMENT. ELIMINATE ALL SOURCES OF IGNITION. PERSONS NOT WEARING PROTECTIVE EQUIPMENT SHOULD BE EXCLUDED FROM THE AREA. ABSORB WITH INERT DRY MATERIAL. PUT INTO AN APPROVED METAL SALVAGE DRUM FOR DISPOSAL. IF IN THE SOLID STATE:. ELIMINATE ALL SOURCES OF IGNITION. RESTRICT ACCESS TO AREA UNTIL COMPLETION OF CLEAN-UP. ENSURE CLEAN-UP IS CONDUCTED BY TRAINED PERSONNEL ONLY. DO NOT TOUCH SPILLED MATERIAL. DO NOT USE WATER ON SPILLED MATERIAL AS HEAT WILL BE GENERATED. PUT SPILLED MATERIAL INTO APPROVED SALVAGE DRUMS FOR DISPOSAL. FLUSH CLEANED AREA WITH WATER, MAKING SURE NO WATER ENTERS XANTHATE CONTAINERS.

SECTION 07: HANDLING AND STORAGE

HANDLING PROCEDURES AND EQUIPMENT:	AVOID ALL SKIN CONTACT. AVOID CONTACT WITH EYES. AVOID BREATHING VAPOURS. EQUIPMENT SHOULD BE GROUNDED TO AVOID STATIC DISCHARGE. KEEP AWAY FROM HEAT, SPARKS, AND OPEN FLAME. USE NON-SPARKING TOOLS AND DO NOT SMOKE.
STORAGE NEEDS:.....	STORE SOLID XANTHATES UNDER COOL, DARK, DRY CONDITIONS. LIQUID PRODUCTS MUST BE KEPT COOL AND USED AS QUICKLY AS POSSIBLE.
SPECIAL SHIPPING INSTRUCTIONS.....	USE PRECAUTION WHEN HANDLING OR SHIPPING ANY CHEMICAL SUBSTANCE. PROTECT AGAINST PHYSICAL DAMAGE.

SECTION 08: EXPOSURE CONTROLS/PERSONAL PROTECTION

INGREDIENTS	ACGIH TLV TWA	ACGIH TLV STEL	OSHA PEL PEL	OSHA PEL STEL	NIOSH REL
SODIUM ISOPROPYL XANTHATE	NOT AVAILABLE				
ISOPROPANOL	400 ppm				

PRODUCT: NAX 31

SECTION 08: EXPOSURE CONTROLS/PERSONAL PROTECTION

INGREDIENTS	ACGIH TLV TWA	ACGIH TLV STEL	OSHA PEL PEL	OSHA PEL STEL	NIOSH REL

SODIUM HYDROXIDE 2 mg/m3 (CEILING) ACGIH

EXPOSURE LIMIT OF MATERIAL:..... TLV FOR DUST: 2 mg/m3. CARBON DISULPHIDE (DECOMPOSITION PRODUCT) ACGIH TLV: TWA: 1ppm 8 hour(s).

PROTECTIVE EQUIPMENT:

GLOVES/TYPE:..... WEAR IMPERVIOUS GLOVES (E.G. NEOPRENE, RUBBER).

RESPIRATOR/TYPE:..... IF RESPIRATORY PROTECTION IS REQUIRED, INSTITUTE A COMPLETE RESPIRATORY PROTECTION PROGRAM INCLUDING SELECTION, FIT TESTING, TRAINING, MAINTENANCE AND INSPECTION. REFER TO THE CAS STANDARD Z94.4-M1982 "SELECTION, CARE, AND USE OF RESPIRATORS" WHICH IS AVAILABLE FROM CANADIAN STANDARDS ASSOCIATION, REXDALE ONTARIO, M9W 1R3. IF VAPOURS ARE PRESENT, USE A NIOSH OR MSHA APPROVED RESPIRATOR FOR ACIDIC VAPOURS OR A SELF CONTAINED BREATHING APPARATUS. SEE M.S.D.S FOR MORE DETAIL ON THIS SECTION.

EYE/TYPE:..... FACE SHIELD. CHEMICAL SAFETY GOGGLES.

FOOTWEAR/TYPE:..... RUBBER SAFETY BOOTS.

CLOTHING/TYPE:..... WEAR ADEQUATE PROTECTIVE CLOTHES.

OTHER/TYPE:..... AN EYE WASH STATION AND SAFETY SHOWER SHOULD BE NEAR THE WORK AREA.

ENGINEERING CONTROLS:..... EXPLOSION PROOF MECHANICAL VENTILATION TO LIMIT VAPOUR CONCENTRATION BELOW T.L.V.

SECTION 09: PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE:..... SOLID.

ODOUR/APPEARANCE:..... YELLOW TO YELLOW-GREEN.

ODOUR THRESHOLD:..... NOT AVAILABLE.

pH:..... 10% H2O 13 +/- 1.

FREEZING POINT °C:..... NOT APPLICABLE.

BOILING POINT °C:..... NOT APPLICABLE. M.P. 150 - 250 (decomposes).

FLASH POINT, F, COC..... NOT APPLICABLE. -30 °C FOR CARBON DISULPHIDE VAPOURS.

EVAPORATION RATE:..... NOT APPLICABLE.

% VOLATILE:

BY VOLUME..... < 20.

BY WEIGHT

UPPER EXPLOSION LIMIT:..... 50% (RESIDUAL CARBON DISULPHIDE).

LOWER EXPLOSION LIMIT:..... 1.25% (RESIDUAL CARBON DISULPHIDE).

VAPOUR PRESSURE:..... NOT APPLICABLE.

REL. VAPOUR DENSITY..... NOT APPLICABLE.

SPECIFIC GRAVITY:..... NOT APPLICABLE.

SOLUBILITY IN WATER (20 °C):..... SOLUBLE.

COEFFICIENT WATER/OIL DIST.:..... NOT AVAILABLE.

AUTO IGNITION TEMPERATURE °C:..... 90 (CARBON DISULPHIDE VAPOURS).

SECTION 10: STABILITY AND REACTIVITY

CHEMICAL STABILITY:

YES.

NO, WHICH CONDITIONS?..... SOLID XANTHATES ARE STABLE WHEN KEPT COOL AND DRY, EXPOSURE TO HEAT CAUSES DECOMPOSITION. ACIDS AND OXIDIZING AGENTS ACCELERATE AGING. IN SOLUTION, XANTHATES WILL DECOMPOSE SLOWLY EVEN AT ROOM TEMPERATURE.

COMPATIBILITY WITH OTHER SUBSTANCES:

YES.

NO, WHICH ONES?..... STRONG ACIDS. OXIDIZING AGENTS.

REACTS VIOLENTLY WITH..... VAPORS OR DUSTS MAY EXPLODE.

RATE OF BURNING:..... NOT AVAILABLE.

EXPLOSIVE POWER:..... NOT AVAILABLE.

EXPLOSION DATA:

SENSITIVITY TO STATIC DISCHARGE:..... CARBON DISULPHIDE VAPOURS WHICH MAY EVOLVE DUE TO DECOMPOSITION CAN BE READILY IGNITED BY STATIC DISCHARGE.

SENSITIVITY TO IMPACT:..... NOT AVAILABLE.

DECOMPOSITION:..... CARBON DISULPHIDE. TRITHIOCARBONATE. ISOPROPYL ALCOHOL.

PRODUCT: NAX 31

SECTION 11: TOXICOLOGICAL INFORMATION

INGREDIENTS	LC50	LD50
SODIUM ISOPROPYL XANTHATE	NOT AVAILABLE	ORAL RAT 250-2000mg/ Kg
ISOPROPANOL	FISH: >1400 MG/L, 96 HOURS	NOT AVAILABLE
SODIUM HYDROXIDE	NOT AVAILABLE	140 - 340 MG/KG RAT ORAL

ROUTE OF ENTRY:

IRRITANCY OF MATERIAL:..... IRRITANT. REFER TO ROUTE OF ENTRY, SECTION 3.

SKIN CONTACT:..... DUST OR VAPORS MAY BE IRRITATING. XANTHATE SOLUTIONS WILL CAUSE SEVERE SKIN IRRITATION.

SKIN ABSORPTION:..... NOT AVAILABLE.

EYE ..... DUST OR VAPORS MAY IRRITATE. XANTHATE SOLUTIONS WILL CAUSE SEVERE EYE IRRITATION.

INGESTION:..... CAN CAUSE GASTRO-INTESTINAL IRRITATION, NAUSEA, VOMITING AND DIARRHEA.

INHALATION ..... AIRBORNE DUST MAY CAUSE IRRITATION OF RESPIRATORY AIRWAYS. VAPOURS FROM DECOMPOSITION (CARBON DISULPHIDE) CAN CAUSE SEVERE DISTURBANCES OF MOOD AND BEHAVIOR, INCLUDING EXCITATION, ANGER AND VIOLENT DREAMS.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE TO THIS PRODUCT HAVE NOT BEEN ESTABLISHED. UNNECESSARY EXPOSURE TO THIS PRODUCT OR ANY OTHER CHEMICAL SHOULD BE AVOIDED.

