

Safety Data Sheet for Copper concentrates
(EU commission regulation N° 1907/2006/EC and amendments)

Version: 1

Revision date: January/ 2021

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SECTION 0: Introduction to this Safety Data Sheet

Under GHS, Silver/Copper concentrate meet the criteria for classification as hazardous to the aquatic environment : acute Cat. 2 and the criteria for classification as hazardous to the human health : Specific target organ toxicity – repeated exposure Cat.2.

Under EU-CLP, Copper concentrate does not meet the criteria for classification as hazardous to the aquatic environment and does meet the criteria for classification as hazardous to the human health : Specific target organ toxicity – repeated exposure Cat.2 (SiO₂ crystalline).

Silver/Copper concentrates may be subjected to pyrometallurgical or hydrometallurgical processes, aiming at the production of pure silver/copper and metal by-products thereby producing intermediate substances (eg matte) with metal-compounds concentrations that may trigger classifications (e.g. other copper, lead, arsenic, nickel species and/or concentrations). SDSs are available for these substances.

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier

Substance name	Silver/Copper concentrate
Trade name	Copper concentrate
Index number	Not applicable
EC number:	Not applicable
EC name:	Naturally occurring substances
CAS number (EC inventory):	Not available
IUPAC name:	Not available
Description:	Silver/Copper concentrate is a naturally occurring UVCB, obtained from crushed copper ore by conventional mineral processing (e.g. flotation)
Chemical formula:	Not applicable - Complex metals containing substance
REACH registration number	Not needed- exempted from REACH registration
ECHA CL Inventory number	ECHA CL submission number : KU126216-22 (Copper Ore Concentrate Group)

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

1.2.1. Relevant identified uses

Uses by workers in industrial settings (substance supplied as such to that use):

IU number	Identified Use (IU) name	Use descriptors
1	use as intermediate in metal manufacturing	<p>Process category (PROC): PROC 22: Potentially closed processing operations with minerals/metals at elevated temperature. Industrial setting PROC 26: Handling of solid inorganic substances at ambient temperature</p> <p>Sector of end use (SU): SU 14: Manufacture of basic metals, including alloys</p> <p>Subsequent service life relevant for that use?: no</p>

Most common technical function of substance: The substance is a UVCB, used for the production of copper.

1.2.2. Uses advised against:

There are no uses advised against.

1.3. Details of the supplier of the safety data sheet

Supplier

Bayhorse Silver Inc.
 2501-4398 Buchanan St, Burnaby, BC V5C 6R7

Web site

www.bayhorsesilver.com

Email

go@bayhorsesilver.com

Information contact

Greame O'Neill, CEO

Phone number

604-684-3394

Fax number

888-684-0586

1.4. Emergency telephone number

Emergency phone number

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SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification and labelling of the substance or mixture according to EU-CLP

2.1.1 Classification and labelling according to Regulation (EC) No. 1272/2008 (CLP)

Hazard statements :

SOT (RE) Cat 1 : H373-May causes damage to organs through prolonged or repeated exposure (SiO₂ crystalline)

Precautionary statements

P281-Use personal protective equipment as required.

P260-Do not breathe dust/fume/gas/mist/vapours/spray. P264-Wash (Hands, face, contaminated skin by the product) thoroughly after handling.

P273: Avoid release to the environment

P502-Refer to manufacturer/supplier for information on recovery/recycling (hazardous waste).

Dispose of contents/container in full compliance with Federal, Provincial and local regulations.

Symbol/hazard pictogram : Warning



2.2. Classification and labelling of the substance or mixture according to GHS 2011

Hazard statements

SOT (RE) Cat 1 : H373-May causes damage to organs through prolonged or repeated exposure (SiO₂ crystalline)

Aquatic acute Cat. 2 : H401-Toxic to aquatic life (Se, Pb, Cu)

Precautionary statements

P281-Use personal protective equipment as required.

P260-Do not breathe dust/fume/gas/mist/vapours/spray. P264-Wash (Hands, face, contaminated skin by the product) thoroughly after handling.

P273: Avoid release to the environment

Symbol/hazard pictogram : Warning



2.3. Other hazards

The substance does not meet the criteria for a PBT or vPvB substance.

Some concentrates may have a low pH (pH 4-8) and dusts may irritate eyes and respiratory track.

No physico-chemical hazard identified. Additional investigations are ongoing

EU Waste hazard properties : STOT/Aspiration Toxicity (HP5).

