KENO HILL SILVER DISTRICT MINING OPERATIONS

MILL DEVELOPMENT AND OPERATIONS PLAN

Revision 6

May 2023

Prepared by:

HECLA YUKON

Prepared for:

ALEXCO KENO HILL MINING CORP.

VERSION HISTORY

ISSUE DATE	DESCRIPTION AND REVISIONS MADE
July 2009	Initial plan. Construction Site Plan, Revision 1, Bellekeno Project.
January 2013	Mill Development and Operations Plan, Keno Hill Silver District Mining Operations – District Mill, Revision 2 Plan updated to reflect the milling of ore from the Bellekeno, Lucky Queen and Onek ore sources
June 2015	Mill Development and Operations Plan, Keno Hill Silver District Mining Operations – District Mill, Revision 3 Plan updated to reflect the milling of ore from the Bellekeno, Lucky Queen, Onek and Flame & Moth ore sources
November 2018	Mill Development and Operations Plan, Keno Hill Silver District Mining Operations – District Mill, Revision 4 Plan updated to included ore from the New Bermingham Mine.
December 2022	Keno Hill Silver District Mining Operations, Mill Development and Operations Plan, Revision 5
May 2023	Keno Hill Silver District Mining Operations, Mill Development and Operations Plan, Revision 6 Current Version

DOCUMENT REVISIONS

SECTION	SUMMARY OF CHANGES
Entire document	Updated to reflect new ownership of company and revised reporting structure Figures and photographs updated; Updated to incorporate comments from EMR.
Version History	Table added that lists the previous revisions of the plan. A brief description of the changes made to document.
Document Revisions	Table added to indicate areas where changes have been made from the previous revision of the Plan
Table 1-3	Updated to Include note about management plans
Table 3-1	Updated moisture content
Ore Stockpile	Updated section to include duration material remains on the ore pad
Water Management Systems	Section updated to reflect no freshwater is expected to be required for mill operations.
Dry Stack Tailings Dewatering and Handling	Section updated to reflect tailings storage area
Reagent Requirements	Section updated to reflect reagent equipment and flow chart
Concentrate Storage and Transportation	Section Updated to reflect concentrate storage

YESAA DECISION DOCUMENT CONCORDANCE TABLE

TERM	DECISION DOCUMENT	TERM & CONDITION	WHERE ADDRESSED
24	2009-0030	Construct and/or maintain water treatment and retention infrastructure so that non-compliant water is not released into the environment.	Section 6
28	2009-0030	Sludge from settling ponds at the Flame and Moth Mill and Bellekeno 625 and sediment collected in Bellekeno East settling ponds shall be removed and transported to a site or paddy cell that has the prior approval of the regulator, and that will keep liabilities separate.	Section 6.2
68	2009-0030	Best management practices for the industry indicate that dust releases must be minimized through the application of a number of preventative measures, including the following. • If excess dust is produced in the crusher, the proponent must be prepared to use air filtration/dust collection equipment to collect the indoor crusher air and removal of particulate from the exhaust. **Note: The crusher is not proposed to be inside but this could be considered as a contingency plan.** • Enclosure of the primary crusher and the use of air filtration/dust collection equipment to collect the indoor crusher air and removal of particulate from the exhaust. **Note: The primary crusher is not proposed to be inside but this could be considered as a contingency plan.** . . . • Use of dust suppression techniques, such as the application of water as necessary, to the Dry Stack Tailing Facility, non-AML rock storage and the haul road, if and when dusting conditions occur. Other dust suppression products and chemicals are available on the market at higher cost and potentially uncertain efficacy. Under no circumstances shall waste oil or other hydrocarbon product be used for dust suppression. . . . • Site layouts - Design operational areas to minimize pollution from dust. For example, take account of prevailing wind conditions, use buildings as screens or enclosures, and use natural topography and vegetation as screening. **Note: Government of Yukon accepts these as best management practices and contingency plans**	Section 7.1
87	2009-0030	Detailed design of the mill building so as not to disturb permafrost.	Section 2.3
25	2011-0315	The proponent shall make best efforts to avoid work in areas of permafrost, where permafrost cannot be avoided the proponent shall take appropriate measures to avoid or minimize damage to and loss of permafrost.	Section 2.3

YESAA PROPONENT COMMITMENT CONCORDANCE TABLE

YESAB ONLINE REGISTRY (YOR)	PROPONENT COMMITMENTS	WHERE ADDRESSED
YOR 2009-0030-015-1	Maintain and use existing water treatment system at Bellekeno 625. Construct new water treatment and retention infrastructure at Mill Site in order to not release noncompliant water. Settlement ponds will be used to settle out metals and sediment.	Section 6
YOR 2009-0030-015-1	Collect and recycle water runoff from dry stack tailings facility and mill pad to reduce discharge and freshwater makeup needs.	Section 6.1
YOR 2009-0030-015-1	Undertake periodic de-sludging of settling ponds and disposal in existing sludge storage areas.	Section 6
YOR 2009-0030-084-1	Ensure that the mill location is greater than 1.0km from the center of the community.	Figure 1-2
YOR 2009-0030-015-1	Mill doors will be oriented away from the community and sound baffling will be installed	Figure 3-1 and Section 3.1
YOR 2009-0030-015-1	The crushing facility will only be operated during the day shift (7 am – 7 pm).	Table 3-1
YOR 2009-0030-015-1	The mill building will be insulated for noise reduction	Section 3.1
YOR 2009-0030-098-1	Sound abatement panels or walls will be constructed around the crushing facility to reduce noise.	Section 3.1
YOR 2009-0030-084-1	Dust suppressants including, but not limited to, water spraying will be used as appropriate	Section 3.1 and Photo 3-2
YOR 2009-0030-015-1	Mine and Mill Site access road will be gate restricted and public access to the site discouraged. Physical restriction and security monitoring will ensure that the public is not exposed to project site accidents or malfunctions.	Section 3
YOR 2009-0030-084-1	Clearing around Mill Site will be minimized to limit mill view.	Section 2.2
YOR 2009-0030-014-1	Previously disturbed areas will be used to minimize environmental effects.	Figure 2-1
YOR 2013-0161-130-1	Progressive reclamation of the current and expanded DSTF (such as placement of cover and revegetation);	Section 10
YOR 2013-0161-130-1	The crusher will be enclosed inside a ventilated building	Section 3.1
YOR 2013-0161-045-1	Reclamation of the mill area and ancillary facilities, and the DSTF, “to an aesthetically acceptable level,”	Section 10
YOR 2017-0176-127-1	Construction of a building over the crushing plant	Section 7.1
YOR 2017-0176-127-1	Operation of the crushing plant during dayshift hours (7 am – 7 pm);	Table 3-1
YOR 2017-0176-127-1	Haul truck traffic from Bermingham to/from the mill will be during dayshift (7 am – 7 pm);	Section 4.1

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LIST OF ACRONYMS AND ABBREVIATIONS

AA	Atomic Absorption
ACG	Access Consulting Group
AKHM	Alexco Keno Hill Mining Corp.
CRF	Cemented Rock Fill
DMT	Dry Metric Tonnes
DSTF	Dry Stack Tailings Facility
EMR	Energy, Mines and Resources
ERDC	Elsa Reclamation and Development Company Ltd.
FNNND	First Nation of Na-Cho Nyak Dun
HDPE	High Density Polyethylene
KHSD	Keno Hill Silver District
LOM	Life of Mine
MCC	Motor Control Centre
MIBC	Methyl Isobutyl Carbinol
N-AML	Non-Acid generating and/or Metal Leaching
P-AML	Potentially-Acid generating and/or Metal Leaching
PAX	Potassium Amyl Xanthate
QML	Quartz Mining Licence
ROM	Run of Mine
SDS	Safety Data Sheets
SIPX	Sodium Isopropyl Xanthate
TPD	Tonnes Per Day
UKHM	United Keno Hill Mines
WL	Water Licence
WTP	Water Treatment Plant
YESAA	Yukon Environmental and Socio-economic Assessment Act
YESAB	Yukon Environmental and Socio-economic Assessment Board
YOR	YESAB Online Registry
YWB	Yukon Water Board
3418A	Aerophine® 3418A promoter

1 INTRODUCTION

1.1 OVERVIEW

This Mill Development and Operations Plan has been updated to include mill process and building refinements, in accordance with Quart Mining License (QML) -0009. It reflects site ownership changes and the current plan of operations that includes the milling of ore and handling of tails from the Bellekeno, Flame & Moth and New Bermingham ore sources. The plan follows the *Plan Requirement Guidance for Quartz Mining Projects* (Yukon Water Board, Energy Mines and Resources 2013) for preparing Mill Development and Operations Plans. The plan will be amended as necessary to incorporate additional ore sources in the future.

Alexco Keno Hill Mining Corp. (AKHM) owns and operates of a series of small underground silver/lead/zinc mines with a centralized mill, the Keno Hill Silver District Mining Operations. The site is 354 km north of Whitehorse, near Keno City in the central Yukon (Figure 1-1). On September 7, 2022, Alexco Resource Corp. (doing business as Hecla Yukon), the parent company of AKHM, was acquired by Hecla Mining Company. An overview of the Keno Hill Silver District (KHSD) mining operations is provided in Table 1-1 and Figure 1-2.

Table 1-1: Keno Hill Silver District Mining Operations Overview

MINES / DEPOSITS	Bellekeno (Production 2010 – 2013, suspended 2013 – 2020, production 2020, temporary closure 2020) Flame & Moth (Development 2018, suspended 2018 – 2020, development and production 2020 - present) New Bermingham (Advanced exploration 2017 – 2018, development and production 2020 - present) Lucky Queen, Onek 990 (Advanced exploration 2013, not active)
MILL	District Mill location at Flame & Moth Mine area (Constructed 2010) Tailings placed in Dry Stack Tailings Facility (Established 2010) or underground as backfill
WORK FORCE	~ 250 employees and contractors during active mine and reclamation operations (as per Yukon Environmental and Socio-economic Assessment Act [YESAA] 2018-0169 Decision Document)
AIRSTRIP	Village of Mayo, YT
CAMP FACILITIES	Flat Creek camp facilities include a trailer camp, kitchen facility, welcoming center and dry Four refurbished houses and a bunkhouse located nearby in the townsite of Elsa
POWER	Hydro grid power Yukon Energy, diesel power backup
WATER SUPPLY AND USE	Fresh water supply from Flat Creek and adjacent well Water treatment plants at Bellekeno 625, Flame & Moth, and New Bermingham for mine effluent Process water is recycled from the Mill Pond to the plant
FIRST NATIONS	First Nation of Na-Cho Nyak Dun (FNNND)

The Keno Hill mining camp has a long mining history and is a brownfields site. AKHM develops the mineral resources, operates the KHSD mines and undertakes receiving environmental monitoring and treatment of mine discharge waters. Hecla Yukon's wholly owned subsidiary Elsa Reclamation & Development Company Ltd. (ERDC) undertakes care and maintenance, environmental monitoring and water treatment of historic adit drainages, district-wide closure planning and studies for the historic environmental liabilities.

The development history of AKHM's KHSD Mining Operations including the construction and operation of the District Mill is outlined in Table 1-2.

Table 1-2: Keno Hill Silver District Mining Operations Timeline

2006 – 2008	Alexco Resource Corp. acquires Keno Hill mining camp and begins aggressive surface exploration programs, focus on expansion of Bellekeno resource
2009	Underground development at the Bellekeno Mine; Mill foundation began
2010	Comprehensive Cooperation and Benefits Agreement signed with FNNND AKHM constructs the mill and surface facilities, and establishes the DSTF District Mill location at Flame & Moth Mine area (Constructed 2010) Tailings placed in Dry Stack Tailings Facility (Established 2010)
2011	Production at Bellekeno Mine and District Mill Surface exploration at Flame & Moth begins
2012	Development and rehabilitation of Lucky Queen adit Development of new Onek 990 decline
2013	Temporary suspension of Bellekeno Mine operations and milling AKHM monitors KHSD mine sites during care and maintenance
2014 – 2020	Permitting and development of Flame & Moth and New Bermingham mines Continued surface exploration, advanced underground exploration decline at New Bermingham deposit Decline development at Flame & Moth and New Bermingham mines Care and maintenance and water treatment
2021	Ore production from Bellekeno and New Bermingham Camp, surface facilities, and mill upgrades Mine development at Flame & Moth and New Bermingham Temporary suspension of Bellekeno Mine operations Continued surface exploration and water treatment
2022	Ore production at New Bermingham and Flame & Moth mines temporarily suspended Continued mine development at Flame & Moth and New Bermingham Continued surface exploration and water treatment Hecla Mining Company acquires Alexco Resource Corp.

KENO HILL SILVER DISTRICT

FIGURE 1-1
PROJECT LOCATION

May 2023

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475,000 477,500 480,000 482,500 485,000 487,500

7,092,500 7,090,000 7,087,500 7,085,000

N W E S

South

HANSON MCQUESTEN ROAD

Christal Creek

South McQuesten River

Sandy Creek

SILVER TRAIL HIGHWAY

Christal Creek

KENO SUMMIT

Star Creek

No Cash Creek

WERNECKE ROAD

Erickson Gulch

Charity

SIGN POST ROAD

CALUMET DRIVE

BERMINGHAM ACCESS ROAD

CHRISTAL LAKE

CHRISTAL LAKE ROAD

FLAME AND MOTH PORTAL

DISTRICT MILL SITE

BELLEKENO HAUL ROAD

FLAT CREEK CAMP

FORMER ELSA TOWNSITE

Porcupine Gulch

GALENA HILL

KENO CITY

Brefalt Creek

NEW BERMINGHAM PORTAL

HISTORIC BERMINGHAM 200 ADIT

DUNCAN CREEK ROAD

Lightning Creek

BELLEKENO 625

BELLEKENO EAST PORTAL

Thunder Gulch

Flat Creek

SOURDOUGH HILL

1:40,000 (when printed on 11 x17 inch paper)

0 0.5 1 2 Kilometres

Datum: NAD 83; Map Projection: UTM Zone 8N

- Adit
- AKHM / ERDC Quartz Claims
- Silver Trail Highway
- Other Road
- Limited-Use Road
- Tailings Area
- Waterbody
- Watercourse
- Contours (100 ft intervals)

Hecla YUKON

ENSERO solutions

FIGURE 1-2

KENO HILL SILVER DISTRICT MINING OPERATIONS OVERVIEW

May 2023

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1.2 REGULATORY CONTEXT

AKHM has all permits and authorizations in place for development and production of KHSD mines Bellekeno, Flame & Moth, and New Bermingham and operations of the District Mill. Approvals, permits, licences and operational management plans associated with the development and operations of the District Mill are listed in Table 1-3. This plan should be read in conjunction with these documents.

Table 1-3: Related Approvals, Permits, Licences and Operational Management Plans

YESSA APPROVALS	• Decision Documents and Evaluation Reports for projects #2009-0030, #2011-0315, #2013-0161 and #2017-0176
QUARTZ MINING ACT APPROVALS	• Class 4 Mining Land Use Approval (LQ00476 expires 2028) • Quartz Mining Licence (QML-0009, updated December 2021, expires 2037)
WATER LICENCE	• Type A Water Licence (QZ18-044 expires 2037)
MANAGEMENT PLANS	• Management Health and Safety Program / Emergency Response Plan • Mine Development and Operations Plans • Adaptive Management Plan • Dust Abatement and Monitoring Plan • Environmental Monitoring, Surveillance and Reporting Plan • Hazardous Materials Management Plan • Noise Monitoring and Management Plan • Overburden Management (included in the Construction Site Plan Revision 1) • Reclamation and Closure Plan • Sediment and Erosion Control Plan (included in the Construction Site Plan Revision 1) • Site Characterization Report • Spill Contingency Plan • Tailings Management Plans • Traffic Management Plan • Waste Management Plan • Waste Rock Management • Wildlife Protection Plan Please note that these management plans are not required by all the authorizations listed in the Table 1-3.

Terms and conditions listed in the Yukon Environmental and Socio-economic Assessment Act (YESAA) Decision Document Concordance Table and proponent commitments listed in the YESAA Proponent Commitment Concordance Table have been addressed in this plan in the corresponding sections. All references to documents on the Yukon Environmental and Socio-economic Assessment Board (YESAB) Online Registry can be found by searching for the Project and document number on the YOR.

2 SITE PREPARATION

2.1 PREVIOUS SITE USE

The District Mill was constructed in a previously impacted site, which AKHM and other stakeholders viewed as a favourable location with regard to minimizing environmental impact of the project (Figure 2-1) (from EBA, 2010, Figures).

The District Mill site is located within an area of historic mine workings. In the 1920's numerous workings, shafts and adits were sunk in the of the District Mill. In the early 1950's, United Keno Hill Mines (UKHM) sank a 27.4 m inclined shaft to a vertical depth of 21.3 m along the footwall of the Moth vein. The company drove a crosscut through the vein, at a depth of 13.7 m and drifted 47.3 m along the bottom of the shaft. In 1987 UKHM began stripping the overburden over a portion of the Flame and Moth deposit for a proposed open pit mine (Yukon Geological Survey Minfile 16660#InfoTab).

UKHM document *Total Minehead production, Keno Hill – Galena Hill area* (Watson 1989) indicates that 1,442 tonnes of ore were produced from the Flame & Moth property. In addition, prior to mill development a commercial surface lease was held by a third party to operate a sawmill out of the old Flame & Moth open pit. The surface lease area was acquired by AKHM prior to construction of the District Mill.

2.2 CLEARING

Clearing and stripping/grubbing of the area surrounding the District Mill was required prior to construction of mill infrastructure including buildings, dry stack tailings facility (DSTF) foundation and the collection and treatment water ponds. Rows of trees remain along the Duncan Creek Road, the Keno City Dump access road and at the height of land between Keno City and the District Mill to limit view of operations from the community.

Stripping was accomplished by dozing surface organics into a stockpile until suitable soil foundation materials were present. The recovered organic material is used to progressively cover the DSTF. Figure 2-2 shows the current location of the stockpiles of organic material that were salvaged during the pre-construction clearing and stripping/grubbing of the mill and warehouse yard footprint. Approximately 3000 m^3 of organic material is currently available for use. Preparatory earthworks details for the District Mill site are provided in the Construction Site Plan, Revision 1 (Access Consulting Group, 2009).

Surface preparation within the DSTF footprint was limited to the sequential flattening and removal of trees, with the standing trees being sheared off just above the ground surface.

2.3 FOUNDATION PREPARATION

Geotechnical test pitting programs have been carried out at the District Mill and DSTF area by Tetra Tech (formerly EBA Engineering) to determine the extent of permafrost in the locations planned for infrastructure development. The results are illustrated on Figure 2-3 (from EBA, 2011, Figures). Perhaps partly because of the previous site disturbance, as well as the southern exposure and shallow soils over bedrock, there was no permafrost encountered in the test pits for the mill building foundation. Elsewhere, the District Mill area is blanketed by a thick cover of fluvio-glacial overburden deposited on an irregular erosional surface that is in places up to 50 m in depth.

All organic soils, weak mineral soils, ice-rich soils and any other soils deemed to be unsuitable were removed down to competent mineral soils or fractured bedrock under the mill facilities, and collection and treatment water ponds were constructed on a prepared foundation. Mill foundations and concrete work for the District Mill site are provided in the Construction Site Plan, Revision 1 (ACG, 2009).

To protect the underlying permafrost foundation material, minimal disturbance to the ground surface was undertaken within the DSTF. Ground surface preparation and drainage blanket placement are completed in the same year as tailings placement. (EBA, 2010).