EFFECTS OF ACUTE EXPOSURE:..... REFER TO ROUTE OF ENTRY.

EFFECTS OF CHRONIC EXPOSURE:..... REFER TO ROUTE OF ENTRY.

INHALATION CHRONIC:..... HIGH CONCENTRATIONS OF DECOMPOSITION PRODUCT (CARBON DISULPHIDE) CAN CAUSE DEATH.

REPRODUCTIVE EFFECTS:

REPRODUCTIVE TOXICITY:..... NOT AVAILABLE.

SENSITIZING CAPABILITY OF MATERIAL: NOT AVAILABLE.

SYNERGISTIC MATERIALS:..... NOT AVAILABLE.

MUTAGENICITY:..... NOT AVAILABLE.

TERATOGENICITY & EMBRYOTOXICITY:. NOT AVAILABLE.

CARCINOGENICITY OF MATERIAL:..... NOT AVAILABLE.

ACUTE ORAL TOXICITY..... NOT AVAILABLE. SEE SECTION 3, HAZARDOUS INGREDIENTS.

LC 50 OF MATERIAL, SPECIES & ROUTE: NOT AVAILABLE. SEE SECTION 3, HAZARDOUS INGREDIENTS.

SECTION 12: ECOLOGICAL INFORMATION

ENVIRONMENTAL..... NOT AVAILABLE.

BIODEGRADABILITY..... NOT AVAILABLE.

SECTION 13: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL, METHOD AND EQUIPMENT: ..... ALL WASTE FROM THIS PRODUCT INCLUDING ALL EMPTY CONTAINERS MUST BE DISPOSED OF IN ACCORDANCE WITH MUNICIPAL, PROVINCIAL AND FEDERAL REGULATIONS.

SECTION 14: TRANSPORT INFORMATION

T.D.G. CLASSIFICATION:..... CLASS 4.2 UN 3342 P.G. II.

T.D.G. SHIPPING NAME:..... XANTHATES.

T.D.G. SHIPPING INFORMATION:..... THE DANGEROUS GOODS ARE DESCRIBED IN ACCORDANCE WITH THE UN RECOMMENDATIONS.

SECTION 15: REGULATORY INFORMATION

WHMIS CLASSIFICATION:..... CLASS B DIV. 6. CLASS D DIV. 1 SUB. B. CLASS E.

CPR COMPLIANCE..... THIS PRODUCT HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE CPR AND THE MSDS CONTAINS ALL OF THE INFORMATION REQUIRED BY THE CPR.

DSL/NDSL:..... ALL COMPONENTS ARE LISTED ON THE DSL.

SECTION 16: OTHER INFORMATION

MANUFACTURERS MSDS DATE:..... JUNE 21, 2004.

MSDS REVISION DATE:..... SEPTEMBER 28, 2015.

PRODUCT: NAX 31

SECTION 16: OTHER INFORMATION

NOTES:.....	We urge each customer or recipient of this MSDS to study it carefully to become aware of and understand the hazards associated with the product. The reader should consider consulting reference works or individuals who are experts in ventilation, toxicology, and fire prevention, as necessary or to use and understand the data contained in this MSDS. To promote safe handling, each customer or recipient should: (1) notify its employees, agents, contractors and others whom it knows or believes will use this material of the information in this MSDS and any other information regarding hazards or safety, (2) furnish this same information to each of its customers for the product; and (3) requests its customers to notify their employees, customers, and other users of the product of this information.
PREPARED BY	Regulatory Affairs
PREPARATION DATE.....	OCT 07/2015

Sodium Isopropyl Xanthate

CHARLES TENNANT & Company/Compagnie
CHARLES TENNANT & CO/CIE,
div of CHARLES TENNANT & CO (CANADA) LTD
34 CLAYSON RD., TORONTO, ONTARIO
M9M 2G8
(416)741-9264
CACD

PRODUCT: SODIUM ISOPROPYL XANTHATE

SECTION 01: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURERS	SUPPLIED BY: CHARLES TENNANT & COMPANY 34 CLAYSON ROAD WESTON, ONTARIO M9M 2G8 (416) 741 9264
PRODUCT NAME	SODIUM ISOPROPYL XANTHATE
CHEMICAL NAME:	SEE SECTION 3 "HAZARDOUS INGREDIENTS " . SODIUM ISOPROPYL XANTHATE.
CHEMICAL FAMILY:	SALTS OF CARBONIC ACID DITHIO ESTERS.
CHEMICAL FORMULA:	(CH3)2CHOCSSNa.
MOLECULAR WEIGHT:	NOT APPLICABLE.
MATERIAL USE:	ORE PROCESSING.
24 HOUR EMERGENCY PHONE NUMBER:	CANUTEC (613) 996-6666.

SECTION 02: HAZARDS IDENTIFICATION

HAZARD CLASSIFICATION	SELF-HEATING SUBSTANCES AND MIXTURES — CATEGORY 1 . ACUTE TOXICITY (ORAL) — CATEGORY 4. ACUTE TOXICITY (DERMAL) — CATEGORY 4. SKIN IRRITATION — CATEGORY 2. EYE IRRITATION — CATEGORY 2A.
SIGNAL WORD	DANGER.
HAZARD STATEMENT	H250 CATCHES FIRE SPONTANEOUSLY IF EXPOSED TO AIR. H302+H312 HARMFUL IF SWALLOWED OR IN CONTACT WITH SKIN. H315 CAUSES SKIN IRRITATION.
PRECAUTIONARY STATEMENT PREVENTION	P235+P410 KEEP COOL. PROTECT FROM SUNLIGHT. P264 WASH SKIN AREA THOROUGHLY AFTER HANDLING. P270 DO NOT EAT, DRINK OR SMOKE WHEN USING THIS PRODUCT. P280 WEAR PROTECTIVE GLOVES/PROTECTIVE CLOTHING/EYE PROTECTION/FACE PROTECTION.
RESPONSE	P301+P310 IF SWALLOWED: IMMEDIATELY CALL A POISON CENTER OR DOCTOR/PHYSICIAN. P330 RINSE MOUTH. P302+P352 IF ON SKIN: WASH WITH PLENTY OF SOAP AND WATER. P332+P313 IF SKIN IRRITATION OCCURS: GET MEDICAL ADVICE/ATTENTION. P363 WASH CONTAMINATED CLOTHING BEFORE REUSE. P362+P364 TAKE OFF CONTAMINATED CLOTHING AND WASH BEFORE REUSE. P305+P351+P338 IF IN EYES: RINSE CAUTIOUSLY WITH WATER FOR SEVERAL MINUTES. REMOVE CONTACT LENSES, IF PRESENT AND EASY TO DO. CONTINUE RINSING.
STORAGE	P407 MAINTAIN AIR GAP BETWEEN STACKS/PALLETS. P420 STORE SEPARATELY.
DISPOSAL	P501 DISPOSE OF CONTENTS AND CONTAINER IN ACCORDANCE WITH LOCAL REGULATORY REQUIREMENTS. .
OTHER HAZARDS	NONE.

SECTION 03: COMPOSITION/INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENTS	CAS #	WT. %
ISOPROPANOL	67-63-0	0.5-1.0
SODIUM ISOPROPYL XANTHATE	140-93-2	>84
SODIUM HYDROXIDE	1310-73-2	1.5
SODIUM SULFIDE	1313-8-2	1

SECTION 04: FIRST AID MEASURES

SKIN:	REMOVE ALL CONTAMINATED CLOTHING. WASH SKIN AREAS WITH SOAP AND WATER UNTIL CHEMICAL IS REMOVED. LAUNDER CLOTHES BEFORE RE-USE.

PRODUCT: SODIUM ISOPROPYL XANTHATE

SECTION 04: FIRST AID MEASURES

EYE:	FLUSH CONTINUOUSLY WITH WATER FOR 15 MINUTES. FORCIBLY HOLD EYELIDS APART TO ENSURE IRRIGATION OF ALL EYE TISSUE. IF IRRITATION PERSISTS GET MEDICAL ATTENTION.
INHALATION:	REMOVE TO FRESH AIR. GIVE ARTIFICIAL RESPIRATION, OR CARDIOPULMONARY RESUSCITATION (CPR) IF REQUIRED. IF BREATHING IS DIFFICULT, GIVE OXYGEN. KEEP WARM AND QUIET, AND OBTAIN MEDICAL ATTENTION.
INGESTION:	IF CONSCIOUS:. GIVE A MINIMUM OF 500 mL WATER. INDUCE VOMITING. HAVE VICTIM RINSE MOUTH THOROUGHLY WITH WATER. IF VOMITING OCCURS NATURALLY, HAVE VICTIM LEAN FORWARD TO REDUCE RISK OF ASPIRATION. DO NOT GIVE AN UNCONSCIOUS PERSON ANYTHING BY MOUTH. SEEK IMMEDIATE MEDICAL ATTENTION.
NOTES TO PHYSICIAN:	THERE IS NO SPECIFIC ANTIDOTE. TREATMENT OF EXPOSURE SHOULD BE DIRECTED AT THE CONTROL OF SYMPTOMS AND THE CLINICAL CONDITION OF THE PATIENT.
GENERAL ADVICE:	CONSULT A PHYSICIAN AND/OR THE NEAREST POISON CONTROL CENTRE FOR ALL BUT MINOR INSTANCES OF INHALATION OR SKIN CONTACT. AVOID HIGH LEVELS OF DUST, USE DUST MASK OR RESPIRATOR WHEN NECESSARY. PRECAUTIONS SHOULD ALWAYS BE TAKEN TO AVOID SKIN/EYE CONTACT WITH ANY CHEMICAL SUBSTANCE.