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substance

Description

Silver/Copper concentrate

Degree of purity

100.0 % (w/w)

Constituents

This product is a concentrate, obtained from naturally occurring copper ores, without chemical modifications. The Silver/Copper concentrates consist of sulphide minerals (e.g. chalcopyrite, pyrite, sphalerite, galena, others).

The detailed elemental composition and metal form (mineral composition) is provided below

Constituent	Concentration (w/w)	Concentration range (w/w)	Remarks
Copper (as Cu) EC no.: 231-159-6	7-14%	≥7≤20%	Copper is in sulphide minerals. Cu minerals (chalcopyrite (CuFeS ₂), bornite (Cu ₅ FeS ₄), chalcocite (Cu ₂ S)) represents 27 to 33%. Oxide copper forms may be present (<3% CuO)
Sulphur (as S) EC no.: 231-722-6	15-25%	≤25%	Sulphur in the sulphide minerals (e.g. chalcopyrite)
Iron (as Fe) EC no.: 231-096-4	3-7%	≤8%	Iron in sulphide minerals as Chalcopyrite (CuFeS ₂), arsenopyrite (FeAsS), pentlandit ((Fe.Ni) ₉ S ₈), bornite (Cu ₅ FeS ₄), pyrite (FeS ₂)
Other major constituents	<12%	≤15%	Elemental concentrations of Al, Ca, Mg, K, Si, To, Mn usually expressed as oxides (Al ₂ O ₃ , CaO, K ₂ O, MgO, MnO, P ₂ O ₅ , TiO ₂ , SiO ₂). These major elements in the form as calcite, dolomite, hornblende, quartz, chlinocchlore, feldspar, kaolinite, biotite. The % refer to the sum of the oxide forms (Al ₂ O ₃ , CaO, K ₂ O, MgO, MnO, P ₂ O ₅ , TiO ₂ , SiO ₂) in concentrates.

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Constituent	Concentration (w/w)	Concentration range (w/w)	Remarks
Zinc (as Zn) EC no.: 231-175-3	15-25%	≤30%	Zinc in the form of sphalerite (ZnS)
Lead (as Pb) EC no.: 231-100-4	2-5%	≤5%	Lead in the form of galena (PbS)
Nickel (as Ni) EC no.: 231-111-4	>0.002%	≤0.003%	Nickel in the form of pentlandit (Fe.Ni) ₉ S ₈
Arsenic (as As) EC no.: 231-148-6	1.5-5%	≤5.0%	Arsenic in the form of minerals: tennantite (Cu ₁₂ As ₄ S ₁₃), enargite ((Cu ₃ As ₄), arsenopyrite (FeASS), argentotennantite (Ag,Cu) ₁₀ (Zn,Fe) ₂ (As,Sb) ₄ S ₁₃
Antimony (as Sb) EC no.: 231-146-5	8-17%	≤17%	Sb in the form of tetrahedrite (Cu ₁₂ Sb ₄ S ₁₄) and/or famanitinite (Cu ₃ As ₄)
Silver (as Ag) EC no.: 231-131-3	5-15%	≤15%	Silver as argentotennantite (Ag,Cu) ₁₀ (Zn,Fe) ₂ (As,Sb) ₄ S ₁₃
Cadmium (as Cd) EC no.: 231-152-8	0.1-0.3 ppm	≤0.3 ppm	
Molybdenum (as Mo) EC no.: 231-107-2	0.002-0.004 ppm	≤0.004 ppm	Molybdenum as molybdenite.
Cobalt (as Co) EC no.: 231-158-0	0.02-0.04%	≤0.04%	
Respirable crystalline silica	7-12%	≤12%	
Minor constituents	2%	≤2%	Minor constituents refers to the sum of other minor constituents (Au,Bi,Te,Se,Hg,F,Cl) and integrated into the minerals. The % refers to the sum of the elemental concentrations.
water EC no.: 231-791-2	7-10%	7-18%	Typical moisture content of 7-10%

There are no additional ingredients present, which, within the current knowledge of the supplier, are classified as hazardous to health or the environment.

See certificate of analysis for more information on concentration levels.

SECTION 4: FIRST AID MEASURES

4.1 Description of first aid measures

Inhalation

In case of discomfort due to exposure to fumes or fine particulates, move to fresh air, lay patient down, get medical attention if discomfort persists.

Ingestion

Rinse mouth thoroughly. Give 200-300 ml water to drink. Do not induce vomiting. Get medical attention if any discomfort continues.

Skin contact:

No significant health effects are anticipated from infrequent skin contact. Use general hygiene measure for contact with the material: wash with soap and warm water. Seek medical attention in case of rash or skin discomfort. Cuts or abrasions should be treated promptly with thorough cleansing of the affected area.