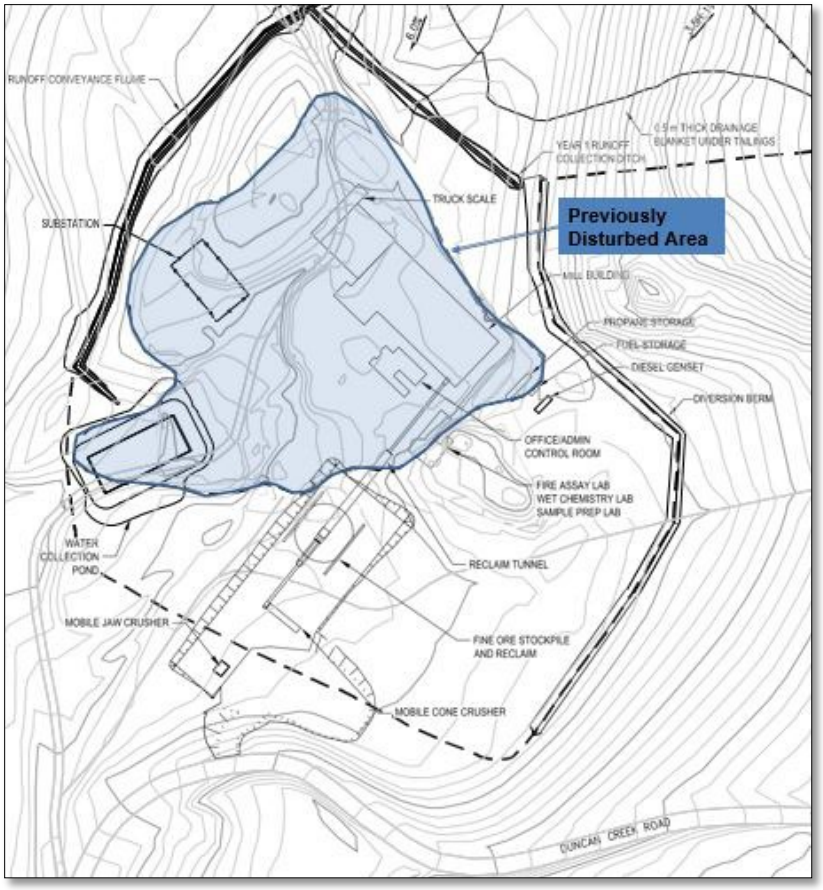


Figure 2-1: Previous disturbed area at District Mill Site

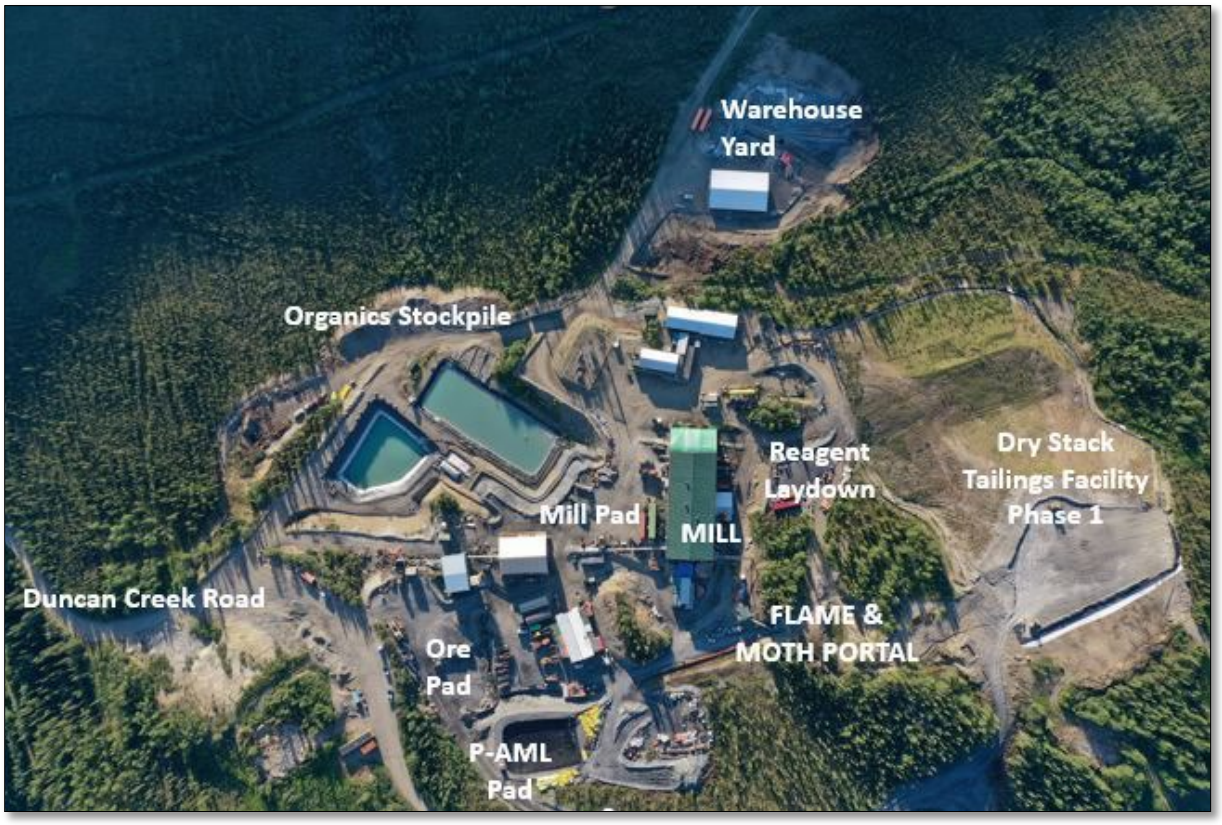


Figure 2-2: Mill and Warehouse Yard Footprint

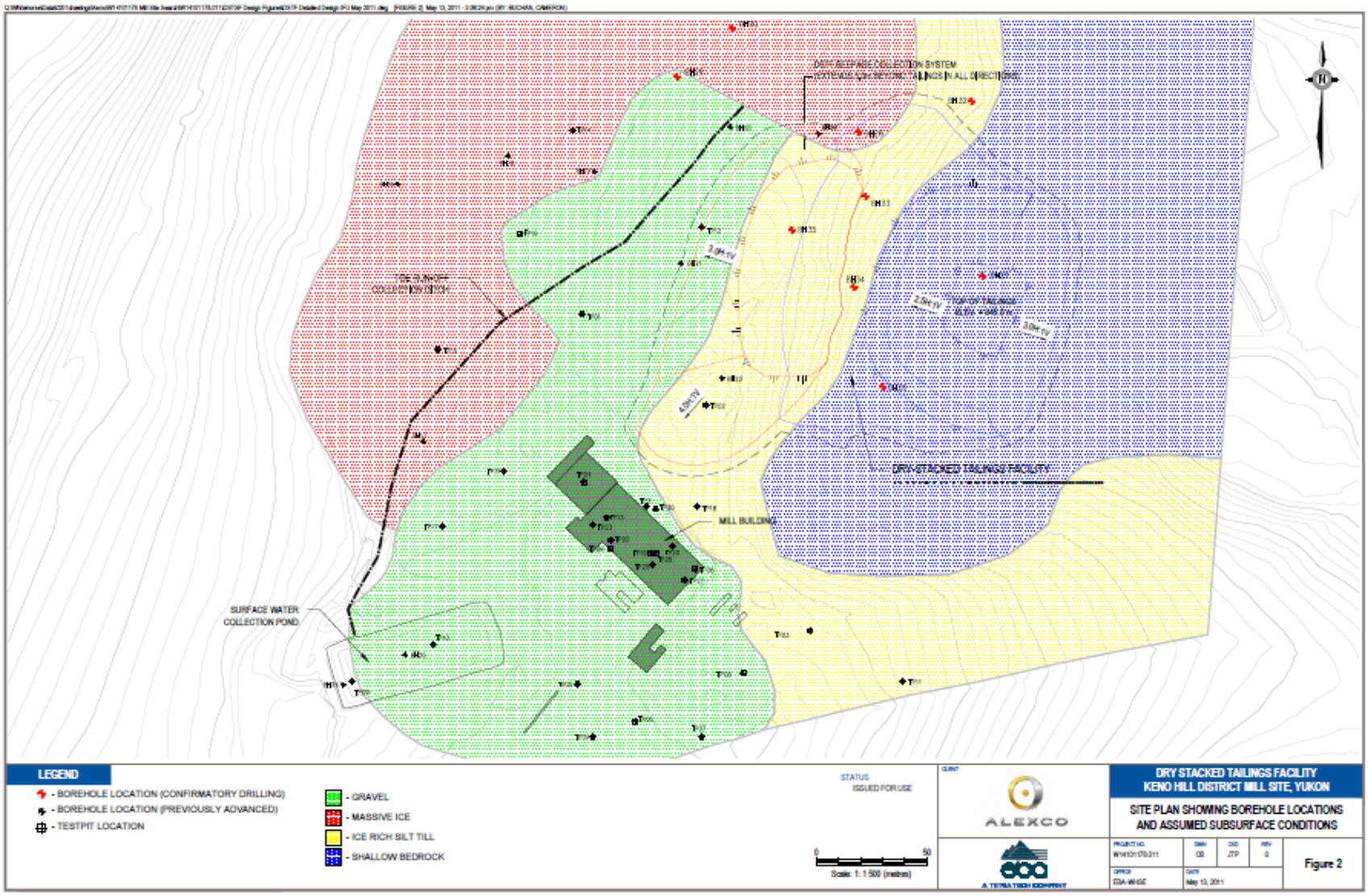


Figure 2-3: Subsurface Conditions at District Mill (circa 2011)

3 MILL INFRASTRUCTURE

An aerial photo with District Mill and Flame and Moth Mine infrastructure is provided in Figure 3-1. Design criteria for the mill operations are summarized in Table 3-1. Infrastructure at the District Mill facility includes the mill and DSTF along with:

1. mine and mill offices,
2. warehouse,
3. maintenance shop,
4. male and female dry facilities,
5. an assay lab,
6. first aid facilities (located inside the mill office),
7. millwright shop, and
8. mill pond.

Additional infrastructure in the area includes the Flame & Moth Mine, located northeast of the mill building, and consists of a miners' office trailer and miners' dry facility, cold storage structure, water treatment plant (inside the mill) and settling pond, ore and waste handling/storing facility, explosives magazine, portal ventilation fan and heater, and air compressors. In the interest of site security and public safety, access to operational areas, including the District Mill access roads, is restricted to site personnel through the usage of sings and gates where appropriate.

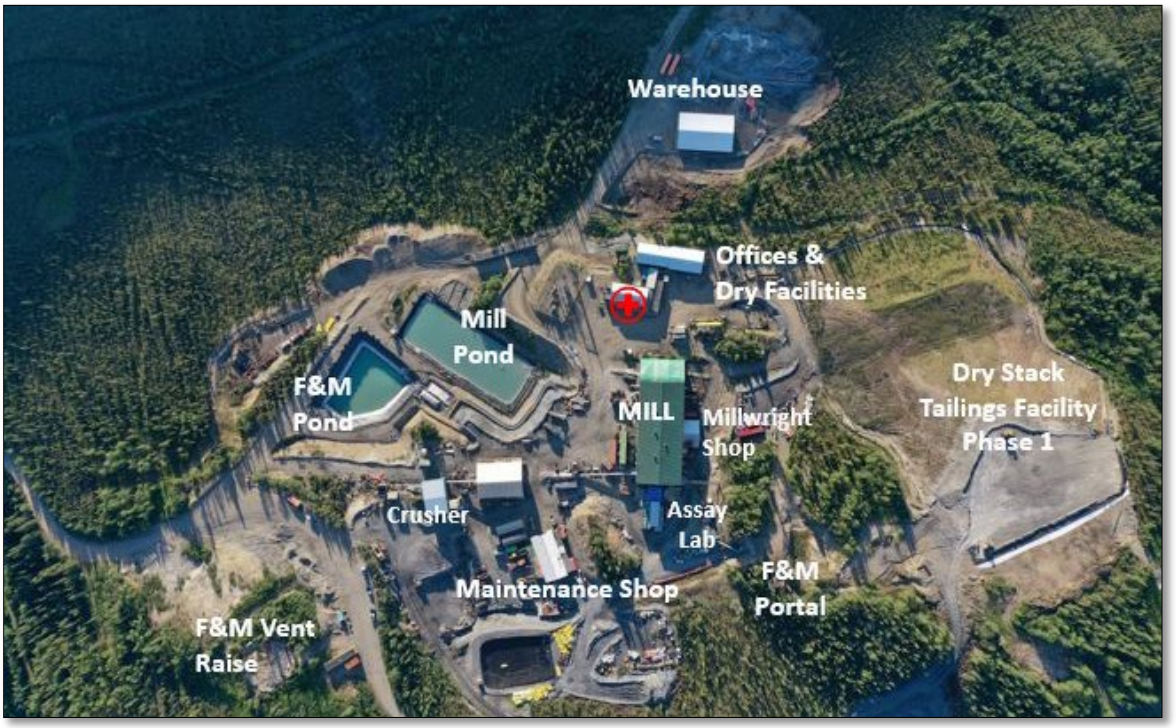


Figure 3-1: Mill Infrastructure Overview

Table 3-1: Mill Design Criteria

DESCRIPTION	UNIT	VALUE
Type of Ore Processed		
Silver/Lead/Zinc sulphide mineralization New Bermingham/Bellekeno/Lucky Queen/ Onek / Flame and Moth Mines		
Ore Characteristics		
Specific Gravity	g/cm³	3.46
Bulk Density	t/m³	2.1
Moisture Content	%	3-5
Operating Schedule		
Crusher Plant		
Shift/Day		1
Hours/Shift between 7 AM and 7 PM only	h	12
Hours/Day	h	12
Grinding and Flotation Plant		
Shift/Day		2
Hours/Shift	h	12
Hours/Day	h	24
Days/Year	day	365
Plant Availability/Utilization		
Overall Plant Feed	mt/a	146,000
Overall Plant Feed	mt/d	250 - 400
Crusher Plant Availability	%	80
Grinding and Flotation Plant Availability	%	92
Crushing Process Rate	mt/h	63.8
Grinding/Flotation Process Rate	mt/h	18.5

3.1 MILL AND ANCILLARY BUILDINGS

The buildings at the District Mill site (Table 3-2) can be broken into five categories:

- modular, prefabricated trailer style buildings,
- rigid, steel frame construction buildings with insulated steel wall sheeting,
- non-rigid prefabricated steel frame "fold-away" buildings,
- containerized buildings, and
- tents.

Table 3-2: Building construction style

BUILDING	MODULAR TRAILER	RIGID STEEL FRAME	FOLD-AWAY	CONTAINERIZED	TENT
Mill and mill expansion		✓			
Crusher building		✓			
Fine ore storage					✓
Assay lab				✓	
Millwright shop				✓	
Warehouse		✓			
Mine and mill offices	✓				
Maintenance shop	✓		✓	✓	
Dry facilities	✓				
Cold storage				✓	

Mill

The Keno District Mill is a conventional differential flotation facility producing two separate metal concentrates that are shipped offsite for final processing. The mill building is a pre-engineered steel building containing all of the processing equipment used for the milling, flotation and recovery of silver, lead and zinc from KHSD Mining Operations. The mill building is 22.5 by 54 meters in dimension (Photo 3-1), In 2021 an expansion to the mill building was added between the mill and the assay lab to house the secondary grinder (Photo 3-4).

Photo 3-1: Mill Building

The crushing plant is enclosed in an insulated metal clad building thereby reducing overall plant noise. Dust at the crushing plant is controlled by mechanical ventilation; a baghouse style dust collection system (Photo 3-2).

Photo 3-2: Crusher building, baghouse, fine ore storage tent and cold storage containers

The fine crushed ore is stored inside a tent (Photo 3-3).

Photo 3-3: Fine Ore Storage Tent

Assay Lab

A metallurgical and assay laboratory conducts all basic test work to monitor and improve the process flowsheet metallurgy and efficiency, and to support environmental monitoring. The assay lab is located immediately adjacent to the mill building and consists of 3 skid mounted trailer units separated by a wooden deck and winter roof truss. The assay laboratory was constructed as a pre-packaged unit consisting of two retrofitted 40 ft shipping containers (2.4 by 6.1 meters in dimension) converted into laboratory modules, which are located adjacent to the mill building. The sample prep trailer is a skid mounted trailer used for preparation of mill and underground samples. The trailer is 13.47 by 3.05 meters in dimension.

The laboratory is equipped with the necessary analytical instruments to provide all routine assays for the mine, plant, and environmental quality control monitoring. The equipment included allows for the preparation and

analysis of approximately 80 samples per 12-hour shift. Standard analysis includes acid digestion of samples followed by analysis on an atomic absorption (AA) spectrometer. The assay lab facility is shown in Photo 3-4.

Photo 3-4: Mill Expansion and Assay Lab

Millwright Shop

Maintenance millwright shop is attached to the mill building and has a concrete floor, containerized walls, and a wooden roof truss.

Warehouse

The warehouse is rigid, steel frame building with steel wall sheeting, and concrete floor. Adjacent yard has been constructed of non-acid generating and/or metal leaching (N-AML) waste-rock from the Flame & Moth Mine.

Maintenance Shop

Maintenance shop is a non-rigid prefabricated steel frame "fold-away" building with attached containerized buildings, adjacent sea containers for storage and modular prefabricated trailer style buildings for offices, lunchroom, and a wash trailer. The shop floor is concrete with an in-floor collection drain and sump.

Administration Buildings

The administrative offices, dry and first aid facilities are based in a complex to the west side of the mill building and consists of modular, prefabricated trailer style buildings. Security cameras are monitored from within the mill office building.

Cold Storage

Sea containers, some retrofitted with roll up doors are used to store parts and materials and are located at various locations around the site (Photo 3-5).

Photo 3-5: Mill Cold Storage

3.2 MOBILE EQUIPMENT

Table 3-3 provides a list of mobile equipment to be used for the operation of the District Mill.

Table 3-3: Project equipment list

EQUIPMENT (OR SIMILAR TO)	# OF ITEMS	PURPOSE
Excavator	1	Moving material; facility maintenance
Loader	3	Moving material; loading and off-loading trucks and facility maintenance
Skid Steer	2	Moving material; loading concentrate and facility maintenance
Articulated 30-tonne Haul Truck	4	Transporting material to and from facility
Road Dump Truck	1	Transporting material to and from facility
Aerial platform	1	Building maintenance
Packer	1	Packing DSTF
Grader	1	Road maintenance
Bulldozer	2	DSTF, road maintenance
Vacuum Truck	2	Evacuation of sewage and impacted water
Telehandler	1	Moving material; loading and off-loading trucks and facility maintenance
Crew Truck	>5	Transporting of personnel, small equipment, and supplies

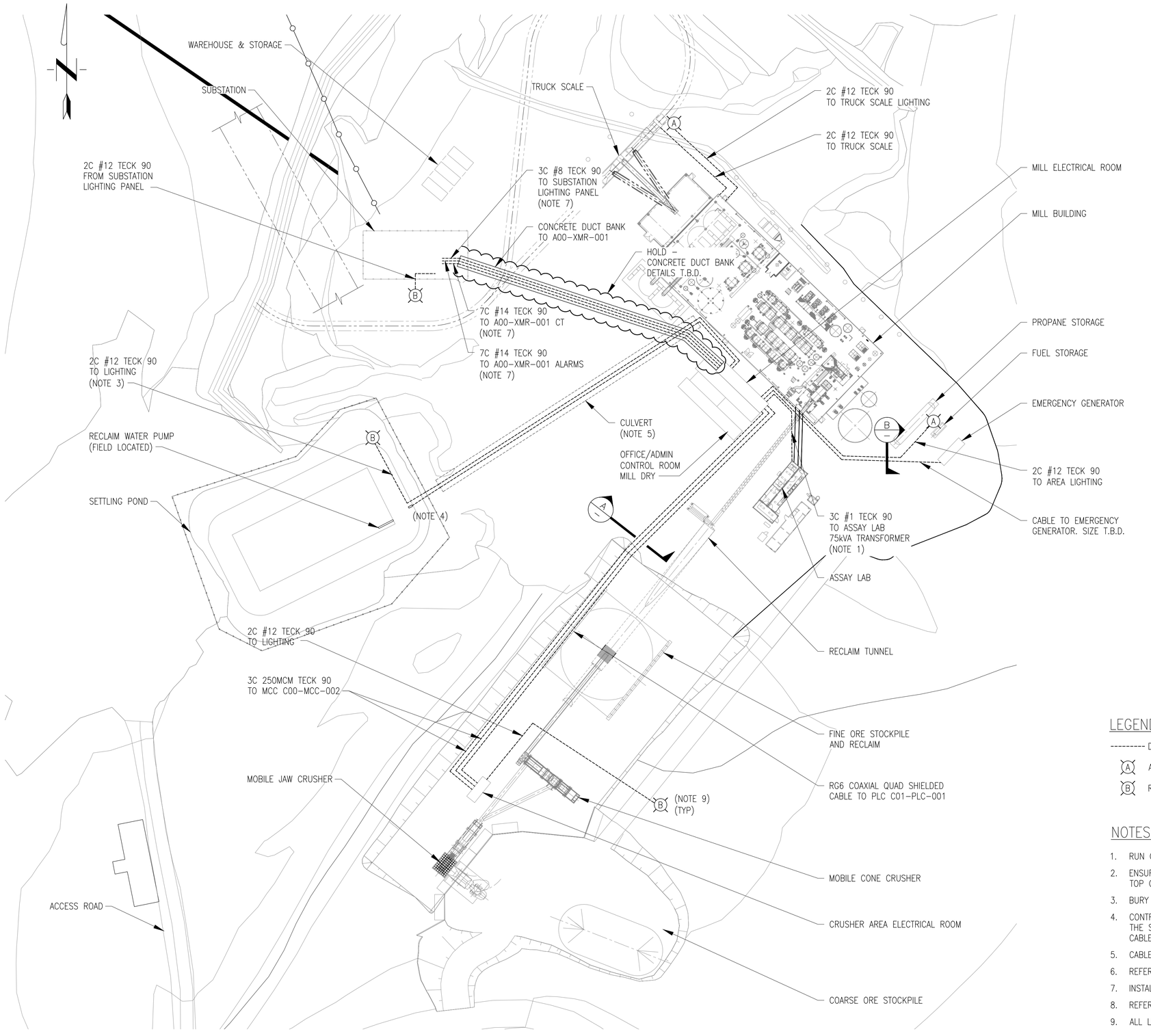
3.3 ELECTRICAL SUBSTATION

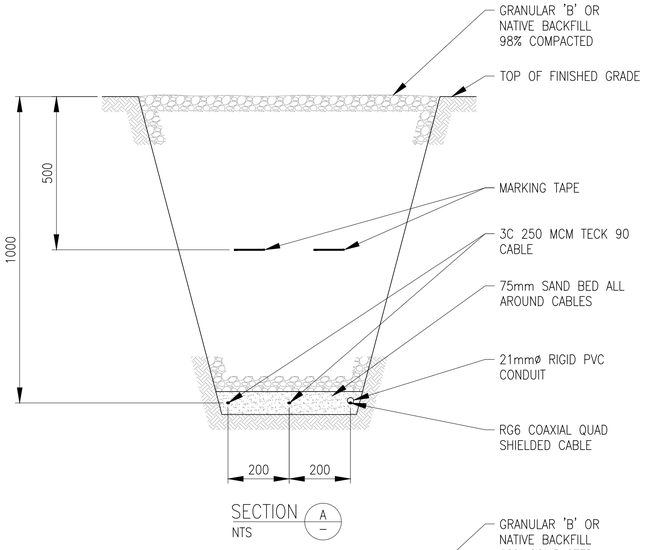
The Project is supplied with electrical power from a hydroelectric plant near Mayo and connection to the Yukon wide electrical grid. The Mayo hydro facility was expanded in 2011 which increased generation capacity from 5 megawatts to 15 megawatts. The power distribution grid was also upgraded from Pelly Crossing to Stewart Crossing during the same time. The power distribution line from Mayo to McQuesten was completed in 2021 to replace the 65-year-old transmission line and to add system protection equipment.

A new 69 kilovolt/4.16 kilovolt-3 megavolt amp substation was installed to deliver power to the District Mill, Flame & Moth Mine, and associated infrastructure. Power is now provided exclusively by the Yukon Energy Corporation (YEC) electrical distribution system. The electrical substation is located adjacent to the mill office/dry facility and houses a primary 69 kilovolt – 600-volt step down transformer and electrical distribution infrastructure. The substation is enclosed by a 28 by 15.5-meter security fence and is shown in Photo 3-6.