SECTION 05: FIRE FIGHTING MEASURES

MEANS OF EXTINCTION:	CARBON DIOXIDE. DRY CHEMICAL. WATER.
HAZARDOUS COMBUSTION PRODUCTS:	
FLAMMABLE LIMITS IN AIR	VAPOURS FROM DECOMPOSITION (CARBON DISULPHIDE) ARE EXTREMELY FLAMMABLE.
IF YES, UNDER WHICH CONDITIONS?.	SOLID XANTHATE WHEN EXPOSED TO HEAT AND/OR MOISTURE CAUSES DECOMPOSITION, AND VAPOURS ARE VERY FLAMMABLE AND SPONTANEOUS COMBUSTION CAN RESULT.
T.D.G. FLAMMABLE CLASS:	CLASS 4.2, SELF-HEATING SUBSTANCES.
SPECIAL PROCEDURES:	SELF-CONTAINED, POSITIVE PRESSURE BREATHING APPARATUS AND PROPER PROTECTIVE CLOTHING SHOULD BE WORN IN FIGHTING FIRES INVOLVING ANY CHEMICAL SUBSTANCE. HEAT WILL DECOMPOSE BOTH SOLID AND LIQUID XANTHATES YIELDING CARBON DISULPHIDE WHICH IS EXTREMELY FLAMMABLE AND TOXIC.

SECTION 06: ACCIDENTAL RELEASE MEASURES

CLEAN-UP PROCEDURES, LEAK/SPILL:	IF IN THE LIQUID STATE:. STOP SPILL AT SOURCE. CONTAIN ANY SPILLED MATERIAL TO PREVENT DISCHARGE INTO THE ENVIRONMENT. ELIMINATE ALL SOURCES OF IGNITION. PERSONS NOT WEARING PROTECTIVE EQUIPMENT SHOULD BE EXCLUDED FROM THE AREA. ABSORB WITH INERT DRY MATERIAL. PUT INTO AN APPROVED METAL SALVAGE DRUM FOR DISPOSAL. IF IN THE SOLID STATE:. ELIMINATE ALL SOURCES OF IGNITION. RESTRICT ACCESS TO AREA UNTIL COMPLETION OF CLEAN-UP. ENSURE CLEAN-UP IS CONDUCTED BY TRAINED PERSONNEL ONLY. DO NOT TOUCH SPILLED MATERIAL. DO NOT USE WATER ON SPILLED MATERIAL AS HEAT WILL BE GENERATED. PUT SPILLED MATERIAL INTO APPROVED SALVAGE DRUMS FOR DISPOSAL. FLUSH CLEANED AREA WITH WATER, MAKING SURE NO WATER ENTERS XANTHATE CONTAINERS.

SECTION 07: HANDLING AND STORAGE

HANDLING PROCEDURES AND EQUIPMENT:	AVOID ALL SKIN CONTACT. AVOID CONTACT WITH EYES. AVOID BREATHING VAPOURS. EQUIPMENT SHOULD BE GROUNDED TO AVOID STATIC DISCHARGE. KEEP AWAY FROM HEAT, SPARKS, AND OPEN FLAME. USE NON-SPARKING TOOLS AND DO NOT SMOKE.
STORAGE NEEDS:	STORE SOLID XANTHATES UNDER COOL, DARK, DRY CONDITIONS. LIQUID PRODUCTS MUST BE KEPT COOL AND USED AS QUICKLY AS POSSIBLE.
SPECIAL SHIPPING INSTRUCTIONS.....	USE PRECAUTION WHEN HANDLING OR SHIPPING ANY CHEMICAL SUBSTANCE. PROTECT AGAINST PHYSICAL DAMAGE.

SECTION 08: EXPOSURE CONTROLS/PERSONAL PROTECTION

INGREDIENTS	ACGIH TLV TWA	ACGIH TLV STEL	OSHA PEL PEL	OSHA PEL STEL	NIOSH REL
ISOPROPANOL	400 ppm				
SODIUM ISOPROPYL XANTHATE	NOT AVAILABLE				

PRODUCT: SODIUM ISOPROPYL XANTHATE

SECTION 08: EXPOSURE CONTROLS/PERSONAL PROTECTION

INGREDIENTS	ACGIH TLV TWA	ACGIH TLV STEL	OSHA PEL PEL	OSHA PEL STEL	NIOSH REL
SODIUM HYDROXIDE	2 mg/m3 (CEILING) ACGIH				
SODIUM SULFIDE	NOT AVAILABLE				

EXPOSURE LIMIT OF MATERIAL:..... TLV FOR DUST: 2 mg/m3; TLV FOR VAPOURS FROM DECOMP.: 31 mg/m3 (see ACGIH).

PROTECTIVE EQUIPMENT:

GLOVES/TYPE:..... WEAR IMPERVIOUS GLOVES (E.G. NEOPRENE, RUBBER) WHEN THERE IS GREATER EXPOSURE RISK.

RESPIRATOR/TYPE:..... IF RESPIRATORY PROTECTION IS REQUIRED, INSTITUTE A COMPLETE RESPIRATORY PROTECTION PROGRAM INCLUDING SELECTION, FIT TESTING, TRAINING, MAINTENANCE AND INSPECTION. REFER TO THE CAS STANDARD Z94.4-M1982 "SELECTION, CARE, AND USE OF RESPIRATORS" WHICH IS AVAILABLE FROM CANADIAN STANDARDS ASSOCIATION, REXDALE ONTARIO, M9W 1R3. IF VAPOURS ARE PRESENT, USE A NIOSH OR MSHA APPROVED RESPIRATOR FOR ACIDIC VAPOURS OR A SELF CONTAINED BREATHING APPARATUS.

EYE/TYPE:..... FACE SHIELD. SAFETY GLASSES WITH SIDE-SHIELDS.

FOOTWEAR/TYPE:..... SAFETY BOOTS.

CLOTHING/TYPE:..... WEAR ADEQUATE PROTECTIVE CLOTHES.

OTHER/TYPE:..... AN EYE WASH STATION AND SAFETY SHOWER SHOULD BE NEAR THE WORK AREA.

ENGINEERING CONTROLS:..... EXPLOSION PROOF MECHANICAL VENTILATION TO LIMIT VAPOUR CONCENTRATION BELOW T.L.V.

SECTION 09: PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE:..... SOLID.

ODOUR/APPEARANCE:..... YELLOW TO YELLOW-GREEN.

ODOUR THRESHOLD:..... NOT AVAILABLE.

pH:..... 10% H2O 13 +/- 1.

FREEZING POINT °C:..... >182 Deg C.

BOILING POINT:..... NOT APPLICABLE. M.P. 150 - 250 (decomposes).

FLASH POINT:..... NOT APPLICABLE. -30 °C FOR CARBON DISULPHIDE VAPOURS.

EVAPORATION RATE:..... NOT APPLICABLE.

% VOLATILE:..... NOT AVAILABLE .

BY VOLUME..... < 20.

BY WEIGHT..... NOT AVAILABLE.

UPPER EXPLOSION LIMIT:..... 50% (RESIDUAL CARBON DISULPHIDE).

LOWER EXPLOSION LIMIT:..... 1.25% (RESIDUAL CARBON DISULPHIDE).

VAPOUR PRESSURE:..... NOT APPLICABLE.

REL. VAPOUR DENSITY..... NOT APPLICABLE.

SPECIFIC GRAVITY:..... NOT APPLICABLE.

SOLUBILITY IN WATER (20 °C):..... SOLUBLE.

COEFFICIENT WATER/OIL DIST.:..... NOT AVAILABLE.

AUTO IGNITION TEMPERATURE °C:..... NOT AVAILABLE.

SECTION 10: STABILITY AND REACTIVITY

REACTS VIOLENTLY WITH..... VAPORS OR DUSTS MAY EXPLODE.

CHEMICAL STABILITY:

YES.

NO, WHICH CONDITIONS?..... SOLID XANTHATES ARE STABLE WHEN KEPT COOL AND DRY, EXPOSURE TO HEAT CAUSES DECOMPOSITION. ACIDS AND OXIDIZING AGENTS ACCELERATE AGING. IN SOLUTION, XANTHATES WILL DECOMPOSE SLOWLY EVEN AT ROOM TEMPERATURE.

COMPATIBILITY WITH OTHER SUBSTANCES:

YES.

NO, WHICH ONES?..... STRONG ACIDS. OXIDIZING AGENTS.

RATE OF BURNING:..... NOT AVAILABLE.

EXPLOSIVE POWER:..... NOT AVAILABLE.

EXPLOSION DATA:..... NOT AVAILABLE.

