



COLORADO
**Division of Reclamation,
Mining and Safety**
Department of Natural Resources
1313 Sherman Street, Room 215
Denver, CO 80203

November 2, 2021

Brian Briggs
Ouray Silver Mines, Inc.
PO Box 564
Ouray, CO 81427

RE: Revenue Mine, Permit No. M-2012-032, Technical Revision (TR-15), Reagent Chemical Storage Modification-Approval

Dear Mr. Briggs:

On October 29, 2021 the Division of Reclamation, Mining and Safety (Division) received your request to store reagent chemicals within the Floatation Gallery of the Revenue Mine. The attached list of chemicals (and associated volumes) are to be used for the commissioning process of the Revenue Mill.

The Division is **approving** your request to store a limited amount of reagent chemicals on site for the commissioning process. Upon completion and final certification of the Reagent Room, chemicals are to be stored within the Reagent Room as approved under TR-14.

If you have any questions please don't hesitate to contact me.

Sincerely,

Amy Yeldell
Environmental Protection Specialist
Division of Reclamation, Mining and Safety

Ec: Travis Marshall, Senior EPS, DRMS
Lucas West, DRMS
Todd Jesse, OSMI
Poppy Staub, OSMI
Michelle Robbins, OSMI



Reagent	Type	Packaging	Amount
Zinc Sulfate	Depressant 1	Dry 50lbs bags	1
Sodium Metabisulfite	Depressant 2	Dry 50lbs bags	1
Areophine 3418	Collector 1	55 gal barrel	1
Polyfroth W20/Cytec 242	Promoter 1	Liquid 240 gal tote	1
Polyfloat 3760/Oreprep F-549	Frother	Liquid 240 gal tote	1
Hydrated Lime	pH modifier	Dry 50lbs bags	50
Copper Sulfate	Promoter 2	Dry 50lb bags	1
Sodium Isopropyl Xanthate	Collector 2	55 gal barrel	1
Flocculant AF-309	Settling Agent	Dry 50lb bags	5