Eye contact

Use general measures if eye irritations occur. Do not rub eyes. Remove any contact lenses. Flush eyes thoroughly with water, taking care to rinse under eyelids. If discomfort continues, consult a physician.

General advice

Get medical attention if any discomfort develops. Seek medical attention for all burns, regardless how minor they may seem. Show this safety data sheet to the doctor in attendance.

Notes to physician: Treat symptomatically.

4.2 Most important symptoms and effects, both acute and delayed

Contact with dust particles may lead to irritation of nose and throat and irritation of eyes and mucous membranes. The effects might be delayed.

4.3 Indication of any immediate medical attention and special treatment needed

Treat symptomatically and consider the Ni, As, Pb, Cd, Co... content in the material.

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SECTION 5: FIREFIGHTING MEASURES

5.1 Extinguishing media

5.1.1 Suitable extinguishing media

Material is non-flammable. Use firefighting measures appropriate to surrounding materials. Ores/concentrates may self-heat under certain conditions of temperature and moisture and release toxic and irritating Sulphur dioxide gas (SO₂). Contact with strong acids can release Hydrogen Sulfide (H₂S) (extremely toxic and flammable gas). Combustion of the ores/concentrates generally has no visible flames. Discoloration of the product upon combustion : Evident. DO NOT use high velocity water streams or extinguishers which may spread burning ores/concentrates. Fire should be extinguished by depriving the concentrate of air (by compression, burying in fresh concentrate).

Use : Dry chemical, CO₂ or foam.

5.1.2 Unsuitable extinguishing media

DO NOT use water or halogenated extinguishing media.

5.2 Special hazards arising from the substance or mixture

Respirable dust. Fire or high temperatures create Metal oxides and Sulphur oxides.

Vapours and fumes released by combustion are corrosive.

Contact with strong acids will generate flammable and highly toxic hydrogen sulphide gas (H₂S)

5.3 Advice for firefighters

Wear a self-contained breathing apparatus and a fully protective suit and gloves.

Dispose of fire debris and contaminated firefighting media in accordance with official regulations

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

6.1.1 For non-emergency personnel

Avoid generation of dust. Ensure adequate ventilation. Avoid inhalation and contact with skin and eyes. Wear protective clothing.

6.1.2 For emergency responders

Wear protective equipment. Keep unprotected persons away

For further information see also point "Exposure controls / personal protection"

6.2 Environmental precautions

In accordance with GHS, avoid release to the environment. Environmental manager must be informed of all major spillages.

6.3 Methods and material for containment and cleaning up for spills and releases

Methods for cleaning up

Avoid generation and spreading of dust. If dusts have been generated, restrict the area to those persons wearing respiratory protection. Do not allow unprotected people into the area until clean-up has been completed.

Collect material using a vacuum cleaner with a HEPA filter. Place in a suitable container for recycling or disposal as hazardous waste

Ventilate the area thoroughly.-avoid to empty into drains or waterways.

6.4 Reference to other sections

For more information on exposure controls/personal protection or disposal considerations, check section 8 and 13 of this safety data sheet.

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling

7.1.1 Protective measures

Adequately assess the composition of the material. Knowledge of the % metal constituents in the Silver/Copper concentrate is critical: the maximum levels indicated in the composition are not to be exceeded.

7.1.2 Advice on general occupational hygiene

Main potential risks

Potential inhalation of the small particles, especially during the storage, loading, unloading and melting of the material.

Appropriate risk management measures

1-Avoid generation and spreading of dust: **keep at 8-10% moisture** during storage and transport ; use of hoods above smelters and appropriate dust filters; sprinklers around storage areas.

2-Provide adequate ventilation. Some sulphide concentrates may slowly oxidize during storage and generate **sulphur dioxide** as well as deplete the **oxygen** content of a confined space. The atmosphere within confined spaces containing concentrate must be tested **before** entry and the area **thoroughly ventilated** or **self-contained breathing apparatus** used, if conditions warrant.

3-Avoid inhalation of dust and small particles and contact with skin and eyes.

4-Wear appropriate personal protective equipment (gloves and/or RPE) in areas where dusts are present (smelting area and during critical maintenance operations).

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5-Observe good industrial hygiene practices.

6-Perform appropriate monitoring campaigns to demonstrate absence of risks towards exposures of Cu, Ni, Pb, As, Cd, Zn.

General measures

Avoid contact with molten material. Do not use water on molten metal. Avoid contact with sharp edges and hot surfaces

7.2 Conditions for safe storage, including any incompatibilities

Avoid contact with strong acids.