SENSITIVITY TO STATIC DISCHARGE:. CARBON DISULPHIDE VAPOURS WHICH MAY EVOLVE DUE TO DECOMPOSITION CAN BE READILY IGNITED BY STATIC DISCHARGE.

SENSITIVITY TO IMPACT:..... NOT AVAILABLE.

DECOMPOSITION:..... CARBON DISULPHIDE. TRITHIOCARBONATE. ISOPROPYL ALCOHOL.

PRODUCT: SODIUM ISOPROPYL XANTHATE

SECTION 11: TOXICOLOGICAL INFORMATION

INGREDIENTS	LC50	LD50
ISOPROPANOL	FISH: >1400 MG/L, 96 HOURS	NOT AVAILABLE
SODIUM ISOPROPYL XANTHATE	NOT AVAILABLE	ORAL RAT 250-2000mg/ Kg
SODIUM HYDROXIDE	NOT AVAILABLE	140 - 340 MG/KG RAT ORAL
SODIUM SULFIDE	NO AVAILABLE	ORAL RAT 208 MG/KG

ROUTE OF ENTRY:	EYE, SKIN CONTACT, INHALATION, INGESTION.
IRRITANCY OF MATERIAL:	IRRITANT. REFER TO ROUTE OF ENTRY, SECTION 3.
SKIN CONTACT:	DUST OR VAPORS MAY BE IRRITATING. XANTHATE SOLUTIONS WILL CAUSE SEVERE SKIN IRRITATION.
SKIN ABSORPTION:	NOT AVAILABLE.
EYE	DUST OR VAPORS MAY IRRITATE. XANTHATE SOLUTIONS WILL CAUSE SEVERE EYE IRRITATION.
INGESTION	CAN CAUSE GASTRO-INTESTINAL IRRITATION, NAUSEA, VOMITING AND DIARRHEA.
INHALATION	AIRBORNE DUST MAY CAUSE IRRITATION OF RESPIRATORY AIRWAYS. VAPOURS FROM DECOMPOSITION (CARBON DISULPHIDE) CAN CAUSE SEVERE DISTURBANCES OF MOOD AND BEHAVIOR, INCLUDING EXCITATION, ANGER AND VIOLENT DREAMS.
MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE:	MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE TO THIS PRODUCT HAVE NOT BEEN ESTABLISHED. UNNECESSARY EXPOSURE TO THIS PRODUCT OR ANY OTHER CHEMICAL SHOULD BE AVOIDED.
EFFECTS OF ACUTE EXPOSURE:	REFER TO ROUTE OF ENTRY.
EFFECTS OF CHRONIC EXPOSURE:	REFER TO ROUTE OF ENTRY.
INHALATION CHRONIC:	HIGH CONCENTRATIONS OF DECOMPOSITION PRODUCT (CARBON DISULPHIDE) CAN CAUSE DEATH.
REPRODUCTIVE EFFECTS:	NOT AVAILABLE.
REPRODUCTIVE TOXICITY:	NOT AVAILABLE.
SENSITIZING CAPABILITY OF MATERIAL:	NOT AVAILABLE.
SYNERGISTIC MATERIALS:	NOT AVAILABLE.
MUTAGENICITY:	NOT AVAILABLE.
TERATOGENICITY & EMBRYOTOXICITY:	NOT AVAILABLE.
CARCINOGENICITY OF MATERIAL:	NOT AVAILABLE.
ACUTE ORAL TOXICITY	NOT AVAILABLE. SEE SECTION 3, HAZARDOUS INGREDIENTS.
LC 50 OF MATERIAL, SPECIES & ROUTE:	NOT AVAILABLE. SEE SECTION 3, HAZARDOUS INGREDIENTS.

SECTION 12: ECOLOGICAL INFORMATION

ENVIRONMENTAL	NOT AVAILABLE. DO NOT ALLOW TO ENTER SOIL, WATERWAYS OR WASTE WATER. THIS PRODUCT MAY BE HARMFUL TO AQUATIC LIFE. .
BIODEGRADABILITY	NOT AVAILABLE.

SECTION 13: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL, METHOD AND EQUIPMENT:	ALL WASTE FROM THIS PRODUCT INCLUDING ALL EMPTY CONTAINERS MUST BE DISPOSED OF IN ACCORDANCE WITH MUNICIPAL, PROVINCIAL AND FEDERAL REGULATIONS.

SECTION 14: TRANSPORT INFORMATION

T.D.G. CLASSIFICATION:	CLASS 4.2 UN 3342 P.G. II.
T.D.G. SHIPPING NAME:	XANTHATES.
T.D.G. SHIPPING INFORMATION:	THE DANGEROUS GOODS ARE DESCRIBED IN ACCORDANCE WITH THE UN RECOMMENDATIONS.

SECTION 15: REGULATORY INFORMATION

WHMIS CLASSIFICATION:	CLASS B DIV. 6. CLASS D DIV. 1 SUB. B.
CPR COMPLIANCE	THIS PRODUCT HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE CPR AND THE SDS CONTAINS ALL OF THE INFORMATION REQUIRED BY THE CPR.
DSL/NDSL:	ALL COMPONENTS ARE LISTED ON THE DSL.

PRODUCT: SODIUM ISOPROPYL XANTHATE

SECTION 16: OTHER INFORMATION

MSDS REVISION DATE:.....	JUNE 19, 2018.
NOTES:.....	The information on this Safety Data Sheet has been obtained from the manufacturer, and where applicable, from other reliable sources such as CCOHS and RTECS. However, CHARLES TENNANT & COMPANY (CANADA) LTD. makes no warranties, expressed or implied, as to the accuracy, completeness or accuracy of the information contained herein, and shall not be held liable (regardless of fault) to anyone directly or indirectly for damages or injuries in the use of this product arising out of or in connection with the accuracy, completeness or adequacy of such information. To promote safe handling, each customer or recipient should: (1) notify its employees, agents, contractors and others whom it knows or believes will use this material of the information in this SDS and any other information regarding hazards or safety, (2) furnish this same information to each of its customers for the product; and (3) requests its customers to notify their employees, customers, and other users of the product of this information.
PREPARED BY	Regulatory Affairs
PREPARATION DATE.....	JUN 21/2018

Flocculant AF-309

SAFETY DATA SHEET

According to U.S. Code of Federal Regulations 29 CFR 1910.1200, Hazard Communication.

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

1.1. Product identifier

Product name: **HYPERFLOC™ AF 309**

Type of product: Mixture.

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

Identified uses: Processing aid for industrial applications.

Uses advised against: None.

1.3. Details of the supplier of the safety data sheet

Company:
SNF Inc.
1 Chemical Plant Road
Riceboro, GA 31323
United States

Telephone: 912-884-3366

Telefax: 912-884-8770

E-mail address: regs@snf.com

1.4. Emergency telephone number

24-hour emergency number: 800-424-9300 CHEMTREC (CCN 20412), Outside U.S. 703-527-3887

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to paragraph (d) of 29 CFR 1910.1200:

Not classified.

2.2. Label elements

Labelling according to paragraph (f) of 29 CFR 1910.1200:

Hazard symbol(s): None.

Signal word: None.

Hazard statement(s): None.

Precautionary statement(s): None.

2.3. Other hazards

Aqueous solutions or powders that become wet render surfaces extremely slippery.

SECTION 3: Composition/information on ingredients

3.1. Substances

Not applicable, this product is a mixture.

3.2. Mixtures

Hazardous components
Contains no reportable hazardous substances.

SECTION 4: First aid measures

4.1. Description of first aid measures

Inhalation:
Move to fresh air. No hazards which require special first aid measures.

Skin contact:
Wash off with soap and plenty of water. Get medical attention if irritation develops and persists.

Eye contact:
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. In case of persistent eye irritation, consult a physician.

Ingestion:
Rinse mouth with water. Do NOT induce vomiting. Get medical attention if symptoms occur.

4.2. Most important symptoms and effects, both acute and delayed

Powder can cause localised skin irritation in folds of the skin or under tight clothing. Moderate eye irritation due to effects all powders have on conjunctivae.

4.3. Indication of any immediate medical attention and special treatment needed

None reasonably foreseeable.

Other information:
Aqueous solutions or powders that become wet render surfaces extremely slippery.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media:
Water. Water spray. Foam. Carbon dioxide (CO2). Dry powder.
Warning! Aqueous solutions or powders that become wet render surfaces extremely slippery.

Unsuitable extinguishing media:
None known.

5.2. Special hazards arising from the substance or mixture

Hazardous decomposition products:
Thermal decomposition may produce: nitrogen oxides (NOx), carbon oxides (COx). Ammonia (NH3). Hydrogen cyanide (hydrocyanic acid) may be produced in the event of combustion in an oxygen deficient atmosphere.

5.3. Advice for firefighters

Protective measures:
In the event of fire, wear self-contained breathing apparatus.

Other information:
Aqueous solutions or powders that become wet render surfaces extremely slippery.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions:
Aqueous solutions or powders that become wet render surfaces extremely slippery.

Protective equipment:
Wear adequate personal protective equipment (see Section 8 Exposure Controls/Personal Protection).

Emergency procedures:
Keep people away from spill/leak. Prevent further leakage or spillage if safe to do so.