Reagent	Manufacturer	Purpose of use	Alt Names	Human Health §2: SDS HCS 2012 (29CFR 1910.1200)	Environmental Impacts §12: SDS	PPE §8: SDS	NFPA - Classification §16 SDS	EPA List of Lists §12 SDS	Corrosivity	Incompatible Materials	
AeroFloat 242 Promoter	Solvay (distributor for Cytec Industries Inc.)	This is the ammonium salt of AEROFLOAT 31 promoter. Widely used for flotation of Pb from Pb/Zn ores and Cu/Pb from Cu/Pb/Zn ores. Improves Ag recovery from these ores.	NA	Acute toxicity, Category 4 Acute toxicity, Category 3 Skin Corrosion, Category 1B Serious eye damage, Category 1 Skin Sensitization, Category 1 Reproductive toxicity, Category 2 Specific target organ toxicity - repeated exposure, Category 2	H302: Harmful if swallowed H311: Toxic in contact with skin H314: Causes severe skin burns and eye damage H315: Causes serious eye damage H317: May cause an allergic skin reaction H361: Suspected of damaging fertility or the unborn child H373: May cause damage to organs through prolonged or repeated exposure. Toxicity to aquatic plants Toxicity to microorganisms M-Factor Ammonium hydroxide Biodegradability Toxicity to benthic organisms Toxicity to soil dwelling organisms Toxicity to terrestrial plants Toxicity to above ground organisms	LC50 - 96 h: ca.66mg/L Rainbow trout Impervious clothing Change working clothes after each shift Handle in accordance with good industrial hygiene and safety practice Wash hands before breakfast at the end of workday When using do not eat, drink or smoke Eye wash bottles/stations in compliance with applicable standards Ensure that eyewash stations and showers are close to the workstation location	Health - 3 Serious Flammability - 1 Slight Instability or Reactivity - 0 Minimal	Ammonium HydroxideCAS - No. 1336-21-6 1000lb	Not classified re: corrosion of metals	Oxidizing agents, strong acids or bases, and amines	
Danafloat 067 (alternative to AeroFloat 242)	Quadra Chemicals Inc.	Flotation Agent	NA	Acute toxicity, Category 4 Acute toxicity, Category 3 Skin Corrosion, Category 1 Serious eye damage, Category 1	H302: Harmful if swallowed H311: Toxic in contact with skin H314: Causes severe skin burns and eye damage H318: Causes serious eye damage	Acute EC50 5 to 10ppm Marine Water - Species: Algae - macrocystic pyrites - young Acute EC50 7000 µg/l fresh water - Crustaceans - Grammusus fasciatus Acute LC50 10000 µg/l fresh water Fish - leporinus macrochirus	Exposure 4 days 48 Hours 96 Hours	Health - 3 Flammability - 0 Physical Hazards - 0	Ammonium O, O-bis(methylphenyl) dithiophosphate 49-51 % CAS- No. 587373-83-4 mix-cresol 0-7% CAS No. 1319-77-3 ammonia 0-7% CAS No. 1336-21-6	Corrosive to the respiratory system and digestive tract	Acids
Aerophine 3418 Promoter	Solvay (distributor for Cytec Industries Inc.)	AEROPHINE 3418A has application in flotation of copper- and lead-sulfide minerals, particularly where these are found in complex sulfide ores containing sphalerite zinc mineralization, and ores with high levels of pyrite and/or pyrrhotite.	NA	Serious eye damage, Category 1 Skin sensitization, Sub-Category 1B Health hazards not otherwise classified, Category 1	H318: Causes serious eye damage H317: May cause an allergic skin reaction Contact with acids liberates toxic gases	Acute toxicity to fish Acute toxicity to daphnia and other aquatic invertebrates Toxicity to aquatic plants Toxicity to microorganisms Chronic toxicity to fish Chronic to daphnia and other aquatic invertebrates Toxicity to benthic organisms Toxicity to soil dwelling organisms Toxicity to terrestrial plants Toxicity to above ground organisms	Not harmful (LC LL50>100mg/L) Not harmful (EC EL50>100mg/L) Not harmful (EC EL50>100mg/L) Not tested Not tested Not tested Not tested Not tested Not tested Not tested Not tested	Health - 3 Serious Flammability - 1 Slight Instability or Reactivity - 0 Minimal	N/A	Not corrosive to metals	Mineral acids, strong oxidizing agents, strong acids or bases
Copper Sulfate Pentahydrate	Quadra Chemicals LTD.	Used in Zinc flotation as an activator of sphalerite	cupric sulfate, blue vitriol, bluestone	Acute Toxicity - Oral Category 4 Skin Corrosion/Irritation Category 2 Eye damage/Irritation Category 2	Harmful if swallowed Harmful in contact with skin Eye damage/Irritation	Ecotoxicity Persistence and degradability Bioaccumulation Mobility Other Adverse Effects	Very toxic to aquatic life with long lasting effects Not determined Not determined May be mobile due to water solubility Not Determined	Health - 3 Serious Flammability - 0 Instability or Reactivity - 0 Minimal	CAS/313 Category Codes N100 & (CERCLA) 313	Mildly corrosive to steel	Aluminum powder, acetylene gas, hydroxylamine, magnesium and moisture
Floquat FL 2949	SNF, Inc.	Used as a settling agent. A flocculant causes the suspended mineral to form into small masses. This will make the thickener load settle.		No known hazards to humans Aqueous solutions or powders that become wet render surfaces extremely slippery	Acute toxicity to fish Acute toxicity to invertebrates Acute toxicity to algae Chronic toxicity to fish Chronic toxicity to invertebrates Toxicity to microorganisms Effects on terrestrial organisms Sediment toxicity	LC50/Danio rerio/96 hours > 10-100mg/L (OECD 203) LC50/Fathead minnow/96 hours > 10-100mg/L (OECD 203) Algal inhibition tests are not appropriate. No Data No Data No Data No known effects No Data	Safety glasses with side shields PVC or other plastic material gloves Coverall and/or chemical apron and rubber footwear where physical contact can occur. No personal respiratory protective equipment normally required Wash hands before breaks and immediately after handling the product.	Health - 0 Flammability - 0 Instability - 0	N/A	Not classified re: corrosion of metals	None known