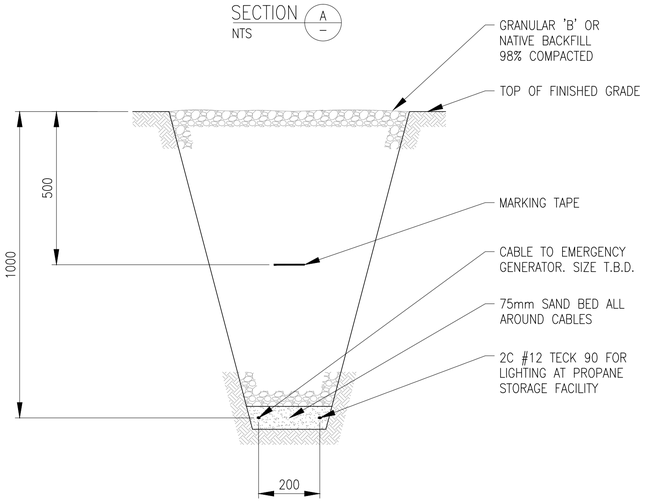
Photo 3-6: Electrical Substation

Engineering drawings for the District Mill electrical substation are included in Figure 3-2.





SECTION A
NTS



SECTION B
NTS

LEGEND

--------- DIRECT BURIED CABLE

(A) AREA FLOODLIGHT

(B) ROADWAY LIGHT

NOTES:

1. RUN CABLE FROM MILL ELECTRICAL ROOM MCC TO ASSAY LAB IN THE SAME TRENCH AS THE PIPING.
2. ENSURE ALL CABLES ARE BURIED AT LEAST 600mm BELOW GRADE. PROVIDE MARKING TAPE AT MIDPOINT BETWEEN CABLE AND TOP OF FINISHED GRADE FOR EACH UNDERGROUND INSTALLATION.
3. BURY LIGHTING CABLE MINIMUM 600mm BELOW GRADE AFTER THE END OF THE CULVERT.
4. CONTRACTOR TO PROVIDE A 600V, 30A, NEMA 4X, LOAD BREAK RATED DISCONNECT SWITCH FOR THE RECLAIM PUMP. INSTALL THE SWITCH ON A FABRICATED UNISTRUT CHANNEL SUPPORT RACK. RUN POWER CABLE FROM PIPE TO SWITCH, AND CONNECT CABLE FROM PUMP TO THE LOAD SIDE OF THE SWITCH.
5. CABLES TO SETTLING POND ARE TO BE RUN ON PIPING IN CULVERT. REFER TO DWG A00-13-101.
6. REFER TO CABLE SCHEDULE FOR CABLE TERMINATION DETAILS.
7. INSTALL CABLE IN CONCRETE DUCT BANK BESIDE TRANSFORMER FEEDER CABLES. INSTALLATION DETAILS T.B.D.
8. REFER TO DWG E00-18-016 FOR LIGHTING FIXTURE DETAILS.
9. ALL LIGHTING FIXTURES ARE TO BE POLE MOUNTED. INSTALLATION DETAILS T.B.D.

10 0 10 20 30 40M
SCALE: 1:500

DWG. NO.	REFERENCE DRAWINGS

PRELIMINARY DRAWING

NOT TO BE USED FOR CONSTRUCTION

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
A	1	ISSUED FOR TENDER	30APR10	BJM

CLIENT / PROJMAN / PROLDNG / PROCESS / ELECTR / INSTR. / PIPING / MECH. / STRUCT. / SERVICES / ARCH. / LAYOUT

SECTION:	ELECTRICAL	
SCALE:	1:500	DATE
DESIGN. BY:	BJM	27APR10
DRAWN BY:	SEO	27APR10
CHECK. BY:	RGD	30ARP10
APP. BY:		

YUKON TERRITORY

ALEXCO

WARDROP | Engineering Inc.

Keno Hill District Mill Site
Figure 3-2
Electrical Site Plan

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
A0018004.DWG	09539602.00	A00-18-004	A

10/03/22 16:18

A1

U:\A-G\Alexco Resource Corp - 5396\09539602.00 - Bellekeno Project (EP)\18-Elec\DWG\Site Electrical Distribution\A0018004.DWG

3.4 MOTOR CONTROL CENTRES

A Motor Control Centre (MCC) for the mill building is located immediately adjacent to the mill and contains the motor control starters and distribution for the mill equipment. The main electrical substation distributes 600-volt electrical power to the mill MCC. The mill MCC is a skid mounted unit mounted a steel support structure and has a dimension of 15.24 by 3.04 meter. The mill MCC is shown in Photo 3-7.

The crusher MCC (Photo 3-8) is located adjacent to the crushing plant and provides electrical distribution for the various motors located in the crushing plant. The main electrical substation distributes 600-volt electrical power directly to the crusher MCC and then individual motor starters within the MCC distribute power to the motors. It is a portable skid mounted steel insulated building with dimensions of 2.4 by 6.1 meter.

Photo 3-7: Mill MCC

Photo 3-8: Crusher MCC

3.5 DIESEL STORAGE TANKS

One skid mounted double walled diesel storage tanks and one skit mounted gasoline tank are located adjacent to the concentrate loadout area and are used for general fuelling of mobile equipment and vehicles. The diesel and gasoline tanks are shown in Photo 3-9.

Photo 3-9: Diesel and Gasoline Fuel Tanks

3.6 PROPANE STORAGE TANK

A tire mounted portable propane storage tank sits near the mill building with a capacity of 10,000 gallons (37,854 litres) or more of propane. Propane is used at the mill for heating the mill building during winter conditions. The propane tank is supplied by the vendor.

4 ORE AND WASTE ROCK MANAGEMENT

4.1 ORE STOCKPILES

The District Mill is capable of blending and processing ores from various mines throughout the Keno Hill Silver District. Milling of ore from the Bellekeno Mine ceased in 2021. Ores from the New Bermingham and Flame & Moth mines are hauled and stored in the coarse ore stockpile prior to crushing. Hauling of ore from New Bermingham Mine is restricted to between 7 AM and 7 PM. Blending of these ore sources are completed to target a consistent mill feed grade which improves overall operating efficiencies. The estimated volumes from New Bermingham, and Flame and Moth are summarized in Table 4-1. Ore is stored at the coarse ore stockpile for a limited amount of time, typically less than 30 days, prior to being moved into the crusher/grinding facility.

Table 4-1: Ore Management for New Bermingham, and Flame and Moth

ORE SOURCE	% MILL FEED	TPD MILL FEED
Flame and Moth	25-88 %	100 – 350
New Bermingham	25-88 %	100 – 350

The coarse ore stockpile is on a 0.5-metre-thick concrete base (cemented rock fill [CRF]) pad which is covered with a layer of low-grade ore. The ore pad is surrounded by portable concrete containment blocks. The ore pad was redesigned in 2022; the design drawing is provided as Figure 4-1. Photo 4-1 shows the coarse ore stockpile with ore being delivered by a 30-tonne mine haul truck.

Photo 4-1: Run of Mine (ROM) Coarse Ore Storage

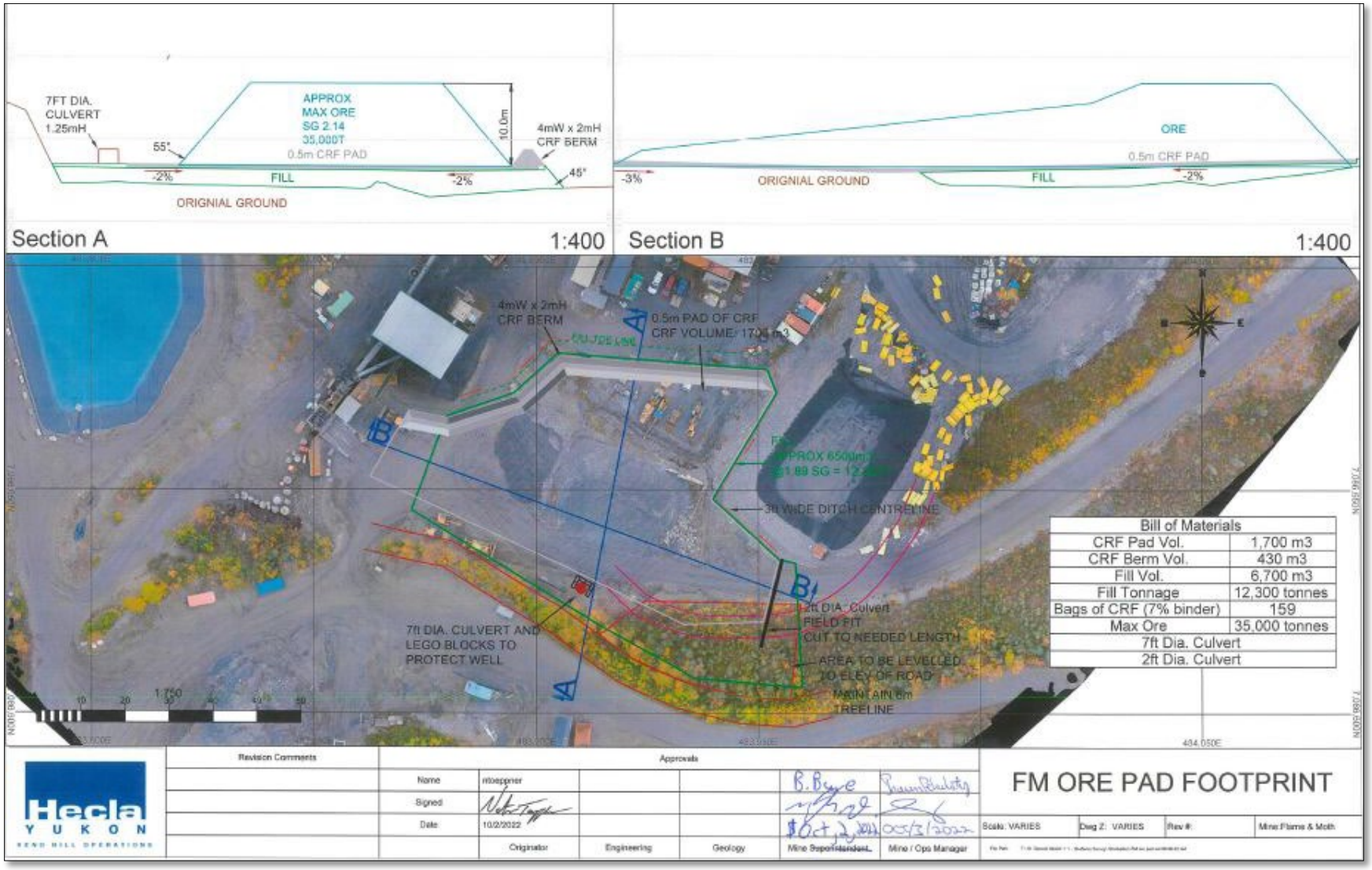


Figure 4-1: District Mill Ore Pad Design Drawing

4.2 WASTE ROCK MANAGEMENT

Non-acid generating and/or metal leaching (N-AML) waste rock generated from development and mining at Flame & Moth is deposited around the mill area to create extensions to laydown yards, stockpiled or used as backfill underground. Potentially acid generating and/or metal leaching (P-AML) waste rock is deposited in a temporary P-AML waste rock storage facility constructed nearby before being backfilled underground.

The specifics of waste rock characterization, handling and final deposition are found in the KHSD Mining Operations Waste Rock Management Plan.

5 DRY STACK TAILINGS FACILITY

As the development of the KHSD mining operations progresses, additional tailings from other ore deposits will be stored in Dry Stack Tailings Facilities. The current and expanded DSTF design is suitable to store tailings from the Bellekeno, Flame & Moth and New Bermingham deposits.

The environmental/geochemical characteristics of the tailings are similar from mill feed across the district. This is due to the consistency of the geology across the district, as well as processing the ore from each in the same metallurgical flowsheet in the District Mill. The KHSD Mining Operations Tailings Characterization Plan provides the geochemical characteristics results and evaluations with respect to acid generating and metal leaching potential. The results of the tailings characterization program are included with the annual report for Water Licence QZ18-044. Additionally, AKHM reviews the data with their consultants to determine if any modifications in handling are required.

Tailings deposited onto the storage are outside the mill building are rehandled and loaded into a 30-tonne articulating haul truck with a front-end loader and transported to the DSTF or to the mines for use as backfill. The dewatered tailings are deposited onto the DSTF liner system; designed to capture any residual porewater that may leave the pile. The tailings are laid down in 0.5-meter lifts and compacted with a vibratory roller compactor. The specifics of tailings deposition with the DSTF are found in the KHSD Mining Operations Tailings Management Plans.

The DSTF is designed and will be constructed in 2 phases. The DSTF Phase 1 footprint has a current design capacity of 322,000 tonnes. The phase 2 footprint has a current design of additional 584,000 tonnes. Current design limitations beyond that footprint include geotechnical conditions (permafrost, ice lenses sub-surface) and general topography. Following completion of Phase 1, expansion of the DSTF Phase 2 will allow the remaining volume of tailings estimated in the Life of Mine (LOM) Plan to be stored. The detailed design of the DSTF Phase 1 is presented in Figure 5-1. The details of the design criteria and slope stability analyses are presented in the design report (EBA, 2011) and discussed in the documents supporting the permit applications listed in Table 1-3. The Phase 2 expansion design is similar to Phase 1 and will be located adjacent to the mill. The footprint of the originally proposed expansion is shown on Figure 5-1 along with the location of boreholes to investigate subsurface conditions. A revised Phase 2 expansion design is underway. Issued for construction drawings will be provided as required under the QML-0009.

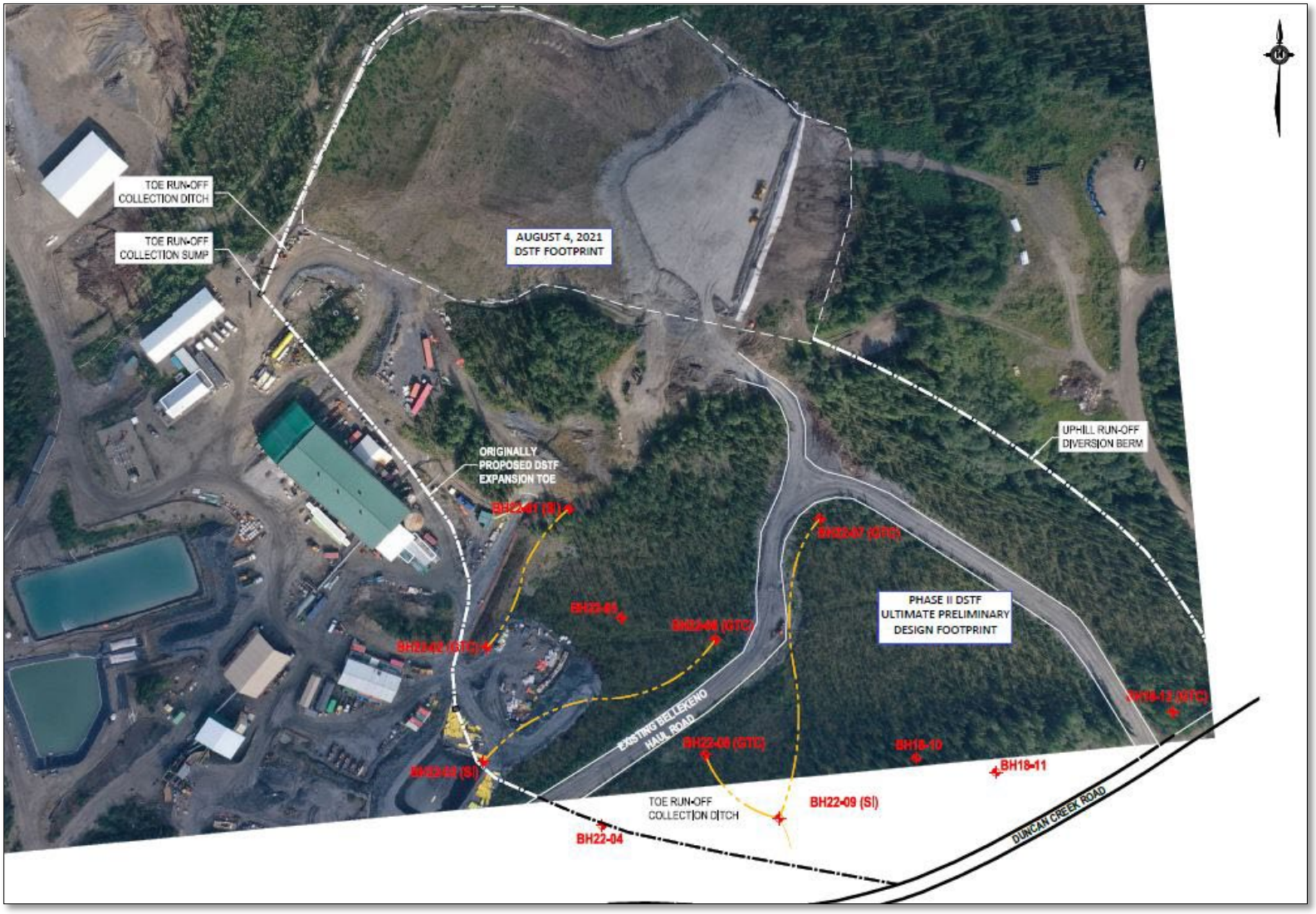


Figure 5-1: DSTF Phase 1 Footprint and Phase 2 Preliminary Design

6 WATER MANAGEMENT SYSTEMS

The water reticulation system for the process plant consists of the following unit operations:

- process water supply,
- non-potable water supply, and
- gland service water supply.

6.1 PROCESS WATER SUPPLY SYSTEM

The mill process water is supplied to the plant primarily via a submersible pump in the mill process water pond. This water supply is used for process stream dilution as well as by the plant clean-up hosing stations. Filtered process water is used to supply gland service water for all centrifugal water and slurry pumps in the plant. The mill process pond is located downgradient from the mill building and contains and manages the process water balance required for the milling operation (Photo 6-1). Thickener overflow water from inside the mill building gravity flows via a high-density polyethylene (HDPE) insulated pipe into the mill process pond. Process makeup water is pumped from the pond to the process water tank for makeup and recycle in the milling process. The mill process pond is 32 by 79 meters in dimension with a total design capacity of 4,340 m^3 based on a 0.4-meter freeboard.

No fresh water supply is currently expected to be required for the mill operations as the mill process water pond is expected to provide adequate water for the mill operation. Should additional water be required for the mill operation, which is not expected at this time, that water would be obtained from the Flame and Moth Water Treatment Pond.

Process water consists primarily of reclaim water from the water polishing pond, as well as tailings thickeners overflow. From the process water pond, the reclaimed water is pumped to a 7 m diameter by 7 m high process water storage tank, from where the water is dispersed to the distribution lines in the process plant. Sludge that accumulates in the mill process water pond is dredged into filtering geotextile sludge bags within a lined area and hauled underground for disposal when dried Figure 6-1.

Photo 6-1: Mill Process Water Pond

6.2 FLAME & MOTH WATER TREATMENT POND

The Flame & Moth Pond (Photo 6-2) is located adjacent to the mill pond and serves as a final polishing step for effluent from the water treatment plant (WTP). The Flame & Moth Mine requires continual dewatering through the Flame & Moth Adit. Treatment at this facility consists of metals removal with the addition of lime to mine water in a rapid mix tank, as well as the addition of small amounts of both iron in the form of ferric chloride, ferric sulphate, ferrous chloride and polymer.

The Flame & Moth WTP clarifier, programmable logic controller, dosing pumps, and reagents tanks are located within the District Mill. The WTP utilizes a conventional pH change for its treatment approach and consists of a lime and polymer coagulation system. The system is comprised of a lamella clarifier for sludge/sediment separation and sludge collection/filtering within geotextile bag(s). The Flame & Moth WTP is automated for both pH (lime slurry addition) and turbidity (polymer addition) adjustments, with dosing pumps increasing and decreasing reagent addition based on monitored pH and turbidity levels at the plant discharge. The plant can be adjusted both automatically and manually by the operators to modify setpoints to achieve target pH and turbidity readings. The process flow is shown in Figure 6-1.

The clarifier overflow water from inside the mill building gravity flows via a 6" HDPE pipe into the Flame & Moth WTP Pond or sent underground for mine water requirements. The water from the pond is pumped to the pond to either the Lightning Creek or Christal Creek discharge. The pond was constructed with an engineered fill embankment.

Studies are underway to determine if the DSTF can accommodate the inclusion of sludge from the Flame & Moth WTP. If positive, the results will be reported in updated Tailings Management Plans.