6.2. Environmental precautions

As with all chemical products, do not flush into surface water.

6.3. Methods and material for containment and cleaning up

Small spills:
Do not flush with water.Clean up promptly by sweeping or vacuum. Keep in suitable, closed containers for disposal.

Large spills:
Do not flush with water.Clean up promptly by sweeping or vacuum. Keep in suitable, closed containers for disposal.

Residues:
After cleaning, flush away traces with water.

6.4. Reference to other sections

SECTION 7: Handling and storage; SECTION 8: Exposure controls/personal protection; SECTION 13: Disposal considerations;

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Aqueous solutions or powders that become wet render surfaces extremely slippery. Use personal protective equipment.

7.2. Conditions for safe storage, including any incompatibilities

Keep in a dry place. Keep container closed when not in use.
Incompatible with strong bases and oxidizing agents.

7.3. Specific end use(s)

This information is not available.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits:
None known.

8.2. Exposure controls

Appropriate engineering controls:

Use local exhaust if dusting occurs. Natural ventilation is adequate in absence of dusts.

Individual protection measures, such as personal protective equipment:

a) Eye/face protection:
Safety glasses with side-shields. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166 (EU).

b) Skin protection:
i) Hand protection: PVC or other plastic material gloves. The selected protective gloves have to satisfy the specifications of EU Directive 89/689/EEC and the standard EN 374 derived from it.
ii) Other: Workclothes protecting arms, legs and body. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

c) Respiratory protection:
No personal respiratory protective equipment normally required. Dust safety masks recommended where working powder concentration is more than 10 mg/m^3. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

d) Additional advice:
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and immediately after handling the product. Wash hands before breaks and at the end of workday.

Environmental exposure controls:

Do not allow uncontrolled discharge of product into the environment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

a) Appearance:	Granular solid, White.
b) Odour:	None.
c) Odour Threshold:	Not applicable.
d) pH:	5 - 9 @ 5 g/L (See Technical Bulletin or Product Specifications for a more precise value, if available)
e) Melting point/freezing point:	> 150°C
f) Initial boiling point and boiling range:	Not applicable.
g) Flash point:	Not applicable.
h) Evaporation rate:	Not applicable.
i) Flammability (solid, gas):	No data available.
j) Upper/lower flammability or explosive limits:	Not expected to create explosive atmospheres.
k) Vapour pressure:	Not applicable.
l) Vapour density:	Not applicable.
m) Relative density:	0.6 - 0.9 (See Technical Bulletin or Product Specifications for a more precise value, if available)
n) Solubility(ies):	Soluble in water.
o) Partition coefficient:	-2
p) Autoignition temperature:	Does not self-ignite (based on the chemical structure).
q) Decomposition temperature:	> 150°C
r) Viscosity:	See Technical Bulletin.
s) Explosive properties:	Kst = 0 Non-flammable to ignition sources of less than 2.5 kJ.
t) Oxidizing properties:	Not expected to be oxidising based on the chemical structure.

9.2. Other information

None.

SECTION 10: Stability and reactivity

10.1. Reactivity

None known.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

Oxidizing agents may cause exothermic reactions. Contact with strong bases liberates ammonia.

10.4. Conditions to avoid

None known.

10.5. Incompatible materials

Incompatible with strong bases and oxidizing agents.

10.6. Hazardous decomposition products

Thermal decomposition may produce: nitrogen oxides (NOx), carbon oxides (COx). Ammonia (NH3). Hydrogen cyanide (hydrocyanic acid) may be produced in the event of combustion in an oxygen deficient atmosphere.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Information on the product as supplied:

Acute oral toxicity:	LD50/oral/rat > 5000 mg/kg
Acute dermal toxicity:	LD50/dermal/rat > 5000 mg/kg.
Acute inhalation toxicity:	The product is not expected to be toxic by inhalation.
Skin corrosion/irritation:	Not irritating.
Serious eye damage/eye irritation:	Not irritating.
Respiratory/skin sensitisation:	Not sensitizing.
Mutagenicity:	Not mutagenic.
Carcinogenicity:	Not carcinogenic.
Reproductive toxicity:	Not toxic for reproduction.
STOT - Single exposure:	No known effects.
STOT - Repeated exposure:	No known effect.

Aspiration hazard: No hazards resulting from the material as supplied.

SECTION 12: Ecological information

12.1. Toxicity

Information on the product as supplied:

Acute toxicity to fish:	LC50/Danio rerio/96 hours > 100 mg/L (OECD 203) LC50/Fathead minnow/96 hours > 100 mg/L (OECD 203)
Acute toxicity to invertebrates:	EC50/Daphnia magna/48 hours > 100 mg/L (OECD 202)
Acute toxicity to algae:	IC50/Scenedesmus subspicatus/72 hours > 100 mg/L (OECD 201)
Chronic toxicity to fish:	No data available.
Chronic toxicity to invertebrates:	No data available.
Toxicity to microorganisms:	No data available.
Effects on terrestrial organisms:	No known effects.
Sediment toxicity:	No data available.

12.2. Persistence and degradability

Information on the product as supplied:

Degradation:	Not readily biodegradable.
Hydrolysis:	Does not hydrolyse.
Photolysis:	No data available.

12.3. Bioaccumulative potential

Information on the product as supplied:

Not bioaccumulating.

Partition co-efficient (Log Pow):	-2
Bioconcentration factor (BCF):	~0

12.4. Mobility in soil

Information on the product as supplied:

None.

12.5. Other adverse effects

None known.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste from residues/unused products:

Dispose in accordance with local and national regulations. Can be landfilled or incinerated, when in compliance with local regulations.

Contaminated packaging:

Rinse empty containers with water and use the rinse-water to prepare the working solution. If recycling is not practicable, dispose of in compliance with local regulations. Can be landfilled or incinerated, when in compliance with local regulations.

Recycling:

In accordance with local and national regulations.

SECTION 14: Transport information

Land transport (DOT)

Not classified.

Sea transport (IMDG)

Not classified.

Air transport (IATA)

Not classified.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Information on the product as supplied:

TSCA Chemical Substances Inventory:

All components of this product are either listed as active on the inventory or are exempt from listing.

US SARA Reporting Requirements:

SARA (Section 311/312) hazard class:
Not concerned.

SARA Title III Sections:

Section 302 (TPQ) - Reportable Quantity:
Not concerned.

Section 304 - Reportable Quantity:
Not concerned.

Section 313 (De minimis concentration):
Not concerned.

Clean Water Act

Section 311 Hazardous Substances (40 CFR 117.3) - Reportable Quantity:
Not concerned.

Clean Air Act

Section 112(r) Accidental release prevention requirements (40 CFR 68) - Reportable Quantity:
Not concerned.

CERCLA

Hazardous Substances List (40 CFR 302.4) - Reportable Quantity:
Not concerned.

RCRA status :

Not RCRA hazardous.

California Proposition 65 Information:

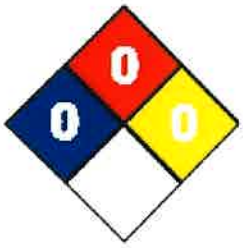
WARNING! This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm, Acrylamide

SECTION 16: Other information

NFPA and HMIS Ratings:

NFPA:

Health:	0
Flammability:	0
Instability:	0



HMIS:

Health:	0
Flammability:	0
Physical Hazard:	0
PPE Code:	B

This data sheet contains changes from the previous version in section(s):

SECTION 8. Exposure controls/personal protection, SECTION 16. Other Information.

Key or legend to abbreviations and acronyms used in the safety data sheet:

Acronyms
STOT = Specific target organ toxicity

Training advice:

Do not handle until all safety precautions have been read and understood.

This SDS was prepared in accordance with the following:

U.S. Code of Federal Regulations 29 CFR 1910.1200

Version: 20.01.b

PRAC001

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

Aerophine 3418A

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

1.1 Product identifier

- Trade name AEROPHINE® 3418A PROMOTER

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

Uses of the Substance / Mixture

- Mining chemicals

1.3 Details of the supplier of the safety data sheet

Company

CYTEC CANADA INC.
9061 Garner Road, Niagara Falls,
Ontario, Canada L2H 0Y2
Tel:+1-905-356-9000

1.4 Emergency telephone

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

Disclaimer

The ® indicates a Registered Trademark in the United States and the ™ indicates a trademark in the United States. The mark may also be registered, subject of an application for registration, or a trademark in other countries.

SECTION 2: Hazards identification

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

2.1 Classification of the substance or mixture

Hazardous Products Regulations (WHMIS 2015)

Serious eye damage, Category 1	H318: Causes serious eye damage.
Skin sensitization, Sub-category 1B	H317: May cause an allergic skin reaction.
Health hazards not otherwise classified, Category 1	Contact with acids liberates toxic gas.

2.2 Label elements

Hazardous Products Regulations (WHMIS 2015)

Pictogram

Signal Word

- Danger

Hazard Statements

- H317 May cause an allergic skin reaction.
- H318 Causes serious eye damage.

Precautionary Statements

Prevention

- P261 Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
- P272 Contaminated work clothing should not be allowed out of the workplace.
- P280 Wear protective gloves/ eye protection/ face protection.