Hyperfloc AF 309 (alternative to Floquat)	SNF, Inc.	Used as a settling agent. A flocculant causes the suspended mineral to form into small masses. This will make the thickener load settle.	NA	No known hazards to humans Aqueous solutions or powders that become wet render surfaces extremely slippery	Acute toxicity to fish Acute toxicity to invertebrates Acute toxicity to algae Chronic toxicity to fish Chronic toxicity to invertebrates Toxicity to microorganisms Effects on terrestrial organisms Sediment toxicity	LC50/Danio rerio/96 hours > 100mg/L (OECD 203) LC50/Fathead minnow/96 hours > 100mg/L (OECD 203) LC50/Scenedesmus subspicatus/72 hours > 100mg/L (OECD 201) No Data No Data No Data No known effects No Data	Safety glasses with side shields Plastic material gloves Work clothes protecting arms, legs and body Dust safety masks recommended where working powder concentration is more than 10 mg/m3. Wash hands before breaks and immediately after handling the product.	Health - 0 Flammability - 0 Instability - 0	CERCLA - Hazardous substances list (40 CFR 302.4) - RQ - Not concerned	Not classified re: corrosion of metals	Strong bases, oxidizing agents
Hydrated Lime	Lhoist North America	Lime is used to adjust the pH to aid in the collector adsorption by controlling the pulp chemistry. It also aids in the depression of certain minerals	NA	Eye damage Category 1 Carcinogen Category 1 Skin Irritation Category 2 Specific Target Organ Toxicity Single Exposure Category 3 Specific Target Organ Toxicity Repeat Exposure Category 1	Serious eye damage Skin irritation Respiratory irritation Damage to lungs through prolonged or repeated exposure when inhaled Cancer potential through inhalation Hydrated lime is not listed as a carcinogen, however this product contains crystalline silica, which is classified as carcinogenic to humans when inhaled.	Reacts with atmospheric CO2 overtime to form calcium carbonate No bioaccumulation effect or food chain concentration toxicity Minimal mobility in soil. Reacts with clay portion of soil to form calcium silicates and calcium aluminates This material is alkaline and if released into water or moist soil will cause an increase in pH Crystalline Silica 14808-60-7 OSHA PEL: 0.050mg/m3 as an 8 hr. TWA (respirable) ACGIH TLV: 0.025 mg/m3 (respirable)	Calcium Hydroxide 13mg/m3/05-62-0 OSHA PEL: 15 mg/m3 (total) 5 mg/m3 (respirable) ACGIH TLV: 5 mg/m3 Magnesium Oxide 1309-48-4 OSHA PEL: 15 mg/m3 ACGIH TLV: 10 mg/m3 Crystalline Silica 14808-60-7 OSHA PEL: 0.050mg/m3 as an 8 hr. TWA (respirable) ACGIH TLV: 0.025 mg/m3 (respirable)	NA	N/A	Not classified re: corrosion of metals	Acids, reactive fluorinated or brominated compounds, reactive powdered metals, organic acid anhydrides, nitro-organic compounds, reactive phosphorus compounds, interhalogenated compounds
Oreprep F-549 Frother	Solvay (distributor for Cytec Canada Inc.)	A frothing agent used to create a stable surface for sulfide mineral to adhere.	NA	Skin irritation Category 2 Eye irritation Category 2A	H315: Causes skin irritation H319: Causes serious eye irritation	Acute toxicity to fish Acute toxicity to daphnia and other aquatic invertebrates Toxicity to aquatic plants Toxicity to microorganisms Chronic toxicity to fish Chronic toxicity to daphnia and other aquatic invertebrates Abiotic degradation physical and photo-chemical elimination Biodegradation Adsorption potential Known distribution to environmental compartments Results of PBT and vPvB assessment Other adverse effects	No Data No Data No Data No Data No Data No Data No Data No Data No Data No Data No Data	Health - 2 Moderate Flammability - 1 Instability or reactivity - 0 or Minimal	N/A	Not corrosive to metals	Strong oxidizing agents
Polyfloh W20 (Alternative to Oreprep)	Quadra Chemicals Inc.	A frothing agent used to create a stable surface for sulfide mineral to adhere.	NA	While this material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200), this SDS contains valuable information critical to the safe handling and proper use of the product. This SDS should be retained and available for employee's and other users of this product. No known significant effects or critical hazards.	No known significant effects or critical hazards. Ecotoxicity - Not available Persistence and degradability - Not available.	Chemical resistat, impervious gloves, complying with an approved standard should be worn at tall times when handling chemical products if a risk assessment indicates this is necessary	Health - 0 Flammability - 0 Instability - 0	NA	NA	No specific test data related to reactivity available for this product or it's ingredients. The product is stable Under normal conditions of storage and use, hazardous reactions will not occur.	