Photo 6-2: Flame & Moth Pond

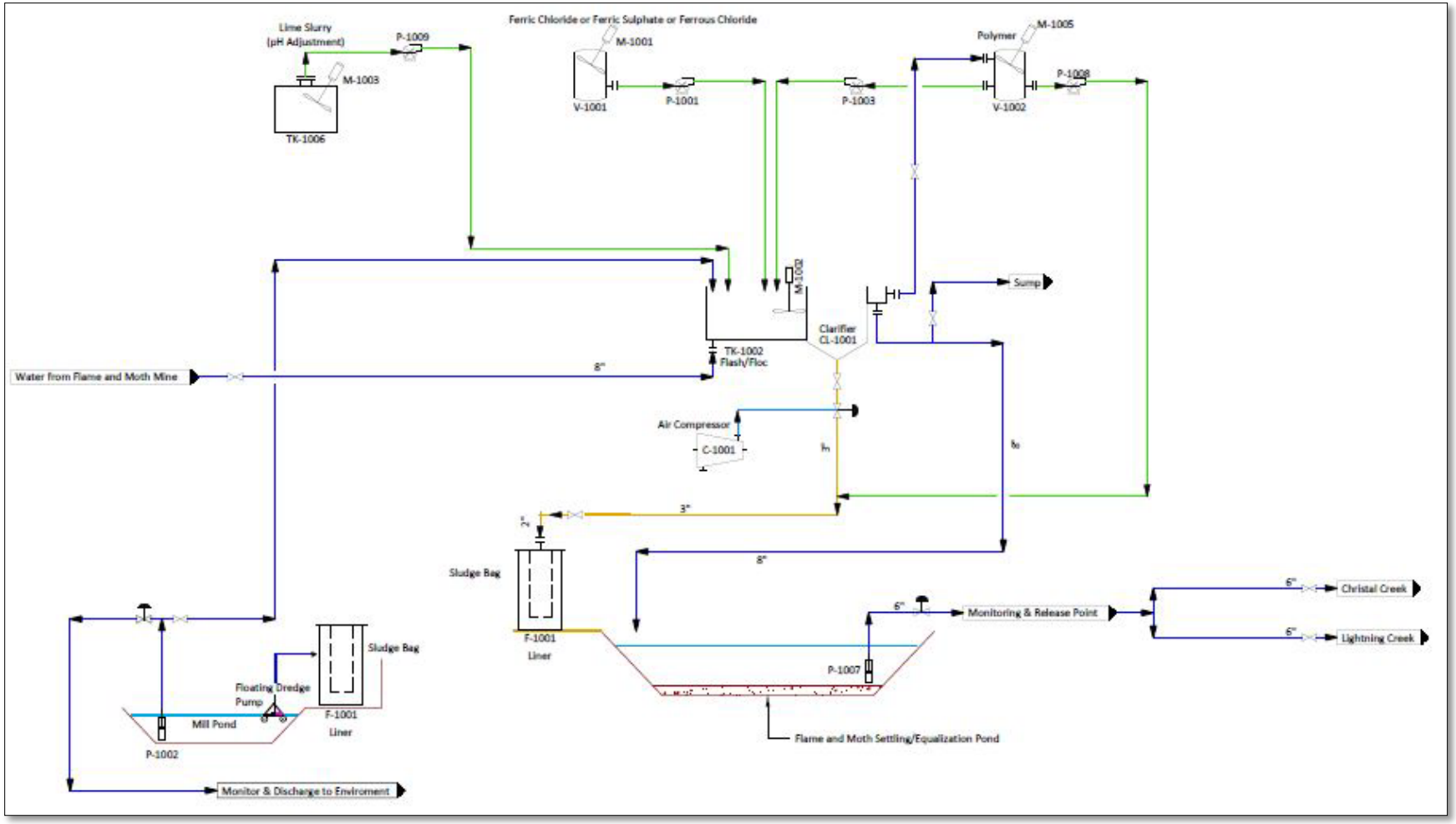


Figure 6-1: Flame & Moth WTP Process Flow Diagram

7 PROCESS DESCRIPTION

The Keno District Mill consists of the following process circuits:

- primary and secondary crushing circuits with a belt conveyor to transport the crushed ore to the covered fine ore stockpile,
- fine ore reclaim system feeding crushed ore from the covered fine ore stockpile,
- primary and secondary ball milling in a closed circuit with a cyclone to produce a grinding product of 80% passing 174 µm,
- the ground ore produces an overflow feeding to lead rougher scavenger flotation circuit to recover lead and silver minerals,
- lead flotation tailings feed the zinc circuit.
- the lead rougher flotation concentrate being upgraded in three stages of cleaner flotation, regrinding is available if required.
- the zinc rougher flotation concentrate being upgraded in three stages of cleaner thickening, regrinding is available if required.
- pressure filtration of the lead and zinc concentrates, and
- thickening and pressure filtration of tailings.

The mill process flowsheet is presented in Figure 7-1. The layout of the operating floor in the mill is shown in Figure 7.2.

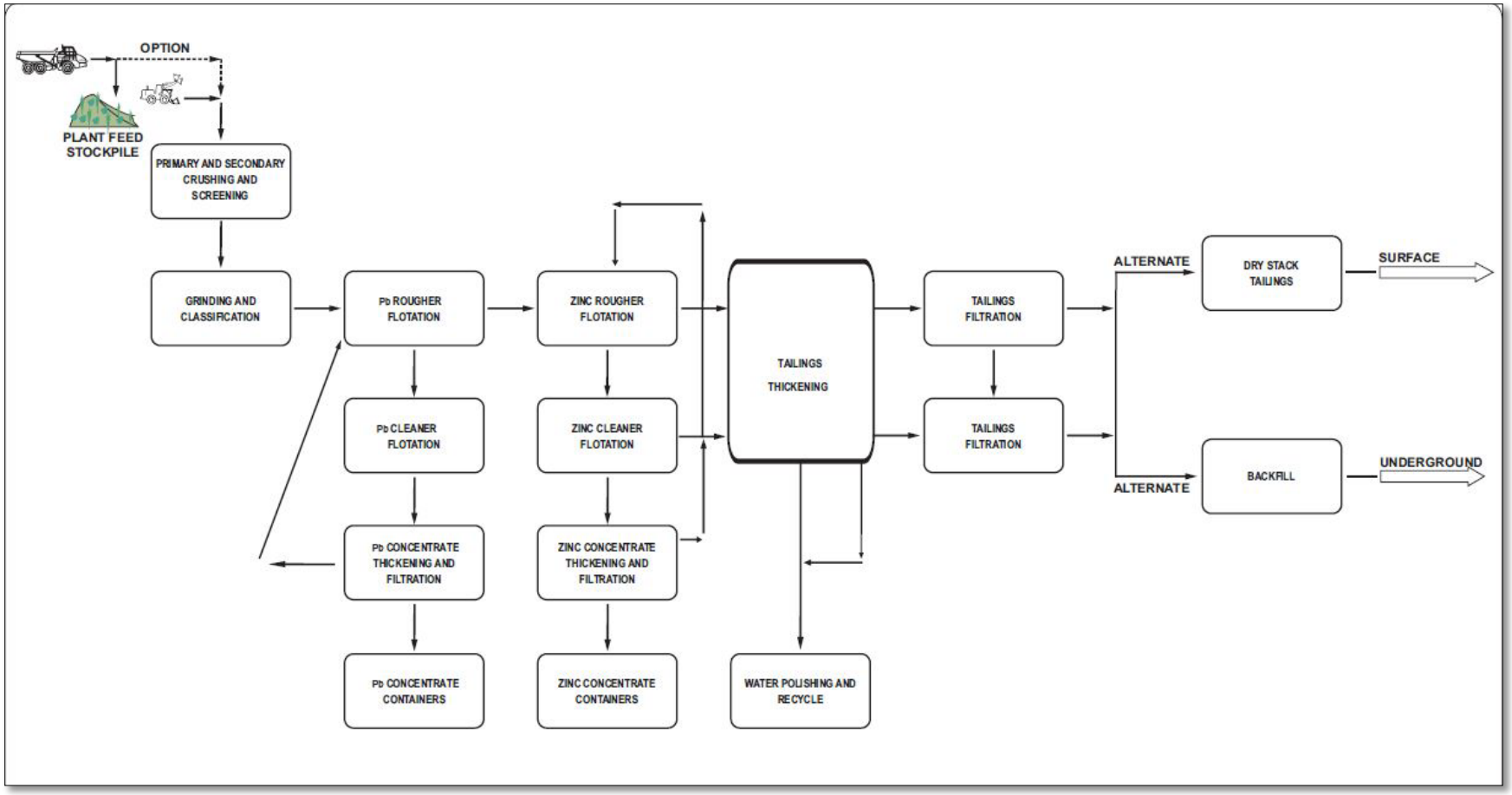


Figure 7-1: District Mill Process Flowchart

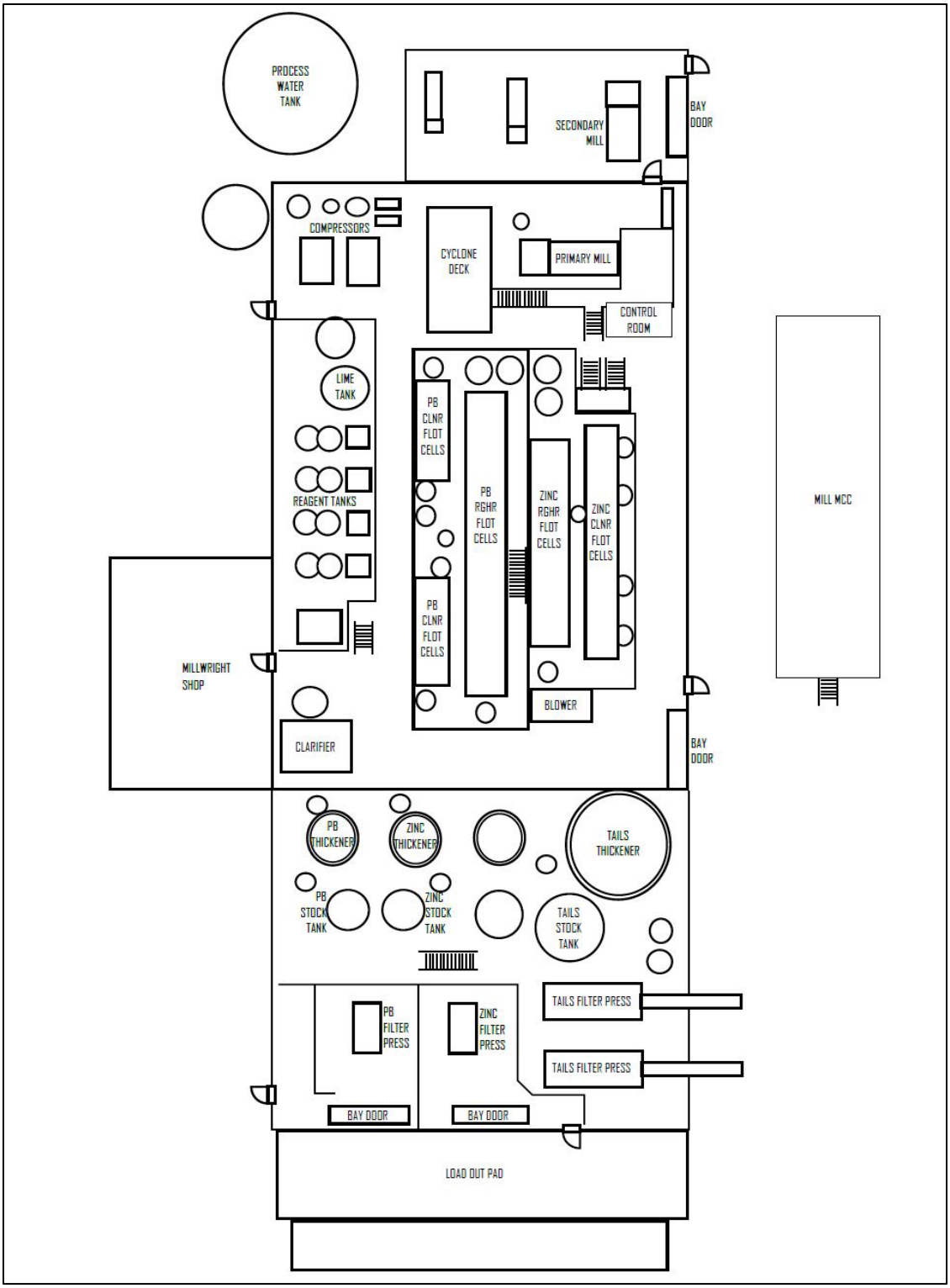


Figure 7-2: General Arrangement Operating Floor

7.1 ROM ORE CRUSHING

ROM ore crushing is completed through a standard two-stage crushing plant (Photo 7-1). ROM ore is stockpiled by 30-ton haulage trucks and feed into the feed hopper with a 47-tonne capacity with a loader. The hopper is equipped with a 450 millimetre (mm) opening stationary grizzly to prevent oversize ore entering the downstream jaw crusher.

The feed to the jaw crusher is controlled using a vibrating grizzly feeder. The 508 mm by 914 mm jaw crusher with a 75-kilowatt motor crushes the ROM ore at a nominal rate of 63.8 tonne per operating hour. The jaw crusher reduces the ore size from minus 450 mm to a size 80% PASSING 50 mm with the crusher closed side setting of 70 mm. The crushed ore discharges onto the crusher discharge conveyor belt. The ore is then transferred onto another conveyor belt, the sizing screen feed conveyor. This conveyor feeds the vibrating sizing screen, with the jaw and cone crusher products and produces the final crushed product size of 80% passing 12 mm. The oversize product from the sizing screen feeds the secondary cone crusher at a rate of approximately 54 tonne per operating hour. The crushing system operates in closed circuit. The crushed material (80% passing of 12 mm) is conveyed to a fine ore stockpile with a 550-tonne live capacity.

To ensure the safety and health of the employees working at the crushing plant access is not permitted to the crusher building when in operation and employees are required to wear respirators when working at the plant.

Photo 7-1: Fine Ore Storage, Secondary and Primary Crusher Building

Crushed ore is reclaimed via a draw down pocket located beneath the fine ore stockpile onto the ball mill feed conveyor belt at a nominal rate of 18.5 tonne per operating hour.

7.2 PRIMARY GRINDING CIRCUIT

Ore from the ball mill feed conveyor discharges into the feed chute of the ball grinding mill which is a heavy duty tire driven type grinding mill 1,800 mm in diameter and 3,600 mm long, with an installed power of 180 kilowatt designed to provide effective impact breakage of the ore. Mill slurry discharges through the discharge trommel.

The primary ball mill trommel undersize material is discharged into a pump box and fed to cyclones. The coarse fraction from the undersize from cyclones returns to the ball mill. The finer product with size of 80% passing 174 µm, gravity flows to the flotation circuit.

Grinding media (steel balls) are added as required via the ball mill feed conveyor feed chute.

A spillage sump pump is located near the discharge pump box for the ball mill. Spillage is returned to the ball mill feed hopper.

The ball mill feed conveyor belt is sampled every shift to provide a head assay of the feed to the plant and moisture content.

Zinc sulphite is added to the ball mill feed to suppress zinc minerals during lead mineral flotation. Sulphuric acid is added to the ball mill discharge pumpbox to modify pH for lead floatation.

7.3 CLASSIFICATION

The ball mill trommel undersize flows into the pumpbox which feeds a cyclone. The cyclone overflow material, at a nominal particle size of 80% passing 174 µm, flows by gravity to a lead conditioning tank. The cyclone underflow discharge is split with 60% reporting to the secondary mill and 40% back to the ball mill feed hopper.

The secondary grinding mill (Photo 7-2) takes 60% of the underflow material for regrinding. Material reports back to the primary pumpbox for classification.

Photo 7-2: Secondary Grinding

7.4 SILVER-LEAD FLOTATION

Lead Rougher and Scavenger Flotation

The cyclone overflow fraction from the primary grinding circuit is further conditioned in agitated tanks with zinc sulphate, sulphuric acid, and lead collectors (namely Aerophine® 3418A promoter [3418A] and sodium isopropyl xanthate [SIPX]) at a pulp density of 32.0% solids.

The conditioned slurry flows into the feed box of the first of five 8 m^3 lead flotation tank cells (Photo 7-3). Low pressure blower air is injected into each cell mechanism to generate the froth for the flotation of lead and silver sulphide minerals.

Lead rougher concentrate from the first two cells flows by gravity to the first cleaner concentrate standpipe or to the lead regrind ball mill if required. The concentrate from the last three rougher flotation cells reports by gravity to the second cleaner flotation tailings standpipe.

The scavenger flotation train consists of two 8 m^3 tank cells and is configured in such a way that concentrate will be pumped directly to the lead conditioning tank. The scavenger flotation tailings flow into a centrifugal pump and is pumped to the zinc flotation circuit.

Photo 7-3: Flotation

Lead First Cleaner Flotation

The first cleaner flotation circuit is sized and can be sent to the regrind ball mill. The first cleaner tailings return to the lead rougher flotation conditioning tanks, while the concentrate together with part of the rougher flotation concentrate feeds the second cleaner flotation stage.

The reagents SIPX, 3418A, and methyl isobutyl carbinol (MIBC) are added to the first cleaner flotation cells, as required. The cleaner flotation feed will gravitate into the feed box of the first of three 3 m^3 first cleaner flotation cells. Blower air is injected into each cell mechanism. The first cleaner flotation tailings will be recycled to the

lead conditioning tanks while the concentrate will flow into a standpipe that, together with part of the rougher flotation concentrate, will be transferred to the second cleaner flotation circuit.

Lead Second Cleaner Flotation

The second cleaner flotation circuit is sized to handle all of the first cleaner flotation concentrate, part of the rougher flotation concentrate and third cleaner flotation tailings that will be generated.

The first cleaner concentrates, part of the rougher flotation concentrate and third cleaner flotation tailings are upgraded in the second cleaner flotation. The major equipment used in the second lead cleaner flotation circuit includes two 3 m^3 conventional flotation cells.

The reagents SIPX, 3418A, and MIBC are added to the second cleaner flotation cells, as required. The second cleaner flotation feed gravity flows to the third cleaner flotation cell and the first cleaner and rougher concentrates are pumped into the feed box of the first of two 3 m^3 second cleaner flotation cells. Blower air is injected into each cell mechanism. Second cleaner flotation concentrate flows into a standpipe, which will transfer the slurry to the third cleaner flotation circuit.

Lead Third Cleaner Flotation

The third cleaner flotation circuit is sized to handle all of the second cleaner flotation concentrate that will be generated.

The second cleaner concentrate is upgraded in the third cleaner flotation. The third cleaner tailings return by gravity to the second lead cleaner flotation, while the concentrate is pumped to the lead concentrate thickener for dewatering. The major equipment used in the third lead cleaner flotation circuit includes one 3 m^3 conventional flotation cell.

The reagent MIBC is added to the third cleaner flotation circuit, as required. The third cleaner flotation feed is pumped from the second cleaner circuit into the feed box of the 3 m^3 cleaner flotation cell. Blower air is injected into the cell mechanism. The third cleaner flotation concentrate will flow into a standpipe, which transfers the slurry to the lead concentrate dewatering circuit. The third cleaner flotation tailings will be recycled by gravity to the second cleaner flotation circuit.

The lead flotation area is equipped with dedicated spillage sump and pump for clean-up purposes.

7.5 ZINC FLOTATION

Zinc Rougher Flotation

Prior to zinc flotation, lead flotation tailings are conditioned with copper sulphate to activate depressed zinc minerals prior to being transferred to the zinc conditioning tanks. Lime is added into the conditioning tank to adjust pH. The flotation generates a zinc rougher concentrate in four 8 m^3 flotation cells and subsequently rougher scavengers concentrate in one same size cell. SIPX is used as zinc mineral collector.

The scavenger concentrate returns to the zinc rougher circuit head conditioning tank while the rougher scavenger flotation tailings feed the tailings dewatering circuit.

The reagents (SIPX, PAX, W22, lime, and copper sulphate) are added to the conditioning tanks prior to flotation as required. SIPX and/or W22 or PAX and/or W22 are used as collectors.

The conditioned slurry flows into the feed box of the first of four 8 m^3 rougher flotation tank cells. Low pressure blower air is injected into each cell mechanism to generate the froth for the flotation of zinc minerals.

Zinc rougher concentrate from the first two cells flows by gravity to the first cleaner concentrate standpipe or to the zinc regrind ball mill if required. The concentrate from the last three rougher flotation cells reports by gravity to the second cleaner flotation tailings standpipe.

The scavenger flotation train consists of two 8 m^3 tank cells and is configured in such a way that concentrate will be pumped directly to the final tailings thickener.

First Zinc Cleaner Flotation and First Zinc Cleaner Scavenger Flotation

The rougher flotation concentrate is further upgraded by three stages of cleaner flotation in six 3 m^3 conventional flotation cells. The first cleaner flotation tailings is pumped back to the zinc circuit head conditioning tank. The second and third cleaner tailings are recycled to the preceding cleaning stages. The third cleaner concentrate is the final zinc concentrate, which will be dewatered prior to shipping.

The first zinc cleaner flotation circuit is sized to handle all of the rougher flotation concentrate, as well as the first cleaner scavenger flotation concentrate and second cleaner flotation tailings that will be generated.

The first zinc cleaner flotation feed is pumped from the zinc rougher concentrate standpipe, first zinc cleaner scavenger flotation standpipe and by gravity from the zinc second cleaner flotation cell into the feed box of the first of three 3 m^3 cleaner flotation cells. Blower air is injected into each cell mechanism. The first cleaner flotation concentrate flows into a standpipe, which will transfer the slurry to the second zinc cleaner flotation circuit.

Second Zinc Cleaner Flotation

The first zinc cleaner flotation concentrate is further upgraded by second cleaner flotation in two 3 m^3 conventional flotation cells. The second zinc cleaner flotation circuit is sized to handle all of the first zinc cleaner flotation concentrate that will be generated.

The second cleaner flotation feed is pumped from the first zinc cleaner flotation standpipe into the feed box of the first of two 3 m^3 cleaner flotation cells. Blower air is injected into each cell mechanism. Cleaner flotation concentrate flows into a standpipe, which transfers the slurry to the third cleaner flotation circuit.

Third Zinc Cleaner Flotation

The third cleaner flotation circuit is sized to handle all of the second zinc cleaner flotation concentrate that will be generated.

The third cleaner flotation feed is pumped from the second zinc cleaner flotation standpipe into the feed box of the 3 m^3 third cleaner flotation cell. Blower air is injected into the cell mechanism. The third cleaner concentrate

will be the final zinc concentrate, which will be dewatered prior to shipping. The zinc flotation area will be equipped with dedicated spillage sump and pump for clean-up purposes.

7.6 LEAD AND ZINC CONCENTRATES DEWATERING AND LOADOUT

Lead Concentrate

The final lead flotation concentrate is discharged to the third lead cleaner concentrate standpipe and is then pumped to the lead concentrate thickener. Flocculent is added as an aid in settling the solids. The thickener is a 3.05 m diameter high-rate unit fitted with an automated rake lifting mechanism and an auto-dilution system. It produces a thickener underflow density of 60% solids, which is pumped to the lead concentrate, filter feed stock tank. Thickener overflow solution flows into a collection process water tank and is pumped to the lead flotation circuit for re-use.

A 25 m^3 holding tank holds the thickener underflow concentrate prior to dewatering by a pressure filter. The concentrate filter feed tank has sufficient residence time for regular maintenance on the concentrate filter. The filter is an 800 mm by 800 mm pressure filter unit with 22 plates and a 45 square metre filtration area. Slurry is pumped into the filter chambers on a batch basis, and solution is squeezed out by pressure. Air is then blown through to dry the cake to attain the required moisture level of 8%. Filter cake is discharged periodically onto a stockpile. A manually taken sample will control the moisture content of the filter cake and will be used for metallurgical mass balance purposes. Filtrate from the filter is returned to the concentrate thickener.