Response

- P302 + P352 IF ON SKIN: Wash with plenty of water.
- P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
- P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.
- P362 + P364 Take off contaminated clothing and wash it before reuse.

Disposal

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

Hazard Statements

- Contact with acids liberates toxic gas.

2.3 Other hazards which do not result in classification

None identified

SECTION 3: Composition/information on ingredients

3.1 Substance

- Not applicable, this product is a mixture.

3.2 Mixture

- Chemical nature Modified dithiophosphinate

WHMIS Hazardous Ingredients and Impurities

Chemical name	Identification number CAS-No.	Concentration [% wt/wt or V/V]
Dithiophosphinate	*****	48 - 60

SECTION 4: First aid measures

4.1 Description of first-aid measures

In case of inhalation

- Quickly move the person away from the contaminated area. Make the affected person rest.
- Obtain medical attention.
- Show this sheet to the doctor.
- Be prepared to provide first aid or medical support if necessary.

In case of skin contact

- Wash off immediately with plenty of water for at least 15 minutes.
- Use appropriate protective equipment when treating a contaminated person.

- Obtain medical attention.
- Show this sheet to the doctor.
- Be prepared to provide first aid or medical support if necessary.

In case of eye contact

- Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
- Keep eye wide open while rinsing.
- Show this sheet to the doctor.
- Always obtain medical advice, even if there are no symptoms.
- Be prepared to provide first aid or medical support if necessary.

In case of ingestion

- Do NOT induce vomiting.
- Immediate medical attention is required.
- Show this sheet to the doctor.
- Do not give anything to drink.
- Be prepared to provide first aid or medical support if necessary.

4.2 Most important symptoms and effects, both acute and delayed

Effects

- Effects on health may appear after exposure.
- The effects will depend on target organs.
- Chronic exposure may cause allergic dermatitis.
- Exposure may cause allergic rhinitis, conjunctivitis, asthma or shock.
- Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.
- Risk of respiratory disorder
- Chronic exposure may cause dermatitis.
- May cause irreversible eye damage.
- Loss of the eye

Symptoms

- Symptoms will depend on the target organs.
- Inhalation may provoke the following symptoms:
- Cough
- Breathing difficulties
- Irritation
- Redness
- Swelling of tissue
- Ingestion may provoke the following symptoms:
- Nausea
- Diarrhea
- Abdominal pain
- allergic rhinitis
- Severe allergic skin reactions, bronchiospasm and anaphylactic shock
- Itching
- Dermatitis
- Causes skin burns.
- Lachrymation
- Conjunctivitis
- Causes eye burns.
- The gas deadens the sense of smell. Do not depend on odor to detect presence of gas.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician

- Be aware to maintain life support if necessary.
- Take victim to hospital if symptoms persist.
- Get medical advice/ attention.
- Consult with an ophthalmologist immediately in all cases.
- Burns must be treated by a physician.
- Treat symptomatically.
- Contact a poison control center.
- Keep under medical follow up for at least 48 hours.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media

- Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

Specific hazards during fire fighting

- Under fire conditions:
- Will burn
- On combustion, toxic gases are released.

Hazardous combustion products:

- Sulfur dioxide or hydrogen sulfide may be formed under fire conditions.

5.3 Advice for firefighters

Special protective equipment for fire-fighters

- In the event of fire, wear self-contained breathing apparatus.
- Personal protective equipment comprising: suitable protective gloves, safety goggles and protective clothing
- Wear a positive-pressure supplied-air respirator with full facepiece.
- For further information refer to section 8 "Exposure controls / personal protection."

Specific fire fighting methods

- Cool containers/tanks with water spray.
- Do not use a solid water stream as it may scatter and spread fire.

Further information

- Do not flush to sewer which may contain acid.
- This could result in generation of toxic and flammable hydrogen sulfide.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

- Where exposure level is not known, wear approved, positive pressure, self-contained respirator.
- Where exposure level is known, wear approved respirator suitable for level of exposure.
- In addition to the protective clothing/equipment in Section 8, wear a two piece PVC suit with hood or PVC overalls with hood.

6.2 Environmental precautions

- Stop the leak. Turn leaking containers leak-side up to prevent the escape of liquid.
- Contain the spilled material by diking.
- Do not let product enter drains.
- Do not allow uncontrolled discharge of product into the environment.

6.3 Methods and materials for containment and cleaning up

- Stop leak if safe to do so.
- Keep in properly labeled containers.
- Keep in suitable, closed containers for disposal.
- Wash nonrecoverable remainder with large amounts of water.
- Soak up with inert absorbent material and dispose of as hazardous waste.
- Decontaminate tools, equipment and personal protective equipment in a segregated area.
- Dispose of in accordance with local regulations.
- Never return spills in original containers for re-use.

6.4 Reference to other sections

- 7. HANDLING AND STORAGE
- 8. EXPOSURE CONTROLS/PERSONAL PROTECTION
- 13. DISPOSAL CONSIDERATIONS

SECTION 7: Handling and storage

7.1 Precautions for safe handling

- Large quantities of undiluted product should not be mixed with acids, since evolution of toxic and flammable hydrogen sulfide could result. In particular, precautions must be taken to avoid the accidental discharge of large volumes of the product in acid storage tanks or any tank or containment containing acidic materials. This precaution does not, of course, apply to addition of this reagent to flotation pulps in amounts customarily used in flotation, where the reagent amounts are small and instantly diluted to concentrations well below the solubility limits.

Hygiene measures

- Handle in accordance with good industrial hygiene and safety practice.
- Wash hands before breaks and at the end of workday.
- When using do not eat, drink or smoke.
- Eye wash bottles or eye wash stations in compliance with applicable standards.
- Ensure that eyewash stations and safety showers are close to the workstation location.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/Storage conditions

- Do not freeze.

Requirements for storage rooms and vessels

Recommended storage temperature: 32 - 95 °F (0 - 35 °C)

- To guarantee the quality and properties of the product keep according to Storage temperature and conditions.

7.3 Specific end use(s)

- no data available

SECTION 8: Exposure controls/personal protection

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

8.1 Control parameters

- Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Control measures

Engineering measures
- Ensure adequate ventilation.
- Apply technical measures to comply with the occupational exposure limits.

Individual protection measures

Respiratory protection
- Keep in a well-ventilated place.

Hand protection
- Take note of the information given by the producer concerning permeability and break through times, and of special workplace conditions (mechanical strain, duration of contact).
- Impervious gloves

Suitable material
- Nitrile or fluorinated rubber gloves.

Eye protection
- Chemical resistant goggles must be worn.
- Tightly fitting safety goggles

Skin and body protection
- Impervious clothing
- Full protective suit
- Change working clothes after each work-shift.
- Contaminated work clothing should not be allowed out of the workplace.

Hygiene measures
- Handle in accordance with good industrial hygiene and safety practice.
- Wash hands before breaks and at the end of workday.
- When using do not eat, drink or smoke.
- Eye wash bottles or eye wash stations in compliance with applicable standards.
- Ensure that eyewash stations and safety showers are close to the workstation location.

SECTION 9: Physical and chemical properties

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

9.1 Information on basic physical and chemical properties

Appearance	Physical state: liquid Color: colorless to pale yellow
Odor	odorless
Odor Threshold	No data available
Molecular weight	232 g/mol
pH	9.0 - 11.0
Melting point/freezing point	Crystallization temperature: ca. 10 °F (-12 °C)
Initial boiling point and boiling range	Boiling point/boiling range: 223 °F (106 °C)
Flash point	Pensky-Martens closed cup No flash up to boiling point
Evaporation rate (Butylacetate = 1)	Not applicable
Flammability (solid, gas)	No data available
Flammability (liquids)	No data available
Flammability / Explosive limit	Lower flammability/explosion limit: Type: Lower flammability limit Not applicable Upper flammability/explosion limit: Type: Upper flammability limit Not applicable
Autoignition temperature	819 °F (437 °C)
Vapor pressure	17.5 mmHg (23.33 hPa) (68 °F (20 °C)) water, The product itself has not been tested.
Vapor density	Not applicable
Density	1.1 g/cm3 (77 °F (25 °C))
Relative density	No data available
Solubility	Water solubility: completely soluble
Partition coefficient: n-octanol/water	Not applicable
Decomposition temperature	> 662 °F (> 350 °C)
Viscosity	Viscosity, dynamic : 16.6 mPa.s (77 °F (25 °C))
Explosive properties	No data available
Oxidizing properties	Not considered as oxidizing.

9.2 Other information

Corrosion of Metals	Not corrosive to metals.

Peroxides	The substance or mixture is not classified as organic peroxide.
Reactions with water / air	Contact with acids liberates toxic gas.

SECTION 10: Stability and reactivity

10.1 Reactivity

- no data available

10.2 Chemical stability

- Stable

10.3 Possibility of hazardous reactions

- no data available

10.4 Conditions to avoid

- Contact with strong acids or bases may liberate toxic gases.