Sodium Isopropyl Xanthate Flottec SPX Collector	Charles Tennant & Copmany	Xanthate is commonly used in the flotation process of sulfide minerals. Xanthate is a combination of alcohol, sodium hydroxide and carbon dioxide, which is an anionic collector.	NA	Sodium Isopropylxanthate Self heating substances and mixtures Category 1 Acute toxicity (oral) Category 4 Acute toxicity (dermal) Category 4 Skin irritation Category 2 Eye irritation Category 2A Catches Fire spontaneously if exposed to air Harmful if swallowed or in contact with skin Causes skin irritation	Proxan Sodium (Synonym) H251: Self-Heating; may catch fire H302: Harmful if swallowed H315: Causes skin Irritation	Acute Aquatic Toxicity Category 2 Chronic Aquatic Toxicity Category 2 Acute toxicity (oral) Category 4 Acute toxicity (dermal) Category 4 Skin irritation Category 2 Eye irritation Category 2A Catches Fire spontaneously if exposed to air Harmful if swallowed or in contact with skin Causes skin irritation	H411: Toxic to aquatic life long lasting effects H251: Self-Heating; may catch fire H302: Harmful if swallowed H315: Causes skin Irritation	Health - 2 Flammability - 0 Instability - 2	CAS/313 Category Codes 7440-23-5 CERCLA RQ 10	Not classified re: corrosion of metals	Strong oxidizing agents, strong acids, strong bases, flammable liquids, heat, moisture
NAX 31 (Sodium isopropyl Xanthate alternative)	Prospec Chemicals (Charles Tennant & CO 3rd party supplier of Xanthate. Cascade columbia is a Distributor for Charles Tennant).	Xanthate is commonly used in the flotation process of sulfide minerals. Xanthate is a combination of alcohol, sodium hydroxide and carbon dioxide, which is an anionic collector.	NA	Acute Toxicity Oral Category 1 Acute Toxicity Dermal Category 4 Acute Toxicity Skin Irritation Eye irritation Category 2 Eye damage/Irritation Danger Category 2	Harmful if swallowed Harmful in contact with skin Wash with plenty of soap and water Eye damage/Irritation NA	NA	NA	Health - 3 Serious Flammability - 0 Instability or Reactivity - 0 Minimal	NA	Not classified re: corrosion of metals	Strong oxidizing agents, strong acids, strong bases, flammable liquids, heat, moisture
Sodium Metabisulfite	Quadra Chemicals LTD (Prospect Chemicals 2nd/3rd party distributor/supplier)	Sodium Metabisulfite aka MBS is used for pH control in float flotation to control Pyrite depression. ... It is also used to prevent flotation of sphalerite by copper activation in the presence of Tennantite/Covellite in the ore.	Sodium Pyrosulfite, Disodium Pyrosulfite, Pyrosulfurous Acid, Disodium Salt, Sodium Disulfite	Acute Toxicity Oral Category 4 Acute Toxicity Dermal Category 5 Serious Eye Irritant Category 1	Harmful if swallowed Harmful in contact with skin Eye damage/Irritation	Ecotoxicity: Sodium Metabisulfite is a non hazardous solid commonly used as a waste water dechlorination agent. High concentrations will contribute to elevated chemical oxygen demand in aquatic environments	General and local exhaust ventilation systems to maintain airborne concentrations If necessary, wear and MSHA/NIOSH approved respirator. Protective boots, gloves, and clothing to prevent excessive skin contact. Protective eye glasses, safety glasses with side shields, or goggles. emergency eye wash stations, showers, and washing facilities available in the work area. Remove this material from PPE as needed. Do not eat, drink or smoke in work areas.	Health - 2 Serious Flammability - 0 Instability or Reactivity - 0 Minimal	Hazardous Substance (40 CFR 302.4) RQ NA	Not classified re: corrosion of metals	Acid and water produce sulfur oxides. Powdered potassium, sodium metal, alkali agents, oxidizing agents, and chlorates.
Zinc Sulphate Monohydrate	Zinc Nacional	The established lead-zinc ore flotation processing scheme is to add zinc sulphate (ZnSO4) to the grind to control metal ion activation (sphalerite depression) ... Sphalerite that is rejected into the lead flotation tails is then floated in a second flotation step after activation with copper sulphate.	White vitriol, Goslarite	Acute aquatic toxicity Category 1 Skin corrosion/Irritation Category 2 Serious eye damage Category 1 Specific target organ toxicity, single exposure, Respiratory tract irritation Category 3 Hazardous to the aquatic environment, long-term hazard Category 1	H302: Harmful if swallowed H315: Causes skin irritation H318: Causes serious eye damage H335: May cause respiratory irritation H410: Very toxic to aquatic life with long lasting effects	LC50 24 Hours fish (rainbow trout) 1.24 mg/L LC50 48 Hours fish (rainbow trout) 2.4 - 5mg/L LC50 96 Hours fish (rainbow trout) 24 - 83 mg/L LC50 96 Hours Daphnia 7.4 mg/L Zinc Sulphate has a high water solubility and its zinc and manganese contents are directly bio available. The zinc may be toxic to aquatic organism, especially fish, with water hardness, pH and dissolved organic carbon levels being regulating factors.	Zinc Sulphate has a high water solubility and its zinc and manganese contents are directly bio available. The zinc may be toxic to aquatic organism, especially fish, with water hardness, pH and dissolved organic carbon levels being regulating factors.	Does not burn or support combustion § 5 Fire Fighting Measures SDS	CERCLA RQ 1000 Section 313c	Not classified re: corrosion of metals	Strong oxidizers, acids, strong bases

* highlighted items are primary reagent chemicals. Non-highlighted are alternatives