The dewatered lead concentrate is discharged to the lead concentrate stockpile, located in a separate room adjacent the load-out area.

Filtrate from the pressure filter is pumped back to the thickener feed well as dilution water. The concentrate thickener overflow is distributed to the lead flotation circuit as process water.

The lead concentrate dewatering area is equipped with dedicated spillage sump and pump for clean-up purposes. Spillage is returned to the lead concentrate thickener.

Zinc Concentrate

The final zinc flotation concentrate is discharged to the third zinc cleaner concentrate standpipe and is then be pumped to the zinc concentrate thickener. Flocculent is added an aid in settling the solids. The thickener is a 3.05 m diameter high-rate unit fitted with an automated rake lifting mechanism and an auto-dilution system. It produces a thickener underflow density of 60% solids, which is pumped to the zinc concentrate, filter feed stock tank. Thickener overflow solution flows into a collection process water tank and is pumped to the zinc flotation circuit for re-use.

A 25 m^3 holding tank holds the thickener underflow concentrate prior to dewatering by a pressure filter. The concentrate filter feed tank has sufficient residence time for regular maintenance on the concentrate filter. The filter is an 800 mm by 800 mm pressure filter unit with 22 plates and a 45 square metre filtration area. Slurry is pumped into the filter chambers on a batch basis, and solution is squeezed out by pressure. Air is blown through to dry the cake to attain the required moisture level of 8%. Filter cake is discharged periodically onto a stockpile. A manually taken sample will control the moisture content of the filter cake and will be used for metallurgical mass balance purposes. Filtrate from the filter is be returned to the concentrate thickener.

The dewatered zinc concentrate is discharged to the zinc concentrate stockpile, located in a separate room adjacent the load-out area.

Filtrate from the pressure filter is pumped back to thickener feed well as dilution water. The concentrate thickener overflow is distributed to the zinc flotation circuit as process water.

The zinc concentrate dewatering area is equipped with dedicated spillage sump and pump for clean-up purposes. Spillage is returned to the zinc concentrate thickener.

Both lead and zinc pressure filters are sized to be able to handle the total amount of concentrates produced and filtered in a batch system in case one of the filters is down for maintenance.

7.7 TAILINGS DEWATERING AND HANDLING

Thickener overflow solution gravitates into the water polishing/ mill settling pond. Underflow slurry is pumped to the tailings storage tank and is then be pumped to the tailings filter presses for dewatering. The dewatered tailings will be discharged onto the filtered tailings belt conveyor. The tailings are dewatered to 10% to 15 % moisture content, which is suitable for disposal by truck from the stockpile to the underground back fill facility or directly to the DSTF for long term storage. Filtrates from the filter presses are collected into a filtrate standpipe and returned to the thickener as dilution water.

The tailings thickening areas are equipped with one dedicated spillage sump pump for clean-up purposes. The spillage is returned to the tailings thickener. The major equipment for tailings management includes:

- 1 (ea.) 6.01 m diameter tailings thickener (Photo 7-4); and
- 2 (ea.) 1000 mm by 1000 mm pressure filter with 50 plates (Photo 7-5).

Photo 7-4: Tailings Thickener

Both tailings pressure filters are sized to be able to handle the total amount of tailings produced and filtered in a batch system in case one of the filters is down for preventative maintenance.

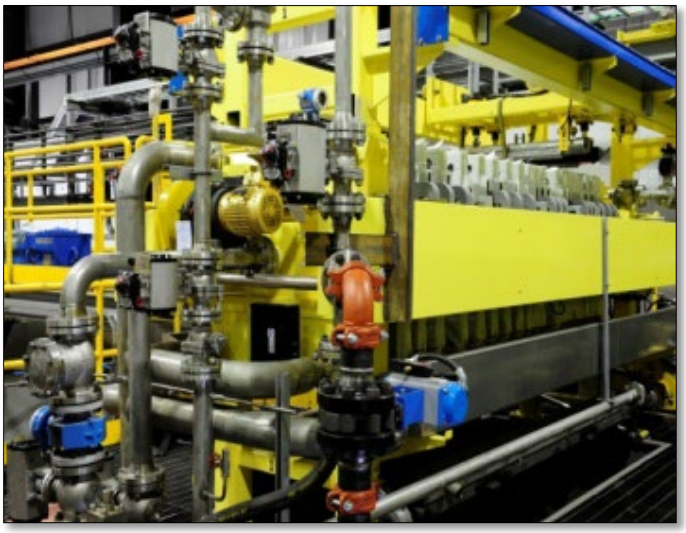


Photo 7-5: Filter Press

Following dewatering through the plate and frame filter presses, the tailings are deposited onto a storage location outside the mill building via a conveyor belt. The tailings stockpile is rehandled; a front-end loaded deposits the tailings into a 30-tonne articulating haul truck which transports it to the DSTF or to the mines for use as underground backfill. The storage location outside of the mil building is an un-lined storage area where tailings are stored until such time that they can be hauled to the DSTF or utilized as underground as backfill. The tailings are typically stored at this location for a short-time frame of less than 24 hours.

A 3.05 m diameter tailings thickener tank is available in the mill as a backup unit for either the lead or zinc circuit.

7.8 REAGENT REQUIREMENTS

The differential flotation process requires a number of chemical reagents to effectively separate the silver lead and zinc from the primary minerals. Table 7-1 summarizes the reagents used in the flotation process and the primary purpose of each reagent. The reagents used in the Keno District Mill are supplied in a variety of packaging methods. Dry reagents are stored and mixed in an engineered reagent mixing system that provides positive ventilation and enclosure to ensure the safety and health of the employees handling these reagents (Photo 7-6). The Safety Data Sheets (SDS) for all reagents used is included in Appendix A.

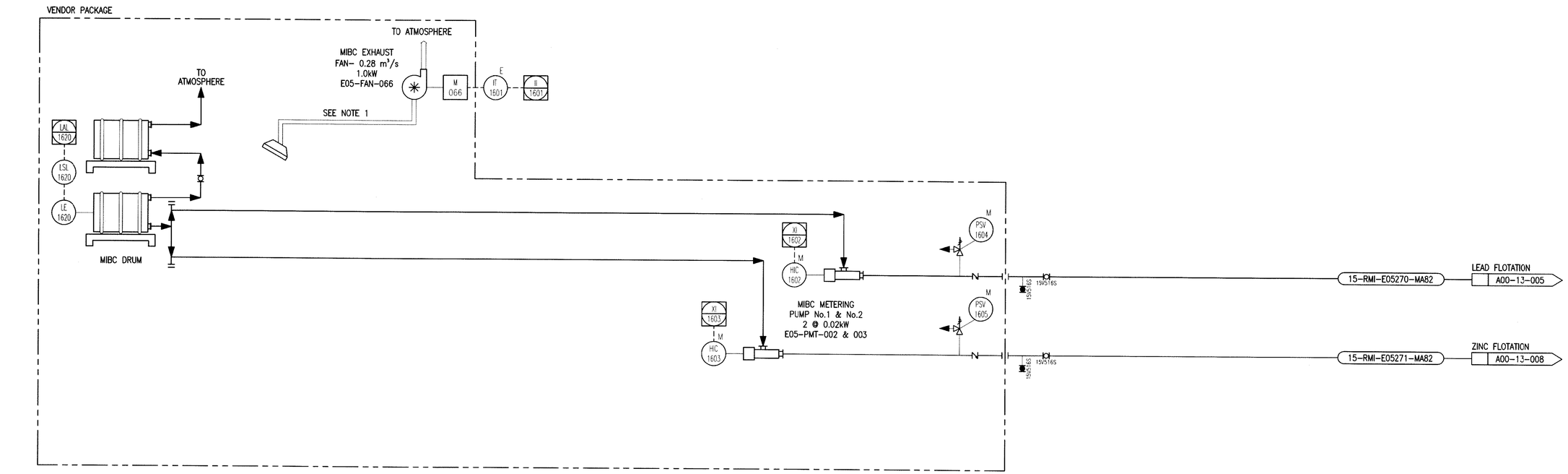
Photo 7-6: Reagent Mixing Station

Table 7-1: Floatation Process Reagents

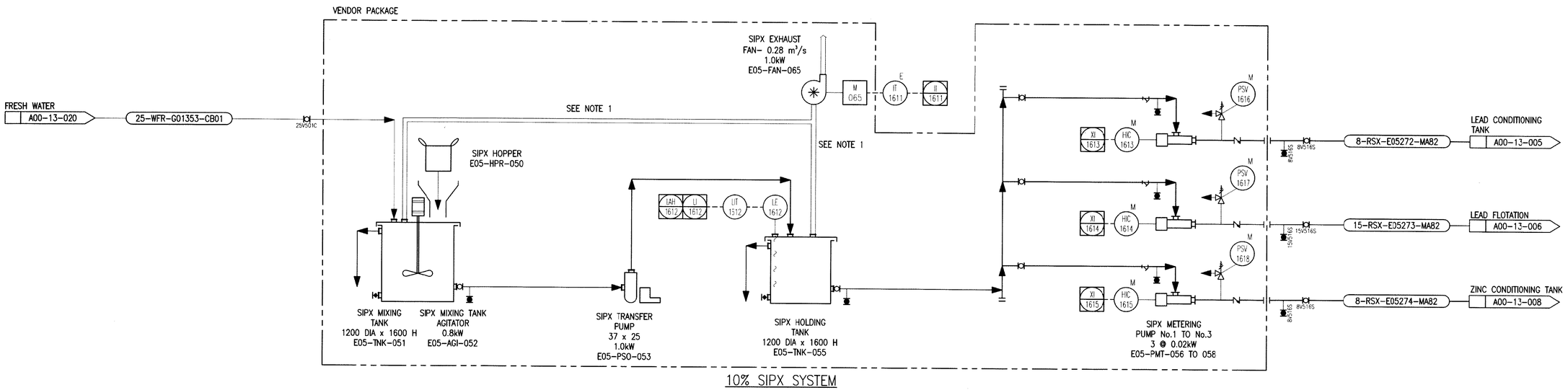
Reagent Name	Chemical Formula/Name	Packaging	Purpose
Zinc Sulphate	$ZnSO_4$	25 kg bags – mixed with H2O	Suppresses zinc from floating in the lead floatation process
Copper Sulphate	$CuSO_4$	25 kg bags – mixed with H2O	Activates zinc in the zinc floatation process
MIBC	Methyl Isobutyl Carbinol	55 gal. Drums liquid	Frother to make bubbles in floatation circuit
SIPX	Sodium Isopropyl Xanthate	35 kg pails – mixed with H2O	Collector for the sulphide minerals to attach to the air bubbles
Sulfuric Acid	H_2SO_4	1000 L tote - liquid	Reduces pH of the floatation slurry
Lime	$Ca(OH)_2$	Lime slurry delivered via truck	Increases pH of the floatation slurry
3418A	$C_8H_{18}PS_2Na$	1000 L tote - liquid	Collector for the sulphide minerals to attach to the air bubbles
PAX	Potassium Amyl Xanthate	55 gal drums - solid	Frother to make bubbles in floatation circuit
W22	Proprietary Blend (mix of polyoxyalkylene alkyl ether 4-methylpentan-2-ol propylene carbonate)	1000 L tote - liquid	Frother to make bubbles in floatation circuit
KAX51	Proprietary Blend (mix of isoamyl alcohol, potassium amyl xanthate, and potassium hydroxide)	55 gal drums - solid	Frother to make bubbles in floatation circuit

The reagent laydown yard is located between the mill and the DSTF on a lined pad. Sea containers are used to store those reagents that must be sheltered from light exposure and/or rain (Photo 7-7). A skid steer loader is utilized to transport the chemicals from the reagent storage yard to the mill facility. Figure 7.3 contains the flow chart for the reagent system.

Photo 7-7: Reagent Laydown Yard



100% MIBC SYSTEM



10% SIPX SYSTEM

NOTE:
1. DUCTING NOT INCLUDED IN VENDOR PACKAGE.

DWG. NO.	REFERENCE DRAWINGS

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
0	1	ISSUED FOR CONSTRUCTION	20MAY10	NP

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SECTION:	PIPING	
SCALE:	NONE	DATE
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DRAWN BY:	PH	APR09
CHECK. BY:	JTC	20MAY10
APP. BY:		20MAY10

YUKON TERRITORY

ALEXCO

WARDROP | Engineering Inc.

TITLE
Figure 7-3
Reagent System
Diagram #1

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
A0013016.DWG	09539602.00	A00–13–016	0

A1

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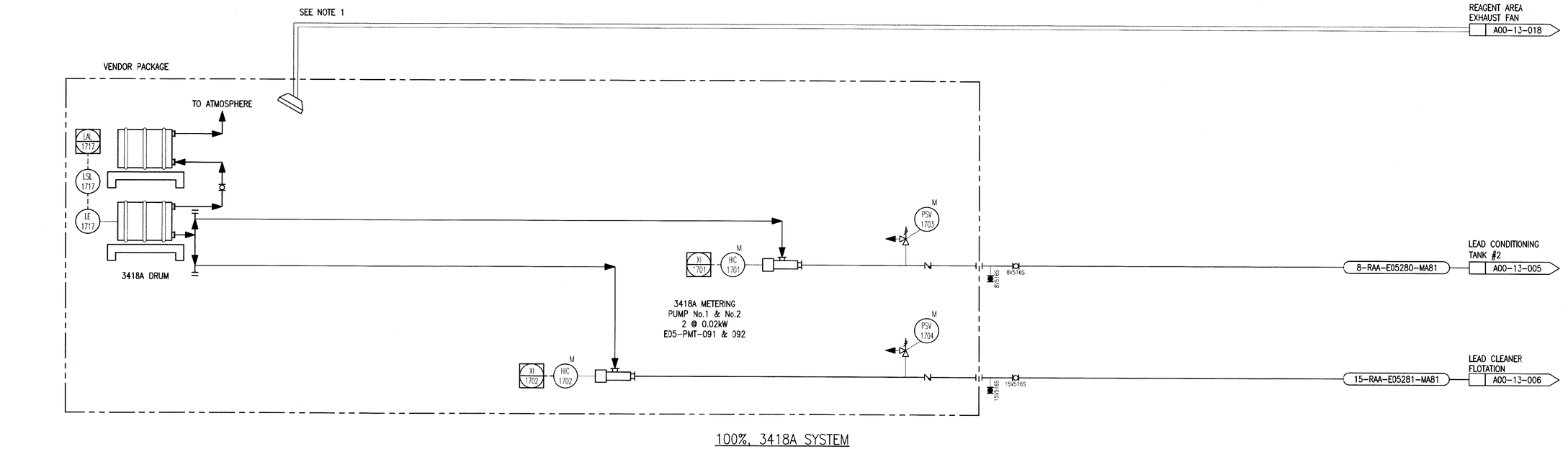
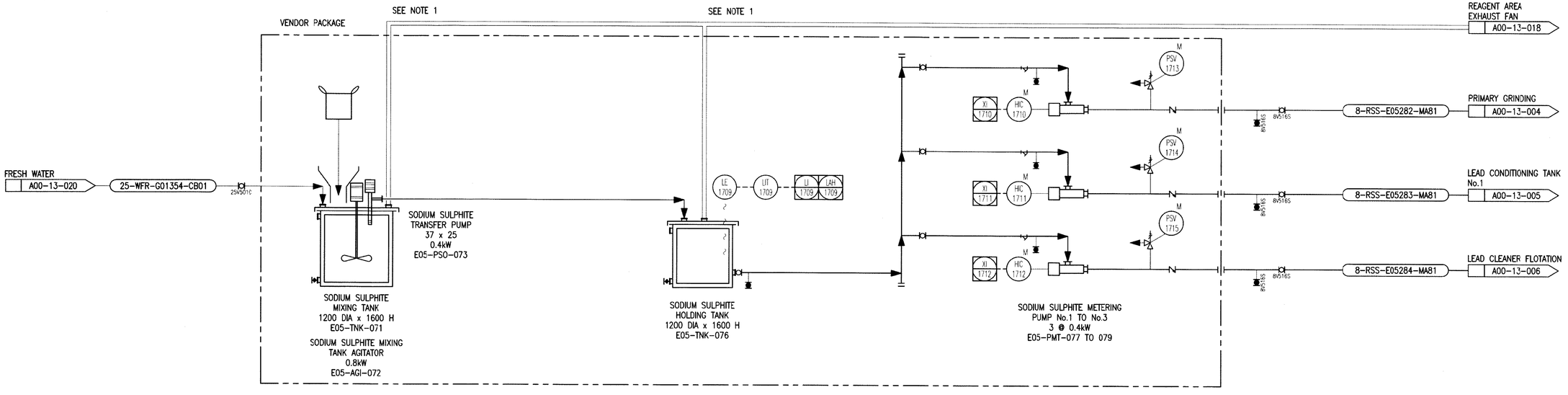


100%, 3418A SYSTEM



10% SODIUM SULPHITE SYSTEM

NOTE:
1. DUCTING NOT INCLUDED IN VENDOR PACKAGE.

DWG. NO.	REFERENCE DRAWINGS

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
0	1	ISSUED FOR CONSTRUCTION	20MAY10	NP

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APP. BY:		20MAY10

YUKON TERRITORY

ALEXCO

WARDROP | Engineering Inc.

TITLE

Figure 7-3 continued Reagent System Diagram #2

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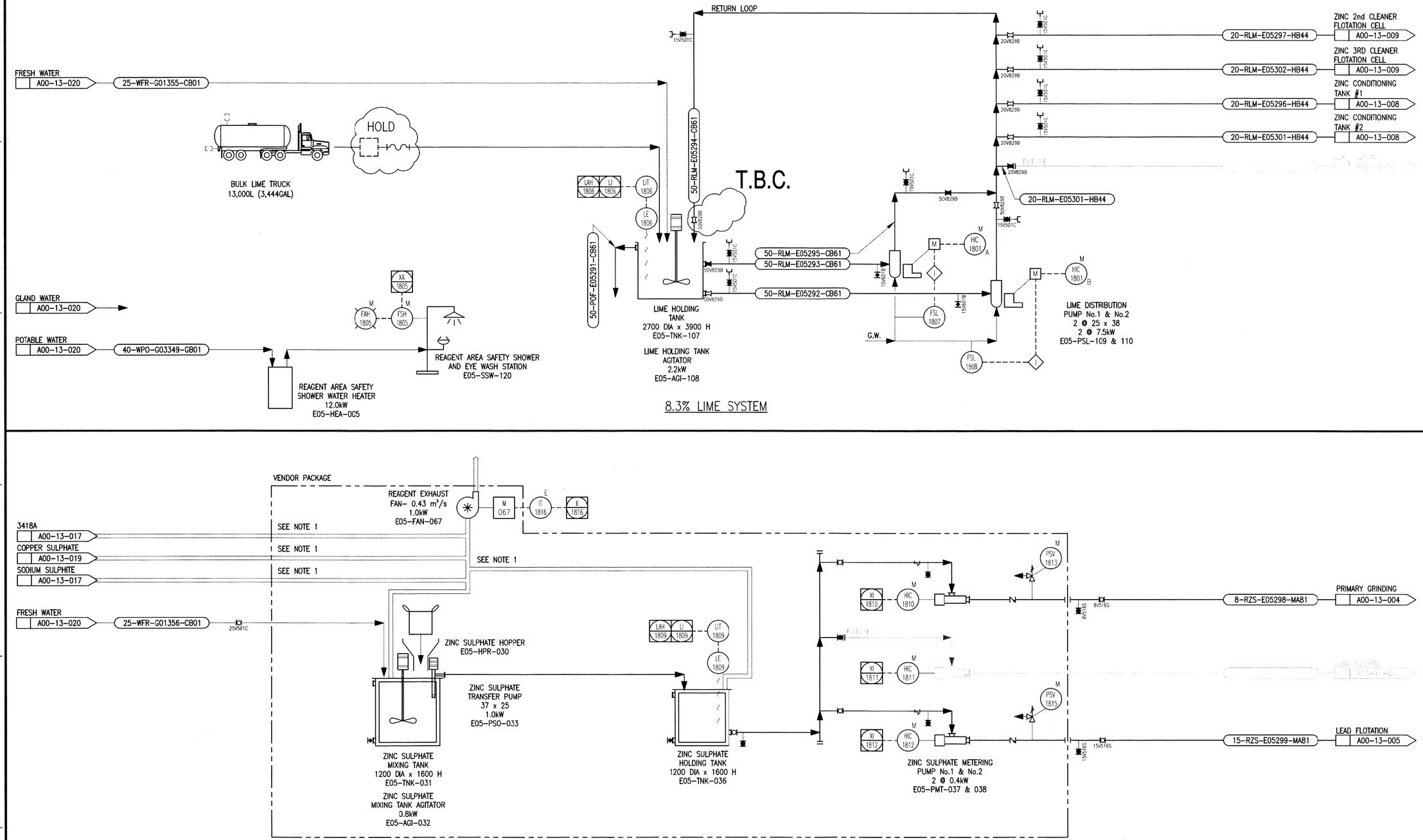

NOTE:
1. DUCTING NOT INCLUDED IN VENDOR PACKAGE.

DWG. NO.	REFERENCE DRAWINGS

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
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CLIENT, PRELIMINARY, PROJECT, PROCESS, ELECTR., PIPING, MECH., STRUCT., SERVICES, ARCH., LAYOUT

SECTION:	PIPING
SCALE:	NONE
DESIGN. BY:	EA
DRAWN BY:	PH
CHECK. BY:	JTC
APP. BY:	
DATE	APR09 / APR09 / 20MAY10 / 20MAY10

YUKON TERRITORY
ALEXCO
WARDROP | Engineering Inc.