10.5 Incompatible materials

- Mineral acids.
- Strong oxidizing agents

10.6 Hazardous decomposition products

Hazardous decomposition products
- Carbon dioxide (CO_2)

Thermal decomposition
- Carbon monoxide
- Sulfur oxides

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Acute oral toxicity	LD50 : 3,350 mg/kg - Rat Unpublished internal reports
Acute inhalation toxicity	Not classified as hazardous for acute inhalation toxicity according to GHS. According to the available data on the components. According to the classification criteria for mixtures. Unpublished reports and/or published data.
Acute dermal toxicity Dithiophosphinate	LD50 : > 2,000 mg/kg - Rat , male and female Method: OECD Test Guideline 402 Not classified as hazardous for acute dermal toxicity according to GHS. Occlusive No mortality observed at this dose. Unpublished reports

Acute toxicity (other routes of administration)	Not applicable

Skin corrosion/irritation

Dithiophosphinate	Human No skin irritation Method: OECD Test Guideline 439 Unpublished reports

Serious eye damage/eye irritation

Dithiophosphinate	Bovine cornea Corrosive Method: OECD Test Guideline 437 Unpublished reports

Respiratory or skin sensitization

Dithiophosphinate	Local lymph node assay - Mouse EC 3 value > 2 % Classified as a skin sensitizer sub-category 1B according to GHS criteria Method: OECD Test Guideline 429 Unpublished reports

Mutagenicity

Genotoxicity in vitro

Dithiophosphinate	Mutagenicity (Salmonella typhimurium - reverse mutation assay) with and without metabolic activation negative Method: OECD Test Guideline 471 Unpublished reports Chromosome aberration test in vitro Strain: Human lymphocytes with and without metabolic activation negative Method: OECD Test Guideline 473 Unpublished reports Gene mutation assays in mammalian cells. Strain: mouse lymphoma cells with and without metabolic activation negative Method: OECD Test Guideline 476 Unpublished reports
Genotoxicity in vivo	Product is not considered to be genotoxic According to the available data on the components. According to the classification criteria for mixtures. Unpublished reports and/or published data.
Carcinogenicity	The product is not considered to be carcinogenic. According to the available data on the components. According to the classification criteria for mixtures. Unpublished reports and/or published data.

Toxicity for reproduction and development

Toxicity to reproduction / fertility	The product is not considered to affect fertility.,According to the available data on the components. According to the classification criteria for mixtures. Unpublished reports and/or published data.
Developmental Toxicity/Teratogenicity	The product is not considered to be toxic for development.,According to the available data on the components. According to the classification criteria for mixtures. Unpublished reports and/or published data.

STOT

STOT-single exposure	The substance or mixture is not classified as specific target organ toxicant, single exposure according to GHS criteria. According to the available data on the components. According to the classification criteria for mixtures. Unpublished reports and/or published data.
STOT-repeated exposure	The substance or mixture is not considered to cause damage to organs through prolonged or repeated exposure. According to the available data on the components. According to the classification criteria for mixtures. Unpublished reports and/or published data. The product itself has not been tested.

Experience with human exposure

Experience with human exposure : Inhalation

In contact with acid

Symptoms: Released substances:
Hydrogen sulphide
Inhalation may provoke the following symptoms:
Irritating to the respiratory system and mucous membranes.
Coma
cardiorespiratory failure
Neurological disorders
Gastrointestinal disturbance

Experience with human exposure : Skin contact

No data is available on the product itself.

Experience with human exposure : Eye contact

No data is available on the product itself.

Experience with human exposure : Ingestion

No data is available on the product itself.

Aspiration toxicity	No aspiration toxicity classification, According to the available data on the components, According to the classification criteria for mixtures.

SECTION 12: Ecological information

12.1 Toxicity

Aquatic Compartment

Acute toxicity to fish

Dithiophosphinate	LC50 - 96 h : 375 mg/l - Lepomis macrochirus (Bluegill sunfish) static test Analytical monitoring: yes Method: OECD Test Guideline 203 Not harmful to fish (LC/LL50 > 100 mg/L) Unpublished reports

Acute toxicity to daphnia and other aquatic invertebrates

Dithiophosphinate	EC50 - 48 h : 149 mg/l - Daphnia magna (Water flea) static test Analytical monitoring: yes Method: OECD Test Guideline 202 Not harmful to aquatic invertebrates. (EC/EL50 > 100 mg/L) Unpublished reports

Toxicity to aquatic plants

Dithiophosphinate	ErC50 - 96 h : 115 mg/l - Pseudokirchneriella subcapitata (microalgae) static test Analytical monitoring: yes Endpoint: Growth rate Method: OECD Test Guideline 201 Not harmful to algae (EC/EL50 > 100 mg/L) Unpublished reports NOErC - 96 h : 20 mg/l - Pseudokirchneriella subcapitata (green algae) static test Analytical monitoring: yes Endpoint: Growth rate Method: OECD Test Guideline 201 No adverse chronic effect observed up to and including the threshold of 1 mg / L. Unpublished reports
Toxicity to microorganisms	The product itself has not been tested.
Chronic toxicity to fish	The product itself has not been tested.
Chronic toxicity to daphnia and other aquatic invertebrates	The product itself has not been tested.

Sediment compartment

Toxicity to benthic organisms	The product itself has not been tested.

Terrestrial Compartment

Toxicity to soil dwelling organisms	The product itself has not been tested.
Toxicity to terrestrial plants	The product itself has not been tested.
Toxicity to above ground organisms	The product itself has not been tested.

12.2 Persistence and degradability

Abiotic degradation

Stability in water	Conclusion is not possible for a mixture as a whole.
Photodegradation	Conclusion is not possible for a mixture as a whole.
Other Physicochemical reactions	Conclusion is not possible for a mixture as a whole.

Physical- and photo-chemical elimination

Physico-chemical removability	Conclusion is not possible for a mixture as a whole.

Biodegradation

Biodegradability	Ready biodegradability study: Method: OECD Test Guideline 301 D 78.8 % - 28 Days The substance fulfills the criteria for ultimate aerobic biodegradability and ready biodegradability Published data
Ratio BOD / COD	Conclusion is not possible for a mixture as a whole.
Ratio BOD / ThOD	Conclusion is not possible for a mixture as a whole.
Biochemical Oxygen Demand (BOD)	Conclusion is not possible for a mixture as a whole.
Dissolved organic carbon (DOC)	Conclusion is not possible for a mixture as a whole.
Chemical Oxygen Demand (COD)	Conclusion is not possible for a mixture as a whole.
Adsorbed organic bound halogens (AOX)	Conclusion is not possible for a mixture as a whole.

Degradability assessment

Dithiophosphinate	The product is considered to be rapidly degradable in the environment

12.3 Bioaccumulative potential

Partition coefficient: n-octanol/water	Conclusion is not possible for a mixture as a whole.
Bioconcentration factor (BCF)	As bioaccumulation is not relevant for mixtures, all the components of the mixture were assessed individually. Conclusion is not possible due to incomplete or heterogeneous data on the components Unpublished reports Published data

12.4 Mobility in soil

Adsorption potential (Koc)	Conclusion is not possible for a mixture as a whole.
Known distribution to environmental compartments	Conclusion is not possible due to incomplete or heterogeneous data on the components

12.5 Results of PBT and vPvB assessment

According to the available data on the components
This mixture contains no substance considered to be persistent, bioaccumulating and toxic (PBT).
This mixture contains no substance considered to be very persistent and very bioaccumulating (vPvB).

12.6 Other adverse effects

Ecotoxicity assessment

Short-term (acute) aquatic hazard

No acute environmental hazard identified.
According to the available data on the components.
According to the classification criteria for mixtures.
Unpublished reports and/or published data.

Long-term (chronic) aquatic hazard

No chronic environmental hazard identified.
According to the available data on the components.
According to the classification criteria for mixtures.
Unpublished reports and/or published data.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product Disposal

- The Company encourages the recycle, recovery and reuse of materials, where permitted. If disposal is necessary, The Company recommends that organic materials, especially when classified as hazardous waste, be disposed of by thermal treatment or incineration at approved facilities. All local and national regulations should be followed.

SECTION 14: Transport information

TDG
not regulated

DOT
not regulated

NOM
not regulated

IMDG
not regulated

IATA
not regulated

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

SECTION 15: Regulatory information

15.1Notification status

Inventory Information	Status
United States TSCA Inventory	- All substances listed as active on the TSCA inventory
EU. European Registration, Evaluation, Authorisation and Restriction of Chemical (REACH)	- When purchased from a Solvay legal entity based in the EEA ("European Economic Area"), this product is compliant with the registration provisions of the REACH Regulation (EC) No. 1907/2006 as all its components are either excluded, exempt, and/or registered. When purchased from a legal entity outside of the EEA, please contact your local representative for additional information.
Canadian Domestic Substances List (DSL)	- Listed on Inventory
Australia Inventory of Chemical Substances (AICS)	- Listed on Inventory
Japan. CSCL - Inventory of Existing and New Chemical Substances	- One or more components not listed on inventory
Korea. Korean Existing Chemicals Inventory (KECI)	- Listed on Inventory
China. Inventory of Existing Chemical Substances in China (IECSC)	- Listed on Inventory
Philippines Inventory of Chemicals and Chemical Substances (PICCS)	- Listed on Inventory
Taiwan Chemical Substance Inventory (TCSI)	- One or more components not listed on inventory
New Zealand. Inventory of Chemical Substances	- All components are listed on the NZIOC inventory. The HSNO status of the product has not been assessed.

15.2 National Regulations

Canada. CEPA 1999 Significant New Activity (SNAc) List:

- No substances are subject to a Significant New Activity Notification.

SECTION 16: Other information

Revision Date:

04/17/2020

NFPA (National Fire Protection Association) - Classification

Health	3 serious
Flammability	1 slight
Instability or Reactivity	0 minimal

Key or legend to abbreviations and acronyms used in the safety data sheet

- ACGIH: American Conference of Governmental Industrial Hygienists
- OSHA: Occupational Safety and Health Administration
- NTP: National Toxicology Program
- IARC: International Agency for Research on Cancer
- NIOSH: National Institute for Occupational Safety and Health
- ADR: European Agreement on International Carriage of Dangerous Goods by Road.
- ADN: European Agreement on the International Carriage of Dangerous Goods by Inland Waterways.
- RID: European Agreement concerning the International Carriage of Dangerous Goods by Rail.
- IATA: International Air Transport Association.
- ICAO-TI: Technical Specification for Safe Transport of Dangerous Goods by Air.
- IMDG: International Maritime Dangerous Goods.
- TWA: Time weighted average
- ATE: Estimated value of acute toxicity
- EC: European Community number
- CAS: Chemical Abstracts Service.
- LD50: Substance that causes 50% (half) death in the test animals group (Median Fatal Dose).
- LC50: Substance concentration causing 50% (half) death in the test animals group.
- EC50: Effective Concentration of the substance causing the maximum of 50%.
- PBT: Persistent, Bioaccumulative and Toxic substance.
- vPvB: Very Persistent and Very Bioaccumulative.
- SEA: Classification, labeling, packaging regulation
- DNEL: Derived No Effect Level
- PNEC: Predicted No Effect Concentration
- BHOT: Specific Target Organ Toxicity

Not all acronyms listed above are referenced in this SDS.

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

Sodium Metabisulfite

SAFETY DATA SHEET

SODIUM METABISULFITE,NON FOOD

Section 1. Identification

Product identifier : SODIUM METABISULFITE,NON FOOD

Product code : Q10410

Relevant identified uses of the substance or mixture

Identified uses
Industrial applications

Supplier's details : QUADRA CHEMICALS LTD.
3901 F.X Tessier
Vaudreuil-Dorion, QC
CANADA J7V 5V5
1-800-665-6553

Emergency telephone number (with hours of operation) : **TRANSPORTATION EMERGENCY - 24HRS/DAY - 7 DAYS/WEEK IN CANADA - CALL 1-888-922-3330**

Section 2. Hazard identification

Classification of the substance or mixture : ACUTE TOXICITY (oral) - Category 4
EYE IRRITATION - Category 2A

GHS label elements

Hazard pictograms :

Signal word : Warning

Hazard statements : Harmful if swallowed.
Causes serious eye irritation.

Precautionary statements

Prevention : Wear eye or face protection. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling.

Response : IF SWALLOWED: Call a POISON CENTER or physician if you feel unwell. Rinse mouth. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

Storage : Not applicable.

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

Supplemental label elements : Percentage of the mixture consisting of ingredient(s) of unknown dermal toxicity: 99.8%
Percentage of the mixture consisting of ingredient(s) of unknown inhalation toxicity: 99.8%

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Ingredient name	% (w/w)	CAS number
sodium metabisulphite	75 - 100	7681-57-4
sodium sulphite	0 - 3	7757-83-7

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

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

Section 4. First-aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. If necessary, call a poison center or physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the nose, throat and lungs.

Skin contact : No known significant effects or critical hazards.

Ingestion : Harmful if swallowed.

Over-exposure signs/symptoms

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

Section 4. First-aid measures

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing

Skin contact : No specific data.

Ingestion : No specific data.

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

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

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

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use dry chemical powder.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : May form explosible dust-air mixture if dispersed.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
sulfur oxides
metal oxide/oxides
Sulfur dioxide

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

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

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing dust. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

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

Section 6. Accidental release measures

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

Methods and materials for containment and cleaning up

Small spill : Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Avoid dust generation. Using a vacuum with HEPA filter will reduce dust dispersal. Place spilled material in a designated, labeled waste container. Dispose of via a licensed waste disposal contractor.

Large spill : Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Avoid creating dusty conditions and prevent wind dispersal. Dispose of via a licensed waste disposal contractor. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing dust. Avoid the creation of dust when handling and avoid all possible sources of ignition (spark or flame). Prevent dust accumulation. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Electrical equipment and lighting should be protected to appropriate standards to prevent dust coming into contact with hot surfaces, sparks or other ignition sources. Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Empty containers retain product residue and can be hazardous. Do not reuse container.

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

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
sodium metabisulphite	**ACGIH TLV (United States, 3/2018).** TWA: 5 mg/m³ 8 hours.
sodium sulphite	-

Appropriate engineering controls : Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

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

Individual protection measures

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

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles. If operating conditions cause high dust concentrations to be produced, use dust goggles.

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

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

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 9. Physical and chemical properties

Physical state	:	Solid. [Crystalline powder.]
Color	:	White to pale yellow.
Odor	:	Faint odor. Sulfur dioxide
Odor threshold	:	Not available.
pH	:	4 to 8 [Conc. (% w/w): 5%]
Melting point	:	Not available.
Boiling point	:	Not available.
Flash point	:	Not available.
Evaporation rate	:	Not available.
Flammability (solid, gas)	:	Not available.
Lower and upper explosive (flammable) limits	:	Not available.
Vapor pressure	:	Not available.
Vapor density	:	Not available.
Relative density	:	Not available.
Density	:	2.36 g/cm³ [20°C (68°F)]
Solubility	:	Easily soluble in the following materials: cold water.
Solubility in water	:	667 g/l
Dispersibility properties	:	Not available.
Partition coefficient: n-octanol/water	:	Not available.
Auto-ignition temperature	:	Not available.
Decomposition temperature	:	>150°C (>302°F)
Viscosity	:	Not available.
Volatility	:	Not available.

Section 10. Stability and reactivity

Reactivity	:	No specific test data related to reactivity available for this product or its ingredients.
Chemical stability	:	The product is stable.
Possibility of hazardous reactions	:	Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to avoid	:	Avoid the creation of dust when handling and avoid all possible sources of ignition (spark or flame). Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Prevent dust accumulation.
Incompatible materials	:	oxidizing materials acids moisture
Hazardous decomposition products	:	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 10. Stability and reactivity

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
sodium metabisulphite	LD50 Oral	Rat	1131 mg/kg	-
SODIUM METABISULFITE, NON FOOD	LC50 Inhalation Dusts and mists	Rat - Male, Female	>5.5 mg/l	4 hours
	LD50 Dermal	Rat - Male, Female	>2000 mg/kg	-
	LD50 Oral	Rat - Male, Female	1540 mg/kg	-

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
sodium metabisulphite	Eyes - Mild irritant	Rabbit	-	24 hours 100 milligrams	-

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Carcinogenicity Classification

Product/ingredient name	IARC	NTP	ACGIH
sodium metabisulphite	3	-	A4

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Routes of entry anticipated: Oral, Dermal, Inhalation.

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the nose, throat and lungs.

Section 11. Toxicological information

Skin contact : No known significant effects or critical hazards.

Ingestion : Harmful if swallowed.

Symptoms related to the physical, chemical and toxicological characteristics

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

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing

Skin contact : No specific data.

Ingestion : No specific data.

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

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

General : Repeated or prolonged inhalation of dust may lead to chronic respiratory irritation.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
sodium metabisulphite SODIUM METABISULFITE, NON FOOD	Acute LC50 32 mg/l Fresh water EC50 43.8 mg/l EC50 89 mg/l LC50 316 mg/l NOEC >21 mg/l NOEC >316 mg/l	Fish - Lepomis macrochirus Aquatic plants Daphnia - Daphnia magna Fish - Leuciscus idus Daphnia - Daphnia magna Fish - Brachydanio rerio	96 hours 72 hours 48 hours 96 hours 21 days 34 days

Persistence and degradability

Not available.

Bioaccumulative potential

Section 12. Ecological information

Product/ingredient name	$LogP_{ow}$	BCF	Potential
sodium metabisulphite	-3.7	-	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

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

Section 13. Disposal considerations

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

Section 14. Transport information

	TDG Classification
UN number	Not regulated.
UN proper shipping name	-
Transport hazard class(es)	-
Packing group	-
Additional information	Not available.

Section 15. Regulatory information

Canada inventory : All components are listed or exempted.

Section 16. Other information

History

Date of issue/Date of revision : 7 November 2019

Prepared by : Regulatory Affairs

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
LogPow = logarithm of the octanol/water partition coefficient
UN = United Nations
HPR = Hazardous Products Regulations

Procedure used to derive the classification

Classification	Justification
ACUTE TOXICITY (oral) - Category 4 EYE IRRITATION - Category 2A	On basis of test data Calculation method

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