TITLE: Figure 7-3 continued
Reagent System
Diagram #3

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
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A1

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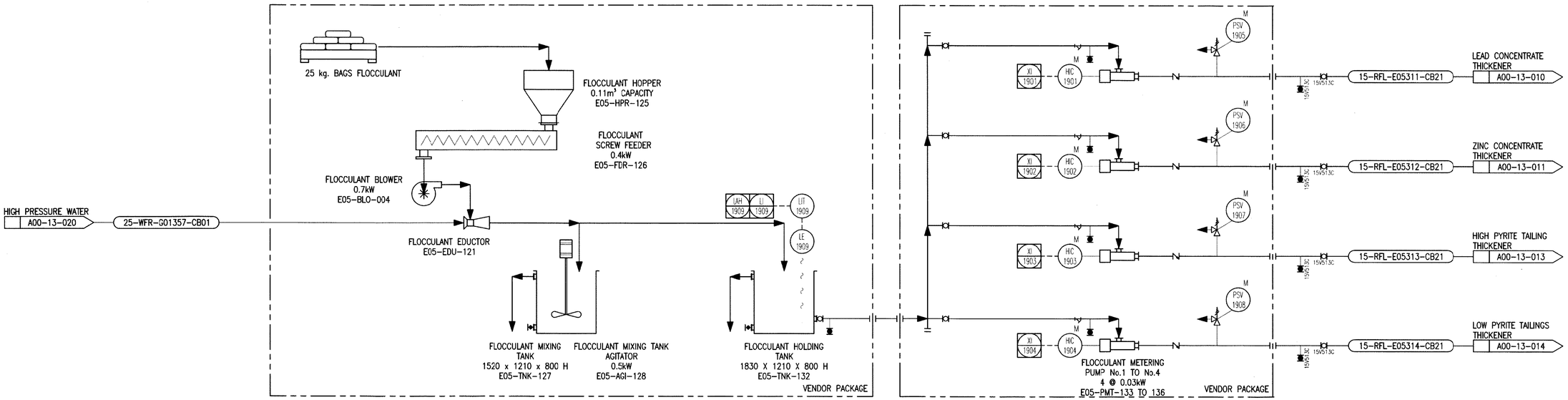
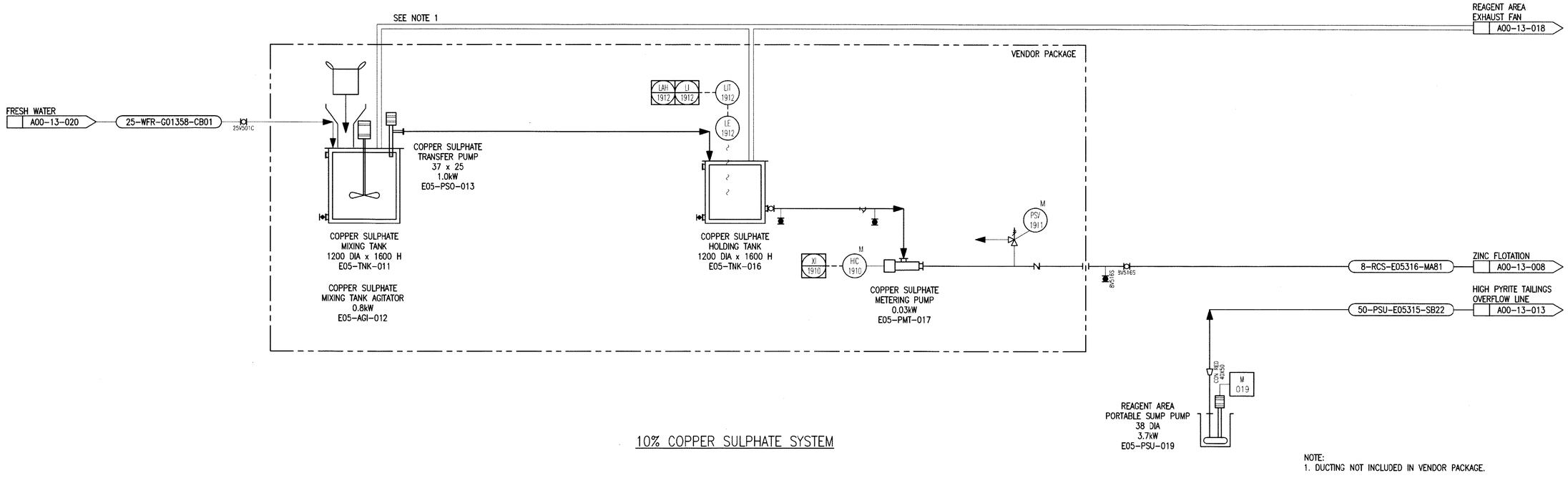


0.3% FLOCCULANT SYSTEM



10% COPPER SULPHATE SYSTEM

NOTE:
1. DUCTING NOT INCLUDED IN VENDOR PACKAGE.

DWG. NO.	REFERENCE DRAWINGS

REV. No.	ISSUE No.	DESCRIPTION	DATE	BY
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SECTION:	PIPING
SCALE:	NONE
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CHECK. BY:	20MAY10
APP. BY:	20MAY10

YUKON TERRITORY

ALEXCO

WARDROP | Engineering Inc.

TITLE: Figure 7-3 continued
Reagent System
Diagram #4

FILENAME	PROJECT NUMBER	DRAWING NUMBER	REV.
A0013019.DWG	09539602.00	A00-13-019	0

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A1

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8 CONCENTRATE PRODUCTION

The daily concentrate grade, metal recovery rates and production rates are provided in Table 8-1.

Table 8-1: Concentrate Production

DESCRIPTION	UNIT	VALUE
Head Grades (LOM)	% Pb	2 - 10
	% Zn	2 - 12
	g/t Au	0.42
	g/t Ag	500 – 1,500
Recovery (LOM)	Pb %	93
	Zn %	75
Recovery (LOM) including in Pb & Zn concentrates	Au %	70
Recovery (LOM) including in Pb & Zn concentrates	Ag %	92
Silver-Lead Concentrate Grade (LOM)	% Pb	65
	% Zn	2.3
	g/t Au	1.5
	g/t Ag	5,500
Zinc Concentrate Grade (LOM)	% Pb	0.5
	% Zn	45
	g/t Au	1.1
	g/t Ag	300
Silver-Lead Concentrate Mass Recovery (LOM)	%	13
Silver-Lead Concentrate Production (LOM)	t/a	19,000
Zinc Concentrate Mass Recovery (LOM)	%	9
Zinc Concentrate Production (LOM)	t/a	8,000

9 CONCENTRATE STORAGE AND TRANSPORTATION

Dewatered concentrate is discharged to stockpiles within separate rooms for lead and zinc. Overhead doors from the lead and zinc stockpile rooms open up to the concentrate load-out deck (Photo 9-1). A weigh scale is in the floor below the deck, where the trucks park for loading. The floor of the load-out area is equipped with dedicated a spillage sump and pump for clean-up purposes. Spillage is returned to either the lead or zinc concentrate thickener.

Photo 9-1: Concentrate Storage

Both lead and zinc concentrates are transported offsite to a smelting facility where final treatment is completed. Lead and zinc concentrate is loaded into specially designed and constructed container pots on a tractor/trailer (Photo 9-2) with a captive skid steer (does not leave the concentrate storage and load-out area). The aluminum pots can hold nominally 17 tonnes of either lead or zinc concentrate. The aluminum pots have a sealed lid for dust containment. During normal operations, three pots are contained on a tractor/trailer arrangement while two pots are used during road restriction periods during the spring break-up period. The concentrate storage area is located inside the mill building and this area contains overhead doors which contain any dust that may be generated from the concentrate loading and unloading.

Photo 9-2: Concentrate Transportation

The volume of lead and zinc concentrate in a shipment fluctuates based on a number of variables including mill throughput, ore grade and recovery. Based on estimated mill throughput rates, Table 9-1 summarizes the estimated dry metric tonnes (DMT) of concentrate transported from the District Mill to the port of Skagway on a monthly basis, based on a 400 tonne per day (TPD) production rate.

Table 9-1: Concentrate Shipped to Skagway

MILL THROUGHPUT TPD	PB CONCENTRATE DMT/MONTH	ZN CONCENTRATE DMT/MONTH
400	690	220

10 DISTRICT MILL DECOMMISSIONING AND SITE RECLAMATION

The closure objectives specific to the District Mill area is to:

- remove potential sources of environmental contamination,
- minimize erosion,
- minimize safety risks to people and wildlife, and
- reclaim them to an aesthetically acceptable level.

Progressive reclamation will begin during operations to promote slope stabilization and reduce erosion during the life of the mine. Disturbed slopes will be stabilized and revegetated as required. Progressive reclamation activities are described in annual reports submitted under Quartz Mining licence QML-0009 and Water Licence QZ18-044. The specifics of the temporary and final reclamation and closure measures are found in the KHSD Mining Operations Reclamation and Closure Plan along with results of reclamation research.

11 REFERENCES

All references to documents on the YESAB Online Registry (YOR) can be found by searching for the Project and document number on the YOR at http://www.yesab.ca/registry.

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APPENDIX A:

SAFETY DATA SHEETS

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, Category 1	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.

- Contact with acids liberates toxic gas.

Precautionary Statements

Prevention

- P261 Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
- P272 Contaminated work clothing must 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.

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]
sodium diisobutyldithiophosphinate	13360-78-6	50 - 60
Alkylphosphine sulfide	*****	<= 1.6

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.

- Always 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.

Unsuitable extinguishing media

- High volume water jet

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

Requirements for storage rooms and vessels

- Temperature does not have impact on material quality.
- 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	> 200 °F (> 93 °C) Pensky-Martens closed cup
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 : > 2,000 mg/kg - Rat 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	LD50 5,000 mg/kg - Rabbit Published data
Acute toxicity (other routes of administration)	Not applicable
Skin corrosion/irritation	No skin irritation Method: EPISKIN Human Skin Model Test Expert judgment
Serious eye damage/eye irritation	Rabbit Risk of serious damage to eyes. Published data
Respiratory or skin sensitization	Local lymph node assay - Mouse Stimulation Index ≥ 3 Classified as a skin sensitizer sub-category 1B according to GHS criteria Published data

Mutagenicity

Genotoxicity in vitro	Ames test Strain: Salmonella typhimurium negative Mouse lymphoma test / TK Strain: L5178Y cells negative Published data Chromosome aberration test in vitro Strain: Human lymphocytes negative 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:
ACGIH

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.

oral (gavage) Subacute exposure 28 Days - Rat
NOAEL: > 300 mg/kg bw/day
Target Organs: Reproductive organs
Published data

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	LC50 - 96 h : 375 mg/l - Lepomis macrochirus (Bluegill sunfish) Method: OECD Test Guideline 203 Published data
Acute toxicity to daphnia and other aquatic invertebrates	EC50 - 48 h : 149 mg/l - Daphnia magna (Water flea) Method: OECD Test Guideline 202 Published data
Toxicity to aquatic plants	ErC50 - 96 h : 115 mg/l - Selenastrum capricornutum (green algae) Method: OECD Test Guideline 201 NOEC - 96 h : 20 mg/l - Selenastrum capricornutum (green algae) Method: OECD Test Guideline 201
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

Alkylphosphine sulfide	Acute aquatic toxicity = 1 Chronic aquatic toxicity = 10

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

sodium diisobutyldithiophosphinate	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 European Solvay legal entity, 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 Europe, 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:

02/15/2019

NFPA (National Fire Protection Association) - Classification

Health	3 serious
Flammability	1 slight
Instability or Reactivity	0 minimal

- 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.

SAFETY DATA SHEET

CUPRIC SULPHATE FEED GRADE

Section 1. Identification

Product identifier : CUPRIC SULPHATE FEED GRADE

Chemical name : Sulfuric acid copper(2+) salt (1:1), hydrate (1:5)

Product code : A00011

Relevant identified uses of the substance or mixture

Identified uses
Feed ingredient.

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

Chemical name : Sulfuric acid copper(2+) salt (1:1), hydrate (1:5)

Ingredient name	% (w/w)	CAS number
Sulfuric acid copper(2+) salt (1:1), hydrate (1:5)	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

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 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).

Section 6. Accidental release measures

Methods and materials for containment and cleaning up

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)	**ACGIH TLV (United States).** TWA: 1 mg/m³, (Cu) Form: Dusts and mists TWA: 0.2 mg/m³, (Cu) Form: Fume of copper

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.

Section 8. Exposure controls/personal protection

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. [Crystals or powder.]

Color : Blue.

Odor : Odourless.

Molecular weight : 249.7 g/mole

Molecular formula : $CuSO_4.5H_20$

Odor threshold : Not available.

pH : Not available.

Melting point : 110°C (230°F)

Boiling point : 150°C (302°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 : 2.284

Density : 2.3 g/cm³

Section 9. Physical and chemical properties

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

Dispersibility properties : Not available.

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.

Section 11. Toxicological information

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 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

Not available.

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Sulfuric acid copper(2+) salt (1:1), hydrate (1:5)	LC50 0.1478 to 0.165 mg/l	Fish - Oncorhynchus mykiss	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.
Transport hazard class(es)	9 
Packing group	III
Additional information	Not available.

Section 15. Regulatory information

Canada inventory : This product is 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	Regulatory data Regulatory data

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.

SAFETY DATA SHEET

FERROUS CHLORIDE SOLUTION

Section 1. Identification

Product identifier : FERROUS CHLORIDE SOLUTION

Product code : Q10745

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 : CORROSIVE TO METALS - Category 1
ACUTE TOXICITY (oral) - Category 4
ACUTE TOXICITY (inhalation) - Category 4
SKIN CORROSION - Category 1
SERIOUS EYE DAMAGE - Category 1
Health Hazards Not Otherwise Classified - Category 1

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : May be corrosive to metals.
Harmful if swallowed or if inhaled.
Causes digestive tract burns.
Causes respiratory tract burns.
Causes severe skin burns and eye damage.

Precautionary statements

Prevention : Wear protective gloves. Wear protective clothing. Wear eye or face protection. Keep only in original packaging. Use only outdoors or in a well-ventilated area. Avoid breathing vapor. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling.

Section 2. Hazard identification

Response : Absorb spillage to prevent material damage. 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. Wash contaminated clothing before reuse. Immediately call a POISON CENTER or physician. 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 or physician.

Storage : Store locked up. Store in a corrosion resistant container with a resistant inner liner.

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.

Percentage of the mixture consisting of ingredient(s) of unknown oral toxicity: 5.9%
Percentage of the mixture consisting of ingredient(s) of unknown dermal toxicity: 35.8%
Percentage of the mixture consisting of ingredient(s) of unknown inhalation toxicity: 29.9%

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Ingredient name	% (w/w)	CAS number
iron dichloride	16 - 30	7758-94-3
Hydrochloric acid	0 - 6	7647-01-0

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.

Section 4. First-aid measures

Skin contact : Get medical attention immediately. Call a poison center or physician. Wash contaminated skin with 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 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 : Harmful if inhaled. Corrosive to the respiratory system.

Skin contact : Causes severe burns.

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 : 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. 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:
halogenated compounds
metal oxide/oxides
Hydrogen gas.

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. Absorb spillage to prevent material damage. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Absorb spillage to prevent material damage. 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). The spilled material may be neutralized with sodium carbonate, sodium bicarbonate or sodium hydroxide. 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. Keep away from alkalis. Empty containers retain product residue and can be hazardous. Do not reuse container. Absorb spillage to prevent material damage.

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. Store in a corrosion resistant container with a resistant inner liner. Store locked up. Separate from alkalis. Keep away from metals. 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
iron dichloride	**ACGIH TLV (United States, 3/2018).** TWA: 1 mg/m³, (as Fe) 8 hours.
Hydrochloric acid	**ACGIH TLV (United States, 3/2018).** C: 2 ppm

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

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.

Section 8. Exposure controls/personal protection

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.

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 : Liquid.

Color : yellow to green

Odor : Iron Slight. Acidic.

Odor threshold : Not available.

pH : <2

Melting point : Not available.

Boiling point : >100°C (>212°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 : 1.2 g/cm³

Solubility : Not available.

Dispersibility properties : Not available.

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

Auto-ignition temperature : Not available.

Decomposition temperature : Not available.

Viscosity : Not available.

Section 9. Physical and chemical properties

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 : oxidizing materials
reducing materials
organic materials
metals
acids
alkalis
moisture

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
iron dichloride	LD50 Oral	Rat	450 mg/kg	-
Hydrochloric acid	LC50 Inhalation Gas.	Mouse	555 ppm	4 hours
	LC50 Inhalation Gas.	Rat	1560 ppm	4 hours
	LD50 Oral	Rabbit	900 mg/kg	-

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
Hydrochloric acid	Eyes - Mild irritant	Rabbit	-	0.5 minutes 5 milligrams	-
	Skin - Mild irritant	Human	-	24 hours 4 Percent	-

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Carcinogenicity Classification

Section 11. Toxicological information

Product/ingredient name	IARC	NTP	ACGIH
Hydrochloric acid	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 damage.

Inhalation : Harmful if inhaled. Corrosive to the respiratory system.

Skin contact : Causes severe burns.

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

General : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral Inhalation (gases)	1507 mg/kg 18420.6 ppm

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
iron dichloride	Acute EC50 17 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 4000 µg/l Fresh water	Fish - Morone saxatilis - Larvae	96 hours
Hydrochloric acid	Acute LC50 240000 µg/l Marine water	Crustaceans - Carcinus maenas - Adult	48 hours
	Acute LC50 282 ppm Fresh water	Fish - Gambusia affinis - Adult	96 hours

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
iron dichloride	-	20	low
Hydrochloric acid	0.25	-	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	UN1760
UN proper shipping name	CORROSIVE LIQUID, N.O.S. (iron dichloride, Hydrochloric acid)
Transport hazard class(es)	8 
Packing group	II
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 : 17 April 2020

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
CORROSIVE TO METALS - Category 1	Expert judgment
ACUTE TOXICITY (oral) - Category 4	Calculation method
ACUTE TOXICITY (inhalation) - Category 4	Calculation method
SKIN CORROSION - Category 1	On basis of test data
SERIOUS EYE DAMAGE - Category 1	On basis of test data
Health Hazards Not Otherwise Classified - Category 1	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.

SAFETY DATA SHEET

KAX 51

Section 1. Identification

Product identifier : KAX 51

Product code : Q08940

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 : SELF-HEATING SUBSTANCES AND MIXTURES - Category 2
ACUTE TOXICITY (oral) - Category 4
ACUTE TOXICITY (dermal) - Category 4
ACUTE TOXICITY (inhalation) - Category 4
SKIN CORROSION - Category 1
SERIOUS EYE DAMAGE - Category 1
TOXIC TO REPRODUCTION - Category 1
Health Hazards Not Otherwise Classified - Category 1

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Self-heating in large quantities; may catch fire.
Harmful if swallowed, in contact with skin or if inhaled.
Causes severe skin burns and eye damage.
May damage fertility or the unborn child.
Causes respiratory tract burns.
Causes digestive tract burns.

Precautionary statements

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

Section 2. Hazard identification

Response : IF exposed or concerned: Get medical advice or attention. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or doctor. IF SWALLOWED: Immediately call a POISON CENTER or doctor. Rinse mouth. Do NOT induce vomiting. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water. Immediately call a POISON CENTER or doctor. Wash contaminated clothing before reuse. IF ON SKIN: Call a POISON CENTER or doctor if you feel unwell. Wash with plenty of water. 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 or doctor.

Storage : Store locked up. Protect from sunlight. Store bulk masses greater than 450 kg/990 lbs at temperatures not exceeding 40 °C/104 °F. Maintain air gap between stacks or pallets. Store separately.

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 taste or swallow. Use only with adequate ventilation. Wash thoroughly after handling. In contact with water, releases gases which are harmful if inhaled.

Percentage of the mixture consisting of ingredient(s) of unknown acute dermal toxicity: 5%

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Ingredient name	% (w/w)	CAS number
potassium O-pentyl dithiocarbonate	80 - 100	2720-73-2
3-methylbutan-1-ol	1 - 5	123-51-3
potassium hydroxide	0.1 - 1	1310-58-3
Carbon disulfide	0.1 - 1	75-15-0

There are no ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified 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.

Section 4. First-aid measures

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. 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 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 : Harmful if inhaled. Corrosive to the respiratory system.

Skin contact : Causes severe burns. Harmful 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
reduced fetal weight
increase in fetal deaths
skeletal malformations

Skin contact : Adverse symptoms may include the following:
pain or irritation
redness
blistering may occur
reduced fetal weight
increase in fetal deaths
skeletal malformations

Ingestion : Adverse symptoms may include the following:
stomach pains
reduced fetal weight
increase in fetal deaths
skeletal malformations

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.

Section 4. First-aid measures

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. Gloves should be worn when removing clothing to prevent additional exposure.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use dry chemical or CO_2.

Unsuitable extinguishing media : Do not use water or foam.

Specific hazards arising from the chemical : Self-heating material when in large quantities. May catch fire. Contact with water liberates toxic gas.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
sulfur oxides
metal oxide/oxides
carbon disulphide
carbonyl sulphide
potassium sulphide
amyl alcohol
trithiocarbonate

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. Keep away from water. 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 allowing the spilled material to get wet or using water to clean up spillages or residues, unless the quantity remaining is very small. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. 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 allowing the spilled material to get wet or using water to clean up spillages or residues, unless the quantity remaining is very small. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. 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). Avoid exposure - obtain special instructions before use. Avoid exposure during pregnancy. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. 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. Protect from moisture. 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. Store bulk masses greater than 450 kg/990 lbs at temperatures not exceeding 40 °C/104 °F. Store locked up. Eliminate all ignition sources. Keep away from water or moist air. Store away from other materials. Maintain air gap between stacks/pallets. 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

Section 8. Exposure controls/personal protection

Ingredient name	Exposure limits
potassium O-pentyl dithiocarbonate	-
3-methylbutan-1-ol	**ACGIH TLV (United States, 3/2020).** TWA: 100 ppm 8 hours. TWA: 361 mg/m³ 8 hours. STEL: 125 ppm 15 minutes. STEL: 452 mg/m³ 15 minutes.
potassium hydroxide	**ACGIH TLV (United States, 3/2020).** C: 2 mg/m³
Carbon disulfide	**ACGIH TLV (United States, 3/2020). Absorbed through skin.** TWA: 1 ppm 8 hours.

Appropriate engineering controls : Use only with adequate ventilation. Engineering controls may be required to control the primary or secondary risks associated with this product. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory 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 and/or face shield. If inhalation hazards exist, a full-face respirator may be required instead.

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 and safety characteristics

The conditions of measurement of all properties are at standard temperature and pressure unless otherwise indicated.

Appearance

Physical state : Solid.

Color : yellow to yellow-green

Odor : Not available.

Odor threshold : Not available.

pH : 12 to 14 [Conc. (% w/w): 10%]

Melting point/freezing point : Decomposes

Boiling point, initial boiling point, and boiling range : Not available.

Flash point : Not applicable.

Evaporation rate : Not available.

Flammability : Not available.

Lower and upper explosion limit/flammability limit : Not applicable.

Vapor pressure : Not available.

Relative vapor density : Not applicable.

Relative density : Not available.

Solubility : Soluble in the following materials: cold water.

Solubility in water : Not available.

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

Auto-ignition temperature : Not applicable.

Decomposition temperature : 150 to 250°C (302 to 482°F)

Viscosity : Not applicable.

Flow time (ISO 2431) : Not available.

Particle characteristics

Median particle size : Not available.

Section 10. Stability and reactivity

Reactivity : This product, by reaction with air and without energy supply, is liable to self-heat and will ignite when in large amounts and after long periods of time. The spontaneous ignition temperature will be ≤ 50°C for a volume of 27 m3.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Hazardous reactions or instability may occur under certain conditions of storage or use.
Conditions may include the following:
contact with water
extended contact with air in bulk storage
Reactions may include the following:
risk of causing fire
spontaneous flammability
liberation of toxic gas

Section 10. Stability and reactivity

Conditions to avoid : No specific data.

Incompatible materials : oxidizing materials
acids
moisture

Hazardous decomposition products : Contact with water liberates toxic gas.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
potassium O-pentyl dithiocarbonate	LD50 Oral	Rat	1000 mg/kg	-
Carbon disulfide	LD50 Oral	Rat	1200 mg/kg	-

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Product/ingredient name	IARC	NTP	ACGIH
Carbon disulfide	-	-	A4

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
Carbon disulfide	Category 3	-	Narcotic effects

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
Carbon disulfide	Category 1	-	-

Aspiration hazard

Not available.

Section 11. Toxicological information

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

Potential acute health effects

Eye contact : Causes serious eye damage.

Inhalation : Harmful if inhaled. Corrosive to the respiratory system.

Skin contact : Causes severe burns. Harmful 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
reduced fetal weight
increase in fetal deaths
skeletal malformations

Skin contact : Adverse symptoms may include the following:
pain or irritation
redness
blistering may occur
reduced fetal weight
increase in fetal deaths
skeletal malformations

Ingestion : Adverse symptoms may include the following:
stomach pains
reduced fetal weight
increase in fetal deaths
skeletal malformations

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 : No known significant effects or critical hazards.

Teratogenicity : May damage the unborn child.

Fertility effects : May damage fertility.

Numerical measures of toxicity

Acute toxicity estimates

Section 11. Toxicological information

Route	ATE value
Oral Dermal	1030.18 mg/kg 1176.52 mg/kg

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
potassium O-pentyl dithiocarbonate	Acute LC50 18000 µg/l Fresh water	Fish - Oncorhynchus mykiss - Fingerling	96 hours
Carbon disulfide	Acute EC50 21000 µg/l Fresh water	Algae - Chlorella pyrenoidosa	96 hours
	Acute LC50 2100 µg/l Fresh water	Daphnia - Daphnia magna	48 hours
	Acute LC50 2.99 mg/l Fresh water	Fish - Poecilia reticulata - Young	96 hours

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Carbon disulfide	1.94	19.5	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	UN3342
UN proper shipping name	XANTHATES
Transport hazard class(es)	4.2 
Packing group	III
Additional information	Not available.

Transport in bulk according to IMO instruments : Not available.

Section 15. Regulatory information

Canada inventory : All components are listed or exempted.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Section 16. Other information

History

Date of issue/Date of revision : 4 November 2021

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
N/A = Not available

Procedure used to derive the classification

Section 16. Other information

Classification	Justification
SELF-HEATING SUBSTANCES AND MIXTURES - Category 2	Expert judgment
ACUTE TOXICITY (oral) - Category 4	Calculation method
ACUTE TOXICITY (dermal) - Category 4	Calculation method
ACUTE TOXICITY (inhalation) - Category 4	Water reactive, releases toxic gases
SKIN CORROSION - Category 1	On basis of test data
SERIOUS EYE DAMAGE - Category 1	On basis of test data
TOXIC TO REPRODUCTION - Category 1	Calculation method
Health Hazards Not Otherwise Classified - Category 1	On basis of test data

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.

SAFETY DATA SHEET

HIGH CALCIUM HYDRATED LIME

Section 1. Identification

Product identifier : HIGH CALCIUM HYDRATED LIME

Product code : Q10290

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 : SKIN CORROSION - Category 1
SERIOUS EYE DAMAGE - Category 1
CARCINOGENICITY - Category 1
Health Hazards Not Otherwise Classified - Category 1

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Causes severe digestive tract burns.
Causes severe respiratory tract burns.
Causes severe skin burns and eye damage.
May cause cancer.

Precautionary statements

Prevention : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves. Wear protective clothing. Wear eye or face protection. Do not breathe dust or mist. Wash hands thoroughly after handling.

Response : IF exposed or concerned: Get medical attention. 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. Wash contaminated clothing before reuse. Immediately call a POISON CENTER or physician. 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 or

Section 2. Hazard identification

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 taste or swallow. Use only with adequate ventilation. Wash thoroughly after handling. Do not breathe dust.

Percentage of the mixture consisting of ingredient(s) of unknown dermal toxicity: 98.9%
Percentage of the mixture consisting of ingredient(s) of unknown inhalation toxicity: 98.9%

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Ingredient name	% (w/w)	CAS number
calcium dihydroxide	87 - 99	1305-62-0
crystalline silica, respirable powder	0.0001 - 1	14808-60-7

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 : 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.

Skin contact : Get medical attention immediately. Call a poison center or physician. Flush contaminated skin with plenty of 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.

Section 4. First-aid measures

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 damage.

Inhalation : Severely corrosive to the respiratory system.

Skin contact : Causes severe burns.

Ingestion : Severely corrosive to the digestive tract. Causes severe burns. May cause burns to mouth, throat and stomach.

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 : 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. 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 : No specific fire or explosion hazard.

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

Small spill : Move containers from spill area. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. 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). Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe dust. 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.

Section 7. Handling and storage

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. 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
calcium dihydroxide	**ACGIH TLV (United States, 3/2018).** TWA: 5 mg/m³ 8 hours.
crystalline silica, respirable powder	**ACGIH TLV (United States, 3/2018).** TWA: 0.025 mg/m³ 8 hours. Form: Respirable fraction

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.

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.

Section 8. Exposure controls/personal protection

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. [Powder.]

Color : White.

Odor : Sweet. Soil-like

Odor threshold : Not available.

pH : 12.45 (saturated solution)

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 : 2.3 to 2.4

Density : 0.37 to 0.62 g/cm³

Solubility : Very slightly soluble in the following materials: cold water.

Solubility in water : 1.65 g/l

Dispersibility properties : Not available.

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

Auto-ignition temperature : Not available.

Decomposition temperature : 540°C (1004°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 : oxidizing materials
metals
acids
moisture

Section 10. Stability and reactivity

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
calcium dihydroxide	LD50 Oral	Rat	7340 mg/kg	-

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
calcium dihydroxide	Eyes - Severe irritant	Rabbit	-	10 milligrams	-

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Carcinogenicity Classification

Product/ingredient name	IARC	NTP	ACGIH
crystalline silica, respirable powder	1	Known to be a human carcinogen.	A2

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
crystalline silica, respirable powder	Category 1	Inhalation	Not determined

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 damage.

Inhalation : Severely corrosive to the respiratory system.

Section 11. Toxicological information

Skin contact : Causes severe burns.

Ingestion : Severely corrosive to the digestive tract. Causes severe burns. May cause burns to mouth, throat and stomach.

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.

Potential chronic health effects

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

Carcinogenicity : May cause cancer. Risk of cancer depends on duration and level of exposure.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
calcium dihydroxide	Acute LC50 33884.4 µg/l Fresh water	Fish - Clarias gariepinus - Fingerling	96 hours

Persistence and degradability

Not available.

Bioaccumulative potential

Not available.

Section 12. Ecological information

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
SKIN CORROSION - Category 1	Calculation method
SERIOUS EYE DAMAGE - Category 1	Calculation method
CARCINOGENICITY - Category 1	Calculation method
Health Hazards Not Otherwise Classified - Category 1	Calculation method

Notice to reader

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SAFETY DATA SHEET

MAGNAFLOC® 10

Section 1. Identification

Product identifier : MAGNAFLOC® 10

Product code : Q10026

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 : COMBUSTIBLE DUSTS - Category 1

GHS label elements

Signal word : Warning

Hazard statements : May form combustible dust concentrations in air.

Precautionary statements

Prevention : Not applicable.

Response : Not applicable.

Storage : Not applicable.

Disposal : Not applicable.

Supplemental label elements : Keep container tightly closed. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Prevent dust accumulation.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

There are no 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 if irritation occurs.

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 adverse health effects persist or are severe. 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 : Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the eyes.

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 : No known significant effects or critical hazards.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
irritation
redness

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 : Avoid high pressure media which could cause the formation of a potentially explosible dust-air mixture.

Specific hazards arising from the chemical : May form explosible dust-air mixture if dispersed.

Hazardous thermal decomposition products : carbon oxides
nitrogen 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. 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".

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. Vacuum or sweep up material and place 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. Vacuum or sweep up material and place in a designated, 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. Product forms slippery surface when combined with water.

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

None.

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.

Section 8. Exposure controls/personal protection

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. 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. [Powder.]

Color : Off-white.

Odor : Odorless.

Odor threshold : Not available.

pH : 6 to 8 [Conc. (% w/w): 1%]

Melting point : Decomposes.

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 : Not available.

Solubility : Soluble in the following materials: cold water.

Dispersibility properties : Not available.

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

Auto-ignition temperature : Not available.

Decomposition temperature : Not available.

Viscosity : Dynamic (room temperature): 25 to 49 mPa·s (25 to 49 cP)

Section 9. Physical and chemical properties

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
alkalis
moisture

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
MAGNAFLOC® 10	LD50 Oral	Rat	>5000 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 : Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the eyes.

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 : No known significant effects or critical hazards.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
irritation
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
MAGNAFLOC® 10	LC50 >100 mg/l LC50 >100 mg/l	Daphnia - Daphnia magna Fish - Oncorhynchus mykiss	48 hours 96 hours

Persistence and degradability

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
MAGNAFLOC® 10	-	-	Not readily

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	Not regulated.
UN proper shipping name	-
Transport hazard class(es)	-
Packing group	-
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 : 12 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
COMBUSTIBLE DUSTS - Category 1	On basis of test data

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.

SAFETY DATA SHEET

MIBC

Section 1. Identification

Product identifier : MIBC

Product code : Q02223

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 : FLAMMABLE LIQUIDS - Category 3
SKIN IRRITATION - Category 2
EYE IRRITATION - Category 2B
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3

GHS label elements

Hazard pictograms :

Signal word : Warning

Hazard statements : Flammable liquid and vapor.
Causes skin and eye irritation.
May cause respiratory irritation.

Precautionary statements

Prevention : Wear protective gloves. Wear eye or face protection. Wear protective clothing. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use only outdoors or in a well-ventilated area. Avoid breathing vapor. Wash hands thoroughly after handling.

Response : IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water. IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing and wash it before reuse. If skin irritation occurs: Get medical attention. 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 : Store locked up.

Section 2. Hazard identification

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
4-methyl-2-pentanol	99 - 100	108-11-2

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 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. Get medical attention. If necessary, call a poison center or physician. 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. Continue to rinse for at least 10 minutes. Get medical attention. 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 adverse health effects persist or are severe. 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 eye irritation.

Inhalation : May cause respiratory irritation.

Skin contact : Causes skin irritation.

Ingestion : No known significant effects or critical hazards.

Over-exposure signs/symptoms

Section 4. First-aid measures

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 : Adverse symptoms may include the following:
irritation
redness

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. 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.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

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

Unsuitable extinguishing media : Do not use water jet.

Specific hazards arising from the chemical : Flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

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. 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 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. Use spark-proof tools and explosion-proof equipment. 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. Use spark-proof tools and explosion-proof equipment. 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 ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. 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.

Section 7. Handling and storage

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. Store locked up. 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.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
4-methyl-2-pentanol	**ACGIH TLV (United States, 3/2016). Absorbed through skin.** TWA: 25 ppm 8 hours. TWA: 104 mg/m³ 8 hours. STEL: 40 ppm 15 minutes. STEL: 167 mg/m³ 15 minutes.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, 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.

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.

Section 8. Exposure controls/personal protection

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. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

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 : Liquid.

Color : Colourless.

Odor : Mild.

Odor threshold : Not available.

pH : Not available.

Melting point : -90°C (-130°F)

Boiling point : 131.6°C (268.9°F)

Flash point : Open cup: 41°C (105.8°F)

Evaporation rate : 0.26 (n-butyl acetate = 1)

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Lower: 1%
Upper: 5.5%

Vapor pressure : 0.37 kPa (2.78 mm Hg) [room temperature]

Vapor density : 3.52 [Air = 1]

Relative density : Not available.

Density : 0.808 g/cm³ [20°C (68°F)]

Solubility : Soluble in the following materials: diethyl ether.
Partially soluble in the following materials: cold water.

Dispersibility properties : Not available.

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

Auto-ignition temperature : 335°C (635°F)

Decomposition temperature : Not available.

Viscosity : Dynamic (room temperature): 4.074 mPa·s (4.074 cP)

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.

Section 10. Stability and reactivity

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

Conditions to avoid : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas.

Incompatible materials : oxidizing 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
4-methyl-2-pentanol	LD50 Oral	Rat	2590 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)

Name	Category	Route of exposure	Target organs
4-methyl-2-pentanol	Category 3	Not applicable.	Respiratory tract irritation

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.

Section 11. Toxicological information

Potential acute health effects

Eye contact : Causes eye irritation.

Inhalation : May cause respiratory irritation.

Skin contact : Causes skin irritation.

Ingestion : No known significant effects or critical hazards.

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 : Adverse symptoms may include the following:
irritation
redness

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 : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral	2590.3 mg/kg

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
MIBC	Acute EC50 337 mg/l Acute LC50 >92.4 mg/l	Daphnia - Daphnia magna Fish - Pimephales promelas	48 hours 96 hours

Persistence and degradability

Product/ingredient name	Test	Result	Dose	Inoculum
MIBC	-	85 % - Readily - 28 days	-	-

Section 12. Ecological information

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
MIBC	-	-	Readily

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
4-methyl-2-pentanol	1.43	-	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. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

	TDG Classification
UN number	2053
UN proper shipping name	METHYL ISOBUTYL CARBINOL
Transport hazard class(es)	3 
Packing group	III
Additional information	Regulated for large means of containment (>450 litres)

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
FLAMMABLE LIQUIDS - Category 3	On basis of test data
SKIN IRRITATION - Category 2	Expert judgment
EYE IRRITATION - Category 2B	Calculation method
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3	Calculation method

Notice to reader

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SAFETY DATA SHEET

PIX-311

Section 1. Identification

Product identifier : PIX-311

Product code : Q09630

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 : CORROSIVE TO METALS - Category 1
ACUTE TOXICITY (oral) - Category 4
ACUTE TOXICITY (inhalation) - Category 4
SKIN CORROSION - Category 1
SERIOUS EYE DAMAGE - Category 1
Health Hazards Not Otherwise Classified - Category 1

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : May be corrosive to metals.
Harmful if swallowed or if inhaled.
Causes digestive tract burns.
Causes respiratory tract burns.
Causes severe skin burns and eye damage.

Precautionary statements

Prevention : Wear protective gloves. Wear eye or face protection. Wear protective clothing. Keep only in original packaging. Use only outdoors or in a well-ventilated area. Avoid breathing vapor. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling.

Section 2. Hazard identification

Response : Absorb spillage to prevent material damage. 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. Wash contaminated clothing before reuse. Immediately call a POISON CENTER or physician. 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 or physician.

Storage : Store locked up. Store in a corrosion resistant container with a resistant inner liner.

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.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Ingredient name	% (w/w)	CAS number
iron trichloride	35 - 45	7705-08-0
hydrochloric acid	1 - 2	7647-01-0

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.

Skin contact : Get medical attention immediately. Call a poison center or physician. Wash contaminated skin with 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.

Section 4. First-aid measures

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 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 : Harmful if inhaled. Corrosive to the respiratory system.

Skin contact : Causes severe burns.

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 : 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. 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:
halogenated compounds
metal oxide/oxides
Hydrogen chloride (HCl).
Hydrogen gas.

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. Absorb spillage to prevent material damage. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Absorb spillage to prevent material damage. 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). The spilled material may be neutralized with sodium carbonate, sodium bicarbonate or sodium hydroxide. 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 6. Accidental release measures

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. Keep away from alkalis. Empty containers retain product residue and can be hazardous. Do not reuse container. Absorb spillage to prevent material damage.

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: 1°C (33.8°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 in a corrosion resistant container with a resistant inner liner. Store locked up. Separate from alkalis. 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.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
iron trichloride	**ACGIH TLV (United States, 3/2017).** TWA: 1 mg/m³, (as Fe) 8 hours.
hydrochloric acid	**ACGIH TLV (United States, 3/2017).** C: 2 ppm

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

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.

Section 8. Exposure controls/personal protection

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.

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 : Liquid.

Color : Brown. [Dark]

Odor : Acidic. [Slight]

Odor threshold : Not available.

pH : <1

Melting point : Not available.

Boiling point : 100 to 105°C (212 to 221°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 : 1.41 to 1.44 g/cm^3

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

Dispersibility properties : Not available.

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

Auto-ignition temperature : Not available.

Decomposition temperature : Not available.

Viscosity : Not available.

Section 9. Physical and chemical properties

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
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
iron trichloride	LD50 Oral	Rat	316 mg/kg	-

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Carcinogenicity Classification

Product/ingredient name	IARC	NTP	ACGIH
hydrochloric acid	3	-	A4

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Section 11. Toxicological information

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 : Harmful if inhaled. Corrosive to the respiratory system.

Skin contact : Causes severe burns.

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.

Potential chronic health effects

General : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral	703.8 mg/kg
Inhalation (gases)	78392 ppm
Inhalation (dusts and mists)	1.114 mg/l

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
iron trichloride	Acute EC50 9600 µg/l Fresh water Acute LC50 644.39 µg/l Fresh water Acute LC50 20.26 mg/l Fresh water Chronic NOEC 0.7 mg/l Fresh water	Daphnia - Daphnia magna Crustaceans - Stenocypris major - Adult Fish - Lepomis macrochirus Daphnia - Daphnia pulex - Neonate	48 hours 48 hours 96 hours 21 days

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
iron trichloride	-	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 and sewers.

Section 14. Transport information

	TDG Classification
UN number	2582
UN proper shipping name	FERRIC CHLORIDE SOLUTION
Transport hazard class(es)	8 

Section 14. Transport information

Packing group	III
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
CORROSIVE TO METALS - Category 1	Expert judgment
ACUTE TOXICITY (oral) - Category 4	Calculation method
ACUTE TOXICITY (inhalation) - Category 4	Calculation method
SKIN CORROSION - Category 1	On basis of test data
SERIOUS EYE DAMAGE - Category 1	On basis of test data
Health Hazards Not Otherwise Classified - Category 1	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.

SAFETY DATA SHEET

PIX-312

Section 1. Identification

Product identifier : PIX-312

Product code : Q08434

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 : CORROSIVE TO METALS - Category 1
ACUTE TOXICITY (oral) - Category 4
SKIN CORROSION - Category 1
SERIOUS EYE DAMAGE - Category 1
Health Hazards Not Otherwise Classified - Category 1

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : May be corrosive to metals.
Harmful if swallowed.
Causes severe skin burns and eye damage.
Causes respiratory tract burns.
Causes digestive tract burns.

Precautionary statements

Prevention : Wear protective gloves, protective clothing and eye or face protection. Keep only in original packaging. Do not eat, drink or smoke when using this product. Wash thoroughly after handling.

Response : Absorb spillage to prevent material damage. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or doctor. IF SWALLOWED: Immediately call a POISON CENTER or doctor. Rinse mouth. Do NOT induce vomiting. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water. Immediately call a POISON CENTER or doctor. Wash contaminated clothing before reuse. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do.

Section 2. Hazard identification

Continue rinsing. Immediately call a POISON CENTER or doctor.

Storage : Store locked up. Store in a corrosion resistant container with a resistant inner liner.

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.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Ingredient name	% (w/w)	CAS number
diiron tris(sulphate)	30 - 60	10028-22-5

There are no ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified 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.

Skin contact : Get medical attention immediately. Call a poison center or physician. Wash contaminated skin with 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. 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 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

Section 4. First-aid measures

Eye contact : Causes serious eye damage.

Inhalation : Corrosive to the respiratory system.

Skin contact : Causes severe burns.

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 : 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. 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:
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.

Section 5. Fire-fighting measures

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. Absorb spillage to prevent material damage. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Absorb spillage to prevent material damage. 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). The spilled material may be neutralized with sodium carbonate, sodium bicarbonate or sodium hydroxide. 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. Keep away from alkalis. Empty containers retain product residue and can be hazardous. Do not reuse container. Absorb spillage to prevent material damage.

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.

Section 7. Handling and storage

Conditions for safe storage, including any incompatibilities : Store between the following temperatures: 0 to 30°C (32 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. Store in a corrosion resistant container with a resistant inner liner. Store locked up. Separate from alkalis. Keep away from metals. 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
diiron tris(sulphate)	**ACGIH TLV (United States, 3/2020).** TWA: 1 mg/m³, (as Fe) 8 hours.

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.

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.

Section 8. Exposure controls/personal protection

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 and safety characteristics

The conditions of measurement of all properties are at standard temperature and pressure unless otherwise indicated.

Appearance

Physical state : Liquid.

Color : Red./Brown. [Dark]

Odor : Not available.

Odor threshold : Not available.

pH : 1 to 2

Melting point/freezing point : -40°C (-40°F)

Boiling point, initial boiling point, and boiling range : 100 to 105°C (212 to 221°F)

Flash point : Not available.

Evaporation rate : Not available.

Flammability : Not available.

Lower and upper explosion limit/flammability limit : Not available.

Vapor pressure : Not available.

Relative vapor density : Not available.

Relative density : 1.51 to 1.58 [@ 20°C]

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

Solubility in water : Not available.

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

Auto-ignition temperature : Not available.

Decomposition temperature : 315°C (599°F)

Viscosity : Dynamic: 30 mPa·s (30 cP)

Flow time (ISO 2431) : Not available.

Particle characteristics

Median particle size : Not applicable.

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.

Section 10. Stability and reactivity

Conditions to avoid : No specific data.

Incompatible materials : oxidizing materials
metals
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
diiron tris(sulphate)	LD50 Oral	Rat - Female	500 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.

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.

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

Section 11. Toxicological information

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.

Potential chronic health effects

General : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral	837.52 mg/kg

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
diiron tris(sulphate)	Acute EC50 120000 µg/l Fresh water Acute LC50 28 mg/l Fresh water	Crustaceans - Asellus aquaticus - Adult Fish - Salmo trutta - Fingerling	48 hours 4 days

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
diiron tris(sulphate)	-	20	low

Section 12. Ecological information

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	UN3264
UN proper shipping name	CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (diiron tris(sulphate))
Transport hazard class(es)	8 
Packing group	III
Additional information	Not available.

Transport in bulk according to IMO instruments : Not available.

Section 15. Regulatory information

Canada inventory : All components are listed or exempted.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol

Section 15. Regulatory information

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Section 16. Other information

History

Date of issue/Date of revision : 17 January 2022

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
N/A = Not available

Procedure used to derive the classification

Classification	Justification
CORROSIVE TO METALS - Category 1	Expert judgment
ACUTE TOXICITY (oral) - Category 4	Calculation method
SKIN CORROSION - Category 1	On basis of test data
SERIOUS EYE DAMAGE - Category 1	On basis of test data
Health Hazards Not Otherwise Classified - Category 1	On basis of test data

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.

SAFETY DATA SHEET

Lime hydrated type N (STD)

Section 1. Identification

Product identifier : Lime hydrated type N (STD)

Product code : Q04842

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 : SKIN CORROSION - Category 1
SERIOUS EYE DAMAGE - Category 1
CARCINOGENICITY - Category 1
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 1
Health Hazards Not Otherwise Classified - Category 1

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Causes severe digestive tract burns.
Causes severe respiratory tract burns.
Causes severe skin burns and eye damage.
May cause cancer.
Causes damage to organs through prolonged or repeated exposure.

Precautionary statements

Prevention : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves. Wear eye or face protection. Wear protective clothing. Do not breathe dust or mist. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling.

Section 2. Hazard identification

Response : Get medical attention if you feel unwell. IF exposed or concerned: Get medical attention. 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. Wash contaminated clothing before reuse. Immediately call a POISON CENTER or physician. 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 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 taste or swallow. Use only with adequate ventilation. Wash thoroughly after handling. Do not breathe dust.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Ingredient name	% (w/w)	CAS number
calcium hydroxide	90 - 100	1305-62-0
magnesium oxide	0 - 3	1309-48-4
quartz	0 - 2	14808-60-7

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 : 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.

Skin contact : Get medical attention immediately. Call a poison center or physician. Flush contaminated skin with plenty of 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.

Section 4. First-aid measures

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 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 : Severely corrosive to the respiratory system.

Skin contact : Causes severe burns.

Ingestion : Severely corrosive to the digestive tract. Causes severe burns. May cause burns to mouth, throat and stomach.

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 : 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. 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 : No specific fire or explosion hazard.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
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. Do not breathe 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

Small spill : Move containers from spill area. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. 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). Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe dust. 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 : 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.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
calcium hydroxide	**ACGIH TLV (United States, 3/2016).** TWA: 5 mg/m³ 8 hours.
magnesium oxide	**ACGIH TLV (United States, 3/2016).** TWA: 10 mg/m³ 8 hours. Form: Inhalable fraction
quartz	**ACGIH TLV (United States, 3/2016).** TWA: 0.025 mg/m³ 8 hours. Form: Respirable fraction

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.

Section 8. Exposure controls/personal protection

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.

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. [Powder.]

Color : White.

Odor : Odourless.

Odor threshold : Not available.

pH : 12.4

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 : 2.2 to 2.4 g/cm³

Solubility : Insoluble in the following materials: cold water.

Dispersibility properties : Not available.

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

Auto-ignition temperature : Not available.

Decomposition temperature : 580°C (1076°F)

Viscosity : Not available.

Section 9. Physical and chemical properties

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 : organic materials
metals
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
calcium hydroxide	LD50 Oral	Rat	7340 mg/kg	-

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
calcium hydroxide	Eyes - Severe irritant	Rabbit	-	10 milligrams	-

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Carcinogenicity Classification

Product/ingredient name	IARC	NTP	ACGIH
quartz	1	Known to be a human carcinogen.	A2

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)

Name	Category	Route of exposure	Target organs
quartz	Category 1	Inhalation	Not determined

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 : Severely corrosive to the respiratory system.

Skin contact : Causes severe burns.

Ingestion : Severely corrosive to the digestive tract. Causes severe burns. May cause burns to mouth, throat and stomach.

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.

Potential chronic health effects

General : Causes damage to organs through prolonged or repeated exposure. Repeated or prolonged inhalation of dust may lead to chronic respiratory irritation.

Carcinogenicity : May cause cancer. Risk of cancer depends on duration and level of exposure.

Numerical measures of toxicity

Section 11. Toxicological information

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
calcium hydroxide	Acute LC50 33884.4 µg/l Fresh water	Fish - Clarias gariepinus - Fingerling	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	Not regulated.
UN proper shipping name	-
Transport hazard class(es)	-

Section 14. Transport information

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
SKIN CORROSION - Category 1	On basis of test data
SERIOUS EYE DAMAGE - Category 1	On basis of test data
CARCINOGENICITY - Category 1	Calculation method
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 1	Calculation method
Health Hazards Not Otherwise Classified - Category 1	Calculation method

Notice to reader

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SAFETY DATA SHEET

MAGNAFLOC® 10

Section 1. Identification

Product identifier : MAGNAFLOC® 10

Product code : Q10026

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 : COMBUSTIBLE DUSTS - Category 1

GHS label elements

Signal word : Warning

Hazard statements : May form combustible dust concentrations in air.

Precautionary statements

Prevention : Not applicable.

Response : Not applicable.

Storage : Not applicable.

Disposal : Not applicable.

Supplemental label elements : Keep container tightly closed. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Prevent dust accumulation.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

There are no 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 if irritation occurs.

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 adverse health effects persist or are severe. 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 : Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the eyes.

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 : No known significant effects or critical hazards.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
irritation
redness

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 : Avoid high pressure media which could cause the formation of a potentially explosible dust-air mixture.

Specific hazards arising from the chemical : May form explosible dust-air mixture if dispersed.

Hazardous thermal decomposition products : carbon oxides
nitrogen 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. 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".

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. Vacuum or sweep up material and place 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. Vacuum or sweep up material and place in a designated, 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. Product forms slippery surface when combined with water.

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

None.

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.

Section 8. Exposure controls/personal protection

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. 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. [Powder.]

Color : Off-white.

Odor : Odorless.

Odor threshold : Not available.

pH : 6 to 8 [Conc. (% w/w): 1%]

Melting point : Decomposes.

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 : Not available.

Solubility : Soluble in the following materials: cold water.

Dispersibility properties : Not available.

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

Auto-ignition temperature : Not available.

Decomposition temperature : Not available.

Viscosity : Dynamic (room temperature): 25 to 49 mPa·s (25 to 49 cP)

Section 9. Physical and chemical properties

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
alkalis
moisture

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
MAGNAFLOC® 10	LD50 Oral	Rat	>5000 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 : Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the eyes.

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 : No known significant effects or critical hazards.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
irritation
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
MAGNAFLOC® 10	LC50 >100 mg/l LC50 >100 mg/l	Daphnia - Daphnia magna Fish - Oncorhynchus mykiss	48 hours 96 hours

Persistence and degradability

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
MAGNAFLOC® 10	-	-	Not readily

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	Not regulated.
UN proper shipping name	-
Transport hazard class(es)	-
Packing group	-
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 : 12 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
COMBUSTIBLE DUSTS - Category 1	On basis of test data

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.

SAFETY DATA SHEET

SIPX 85%

Section 1. Identification

Product identifier : SIPX 85%

Product code : Q06688

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 : SELF-HEATING SUBSTANCES AND MIXTURES - Category 2
COMBUSTIBLE DUSTS - Category 1
ACUTE TOXICITY (oral) - Category 4
SKIN IRRITATION - Category 2

GHS label elements

Hazard pictograms :

Signal word : Warning

Hazard statements : Self-heating in large quantities; may catch fire.
May form combustible dust concentrations in air.
Harmful if swallowed.
Causes skin irritation.

Precautionary statements

Prevention : Wear protective gloves. Wear protective clothing. Wear eye or face protection. Keep cool. 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 ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing and wash it before reuse. If skin irritation occurs: Get medical attention.

Storage : Store bulk masses greater than @%1 kg/@%2 lbs at temperatures not exceeding @%3 °C/@%4 °F. Maintain air gap between stacks or pallets. Store separately.

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

Section 2. Hazard identification

Supplemental label elements : Keep container tightly closed. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Prevent dust accumulation.

Percentage of the mixture consisting of ingredient(s) of unknown dermal toxicity: 85%
Percentage of the mixture consisting of ingredient(s) of unknown inhalation toxicity: 85%

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Ingredient name	% (w/w)	CAS number
proxan-sodium (ISO)	85	140-93-2
sodium hydroxide	0 - 0.5	1310-73-2

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. Continue to rinse for at least 10 minutes. Get medical attention. 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 : Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the eyes.

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

Section 4. First-aid measures

Skin contact : Causes skin irritation.

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

Skin contact : Adverse symptoms may include the following:
irritation
redness

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 : Avoid high pressure media which could cause the formation of a potentially explosible dust-air mixture.

Specific hazards arising from the chemical : Self-heating material when in large quantities. May catch fire. May form explosible dust-air mixture if dispersed.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
sulfur oxides
metal oxide/oxides
carbon disulphide
sodium sulphide

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".

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. May form explosible dust-air mixture if dispersed. 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.

Section 7. Handling and storage

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. Store bulk masses greater than @%1 kg/@%2 lbs at temperatures not exceeding @%3 °C/@%4 °F. Eliminate all ignition sources. Separate from oxidizing materials. Store away from other materials. Maintain air gap between stacks/pallets. 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. Do not store in copper or brass containers.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
proxan-sodium (ISO) sodium hydroxide	- **ACGIH TLV (United States, 3/2018).** C: 2 mg/m³

Appropriate engineering controls : Use only with adequate ventilation. Engineering controls may be required to control the primary or secondary risks associated with this product. 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.

Section 8. Exposure controls/personal protection

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. [Pellets or powder.]

Color : Yellow/Green.

Odor : Disagreeable.

Odor threshold : Not available.

pH : Not available.

Melting point : 150 to 200°C (302 to 392°F)

Boiling point : Not available.

Flash point : Closed cup: -29°C (-20.2°F) (carbon disulphide)

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Lower: 1.3%
Upper: 50% (carbon disulphide)

Vapor pressure : Not available.

Vapor density : Not available.

Relative density : 0.75 to 0.8

Density : Not available.

Solubility : Soluble in the following materials: cold water.

Dispersibility properties : Not available.

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

Auto-ignition temperature : 90°C (194°F) (carbon disulphide)

Decomposition temperature : 150°C (302°F)

Viscosity : Not available.

Volatility : Not available.

Section 10. Stability and reactivity

Reactivity : This product, by reaction with air and without energy supply, is liable to self-heat and will ignite when in large amounts and after long periods of time. The spontaneous ignition temperature will be ≤ 50°C for a volume of 27 m3.

Chemical stability : The product is stable.

Section 10. Stability and reactivity

Possibility of hazardous reactions : Hazardous reactions or instability may occur under certain conditions of storage or use.
Conditions may include the following:
extended contact with air in bulk storage
Reactions may include the following:
risk of causing fire
spontaneous flammability

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
metals
acids
moisture

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

Not available.

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.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Section 11. Toxicological information

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

Potential acute health effects

Eye contact : Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the eyes.

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

Skin contact : Causes skin irritation.

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 : Adverse symptoms may include the following:
irritation
redness

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	588.2 mg/kg

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
proxan-sodium (ISO)	Acute LC50 217000 µg/l Fresh water	Fish - Oncorhynchus mykiss - Fingerling	96 hours

Section 12. Ecological information

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	3342
UN proper shipping name	XANTHATES
Transport hazard class(es)	4.2 
Packing group	III
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
SELF-HEATING SUBSTANCES AND MIXTURES - Category 2	Expert judgment
COMBUSTIBLE DUSTS - Category 1	On basis of test data
ACUTE TOXICITY (oral) - Category 4	Calculation method
SKIN IRRITATION - Category 2	Calculation method

Notice to reader

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SAFETY DATA SHEET

SULFURIC ACID 50%

Section 1. Identification

Product identifier : SULFURIC ACID 50%

Product code : Q11246

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 : CORROSIVE TO METALS - Category 1
SKIN CORROSION - Category 1
SERIOUS EYE DAMAGE - Category 1
Health Hazards Not Otherwise Classified - Category 1

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : May be corrosive to metals.
Causes severe digestive tract burns.
Causes severe respiratory tract burns.
Causes severe skin burns and eye damage.

Precautionary statements

Prevention : Wear protective gloves. Wear protective clothing. Wear eye or face protection. Keep only in original packaging. Wash hands thoroughly after handling.

Response : Absorb spillage to prevent material damage. 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. Wash contaminated clothing before reuse. Immediately call a POISON CENTER or physician. 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 or physician.

Storage : Store locked up. Store in a corrosion resistant container with a resistant inner liner.

Section 2. Hazard identification

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.

Percentage of the mixture consisting of ingredient(s) of unknown dermal toxicity: 50%
Percentage of the mixture consisting of ingredient(s) of unknown inhalation toxicity: 50%

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Ingredient name	% (w/w)	CAS number
sulphuric acid	50	7664-93-9

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.

Skin contact : Get medical attention immediately. Call a poison center or physician. Wash contaminated skin with 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 recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Section 4. First-aid measures

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Causes serious eye damage.

Inhalation : Severely corrosive to the respiratory system.

Skin contact : Causes severe burns.

Ingestion : Severely corrosive to the digestive tract. Causes severe burns. May cause burns to mouth, throat and stomach.

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 : 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. 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:
sulfur oxides
Hydrogen gas.

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. Absorb spillage to prevent material damage. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Absorb spillage to prevent material damage. 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). The spilled material may be neutralized with sodium carbonate, sodium bicarbonate or sodium hydroxide. 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. Keep away from alkalis. Empty containers retain product residue and can be hazardous. Do not reuse container. Absorb spillage to prevent material damage.

Section 7. Handling and storage

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. Store in a corrosion resistant container with a resistant inner liner. Store locked up. Separate from alkalis. Keep away from metals. 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
sulphuric acid	**ACGIH TLV (United States, 3/2019).** TWA: 0.2 mg/m³ 8 hours. Form: Thoracic fraction

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.

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.

Section 8. Exposure controls/personal protection

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 : Liquid. [Oily liquid.]

Color : Colorless.

Odor : Odorless.

Odor threshold : Not available.

pH : <1

Melting point : -37°C (-34.6°F)

Boiling point : 120°C (248°F)

Flash point : Not available.

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

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

Vapor pressure : 0.00013 kPa (0.001 mm Hg) [room temperature]

Vapor density : 3.4 [Air = 1]

Relative density : 1.3993 [@ 15.6°C]

Density : Not available.

Solubility : Soluble in the following materials: cold water.

Dispersibility properties : Not available.

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

Auto-ignition temperature : Not available.

Decomposition temperature : Not available.

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 : heat

Section 10. Stability and reactivity

Incompatible materials : oxidizing materials
reducing materials
metals
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
sulphuric acid	LC50 Inhalation Dusts and mists LD50 Oral	Mouse Rat	160 mg/m³ 2140 mg/kg	4 hours -

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
sulphuric acid	Eyes - Severe irritant Eyes - Severe irritant	Rabbit Rabbit	- -	250 ug 0.5 minutes 5 mg	- -

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Carcinogenicity Classification

Product/ingredient name	IARC	NTP	ACGIH
sulphuric acid	1	Known to be a human carcinogen.	A2

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.

Section 11. Toxicological information

Potential acute health effects

Eye contact : Causes serious eye damage.

Inhalation : Severely corrosive to the respiratory system.

Skin contact : Causes severe burns.

Ingestion : Severely corrosive to the digestive tract. Causes severe burns. May cause burns to mouth, throat and stomach.

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.

Potential chronic health effects

General : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral	4280 mg/kg

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
sulphuric acid	Acute LC50 42500 µg/l Marine water	Crustaceans - Pandalus montagui - Adult	48 hours
	Acute LC50 36 ul/L Marine water	Fish - Agonus cataphractus	96 hours

Persistence and degradability

Section 12. Ecological information

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	UN2796
UN proper shipping name	SULFURIC ACID
Transport hazard class(es)	8 
Packing group	II
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 : 10 March 2021

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
CORROSIVE TO METALS - Category 1	Expert judgment
SKIN CORROSION - Category 1	On basis of test data
SERIOUS EYE DAMAGE - Category 1	On basis of test data
Health Hazards Not Otherwise Classified - Category 1	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.

SAFETY DATA SHEET

POLYFROTH® W22C FROTHER

Section 1. Identification

Product identifier : POLYFROTH® W22C FROTHER

Product code : Q05363

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 : FLAMMABLE LIQUIDS - Category 4
EYE IRRITATION - Category 2A

GHS label elements

Hazard pictograms :

Signal word : Warning

Hazard statements : Combustible liquid.
Causes serious eye irritation.

Precautionary statements

Prevention : Wear protective gloves. Wear protective clothing. Wear eye or face protection. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Wash hands thoroughly after handling.

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

Storage : Not applicable.

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

Supplemental label elements : Percentage of the mixture consisting of ingredient(s) of unknown dermal toxicity: 14.9%
Percentage of the mixture consisting of ingredient(s) of unknown inhalation toxicity: 14.9%

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Ingredient name	% (w/w)	CAS number	
polyoxyalkylene alkyl ether	90 - 100	Trade secret	*
4-methylpentan-2-ol	5 - 10	108-11-2	
propylene carbonate	0 - 5	108-32-7	

* HMIRA registration number:9457. Filing date: 06/26/2018.

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 adverse health effects persist or are severe. 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 : 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 : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : No specific data.

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

Unsuitable extinguishing media : Do not use water jet.

Specific hazards arising from the chemical : Combustible liquid. Runoff to sewer may create fire or explosion hazard. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.

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. 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 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).

Section 6. Accidental release measures

Methods and materials for containment and cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. 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. Use spark-proof tools and explosion-proof equipment. 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 ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. 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

Section 8. Exposure controls/personal protection

Ingredient name	Exposure limits
polyoxyalkylene alkyl ether	-
4-methylpentan-2-ol	**ACGIH TLV (United States, 3/2019). Absorbed through skin.** TWA: 25 ppm 8 hours. STEL: 40 ppm 15 minutes.
propylene carbonate	-

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, 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.

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	:	Liquid.
Color	:	Yellow.
Odor	:	Alcohol like.
Odor threshold	:	Not available.
pH	:	8.6
Melting point	:	-60°C (-76°F)
Boiling point	:	160 to 190°C (320 to 374°F)
Flash point	:	Closed cup: 79°C (174.2°F) [Pensky-Martens.]
Evaporation rate	:	Not available.
Flammability (solid, gas)	:	Not available.
Lower and upper explosive (flammable) limits	:	Not available.
Vapor pressure	:	0.15 kPa (1.0998 mm Hg) [room temperature]
Vapor density	:	Not available.
Relative density	:	0.9115 [@ 25°C]
Density	:	0.9115 g/cm³ [25°C (77°F)]
Solubility	:	Very slightly soluble in the following materials: cold water.
Dispersibility properties	:	Not available.
Partition coefficient: n-octanol/water	:	Not available.
Auto-ignition temperature	:	Not available.
Decomposition temperature	:	Not available.
Viscosity	:	Kinematic (40°C (104°F)): 0.043 cm^2/s (4.3 cSt)
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 all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.
Incompatible materials	:	Reactive or incompatible with the following materials: oxidizing materials
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

Not available.

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.

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

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.

Section 11. Toxicological information

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

General : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral	29882.6 mg/kg

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
POLYFROTH® W22C FROTHER	-	-	Readily

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. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil,

Section 13. Disposal considerations

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 : 18 February 2021

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
FLAMMABLE LIQUIDS - Category 4 EYE IRRITATION - Category 2A	On basis of test data Calculation method

Notice to reader

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SAFETY DATA SHEET

ZINC SULPHATE MONOHYDRATE POWDER (I)

Section 1. Identification

Product identifier : ZINC SULPHATE MONOHYDRATE POWDER (I)

Product code : Q06003

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, zinc salt (1:1), monohydrate	96 - 100	7446-19-7

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

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, zinc salt (1:1), monohydrate	-

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. [Powder.]

Color : White.

Odor : Odorless.

Odor threshold : Not available.

pH : 4 to 7

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 : 3.28

Density : Not available.

Solubility : Soluble in the following materials: cold water.
Insoluble in the following materials: acetone.

Dispersibility properties : Not available.

Section 9. Physical and chemical properties

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

Auto-ignition temperature : Not available.

Decomposition temperature : Not available.

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 : oxidizing 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

Not available.

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.

Specific target organ toxicity (repeated exposure)

Section 11. Toxicological information

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.

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	500.2 mg/kg

Section 12. Ecological information

Toxicity

Not available.

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	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

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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

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