7.3 Specific end use(s)

Check the identified uses in section 1.2 of this safety data sheet.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters

8.1.2 PNECs and DNELs

Not available for the substance

DNEL (elemental constituents)

Copper sulfide : DNEL_{acute, systemic, inhalation} : 18.2 mg/m³. DNEL_{chronic, systemic, dermal} : 137 mg/kg bw/day

Silica : DNEL_{systemic, inhalation} : 4 mg/m³

Zinc : DNEL_{acute, local, inhalation} : 4 mg/m³. DNEL_{chronic, local, inhalation} : 0.05 mg/m³.

Zinc oxide : DNEL_{chronic, systemic, inhalation} : 5 mg/m³. DNEL_{chronic, systemic, dermal} : 83 mg/kg bw/day

Iron oxide : DNEL_{chronic, systemic, inhalation} : 5 mg/m³. DNEL_{chronic, systemic, dermal} : 83 mg/kg bw/day.

Lead sulfide : DNEL_{chronic, systemic} : 40 µg/dl (nervous system) ; 10 µg/dl (pregnant –fetus development).

Molybdenum sulfide : DNEL_{local, inhalation} : 3 mg/m³. DNEL_{systemic, inhalation} : 11.17 mg/m³

PNEC (elemental constituents)

Copper and compounds : PNEC_{freshwater} : 7.8 µg/l. PNEC_{added, soil} : 65 mg/kg dry soil

Zinc and compounds : PNEC_{freshwater} : 20.6 µg/l. PNEC_{soil} : 35.6 mg/kg dry soil.

Iron : PNEC_{freshwater} : 1 mg/l (long term)

Lead and compounds : PNEC_{freshwater} : 3.1 µg/l (dissolved). PNEC_{soil} : 212 mg/kg dry weight

Arsenic inorganic : PNEC_{freshwater} : 4.4 µg/l. PNEC_{soil} : 1.8 mg/kg dry weight

Molybdenum compounds : PNEC_{freshwater} : 12.7 mg Mo/l.

8.2 Exposure controls

There are no specific exposure limits for copper concentrates or any of its sulphide minerals except for lead compounds.

Exposure limits of the elemental metals. Commonly reported Time Weighted Average (TWA) limit values:

Copper (8h –TWA) 1 (mg/m³) (copper and compounds dust)

Zinc (8h –TWA) 10 (mg/m³) (zinc oxide dust)

Iron (8h –TWA) 5 (mg/m³) (iron oxide fume)

Galena and Lead (8h –TWA) 0.15 (mg/m³) (inorganic dust and fumes)

Cadmium (8h –TWA) 0.025 (mg/m³) (cadmium and compounds)

8.2.1 Appropriate engineering controls

Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.

8.2.2 Individual protection measures, such as personal protective equipment

GENERAL PROTECTIVE AND HYGENIC MEASURES: Keep away from foodstuffs, beverages and food.

8.2.2.1 Eye/face protection: not required (not classified)

8.2.2.2. Skin protection: not required (not classified). Gloves are recommended

8.2.2.3. Respiratory protection: not required (not classified). RPE recommended when generating dust

8.2.2.4 Thermal hazards : not required (not classified)

8.2.3 Environmental exposure controls

Recommended to avoid release to the environment (GHS, aquatic acute 2 classification)

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

(a) Appearance	Solid, grey powder (particle sizes <100 µm)
(b) Odour	Odourless
(c) Odour threshold	Not applicable because odourless
(d) pH	Not applicable (solid). pH (suspension in water): 4-8
(e) melting point	900-1170°C
(f) Initial boiling point	Not applicable because solid melting above 1000°C

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and boiling range

(g) Flash point	Not applicable to inorganic solid
(h) Evaporation rate	Not applicable (solid)
(i) Flammability (solid, gas)	Not classified-inorganic solid demonstrated to be thermally stable up to 370°C From UN tests N.1. on 5 typical copper concentrate, it was concluded that they are not readily combustible substances
(j) Upper/lower flammability or explosive limits	Not applicable
(k) Vapour pressure	Not applicable (inorganic solid melting above 300°C)
(l) Vapour density	Not applicable (inorganic solid melting above 300°C)
(m) Relative density	Range from 4.1-4.4 g/cm ³ at 20°C
(n) Solubility(ies)	Low solubility
(o) Partition coefficient n-octanol/water	Not applicable to inorganic substances.
(p) Auto-ignition temperature	Not classified because auto-ignition temperature is above 400°C From N.4 tests on 5 typical copper concentrate, it was concluded that they do not show signs of exothermic activity during the first trial
(q) Decomposition temperature	Decomposition and/or melting starts above 900°C.
(r) Viscosity	Not applicable to solid.
(s) Explosive properties	Non explosive, not containing chemical groups associated with explosivity.
(t) Oxidising properties	Not classified under UN O.1, based on chemistry (inorganic solid)

9.2 Other information

Not applicable.

SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity

Not applicable. See section 9.

10.2 Chemical stability

Under normal conditions of use and storage, the product is stable.

10.3 Possibility of hazardous reactions

Reaction with oxidizing /reducing agents will change the metal speciation and may induce releases of sulphur dioxide and soluble metal compounds.

10.4 Conditions to avoid

Avoid dust formation and contact with strong acids. Avoid high temperatures

10.5 Incompatible materials

Strong acids and oxidising agents (e.g. peroxides, hypochlorites)

10.6 Hazardous decomposition products

The metals does not decompose but may be transformed into other metal forms (e.g. Cu²⁺) –see section 10.3.
May evolve toxic sulphur dioxides.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Information obtained from CLP notification dossier submitted to ECHA (December 2010)

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Toxicity endpoints	Description of effects
Effects	Derived based on CLP Mixture toxicity rules applied on constituents listed under Section 3, taking into account the forms present and assuming release of soluble, potentially bio available ionic species as described in the section bio accessibility
Bio accessibility and read-across	The physical form (solid) and the physico-chemical properties (metal constituents present in mineral forms) limit the solubility of the constituents in biological fluids and results in limited potential for cellular absorption of the constituents. The toxicokinetics are therefore primarily related to the degree to which the metal mineral phases react with biological fluids and release soluble, potentially bioavailable ionic species. The fraction of metals that solubilise under these conditions can be considered as worst case determinant of bio-accessibility of metal constituents, because only solubility in the biological fluid is assessed and the absorption and homeostatic control mechanisms at the level of cells (e.g. intestine and liver) are ignored
Oral (gastric) kinetics	Metal release rates from 11 copper concentrates and 8 minerals, typical for copper concentrates, were assessed from in-vitro bio-solubility tests in gastric fluids (ASTM 55717-07) (Rodriguez et al., 2010). The results consistently demonstrate lower bio accessibility of the metals from the concentrates (consistent with the mineralogical profile) compared to the soluble reference metal compounds (with measured bio accessibility >90% and known hazard profile). For copper, the highest relative oral bio-accessibility values, obtained for the concentrates assessed was 6.5%. For the other elements, the highest relative oral bio-accessibility values, obtained for the concentrates assessed (Ni (11%), As (1.8%), Zn (8.1%), Cd (14%), Co (4.0%), Pb (57%)) are carried forward as read-across parameters for the hazard classification. Read-across procedure: the oral bio-accessibility values are applied to the composition (see section 3.1) to calculate a potential bio-accessible concentration for each metal. To ensure appropriate translation of the classification between the source (soluble metal compounds classified e.g. CuSO ₄ , ZnCl ₂ , CoCl ₂ , NiCl ₂ , CdCl ₂) and the target (bio-accessible Me-ions) an additional molecular weight adjustment is applied.
Inhalation kinetics	Particle size determinations showed that for copper concentrates, the fraction respirable (<10µm) is typically <33 % of the sample. Copper concentrates typically have 7-10% moisture and this will limit dust formation and related inhalation exposure. No lung-fluid bio-elution data are available. The release rates observed in gastric fluids (pH 1.5) are applicable to the fraction being bypassed to the gastro-intestinal tract (particle sizes >10µm). The gastric fluids have a lower pH than inhalation fluids (1.5 versus 4-7.4) and are therefore conservative estimates for the releases in lung fluids. The pH 1.5 gastric bio-elution data are therefore also retained as input into the classification for inhalation exposures.
Dermal kinetics	No bio-elution tests are available for the copper concentrates. The assessment is potentially relevant to Ni and Co (skin sensitizers). Direct read across from NiS and CoS classifications are used.
The Acute toxicity	Based on the information on bio-accessible constituents, the classification criteria are not met. The calculated ATE (oral, dermal and inhalation): >2000 mg/kg bodyweight. The assessment considers additive toxicity calculated from the December 2014 MECLAS tool (http://www.meclas.eu)
Skin corrosion /irritation	From the constituents, the classification criteria are not met because there are no constituents with skin-corrosive properties. Assessed by calculation: November 2014 MECLAS tool (http://www.meclas.eu)
Serious eye damage/irritation	After read-across from Cu to CuO (CuO not classified, the less soluble CuS minerals have not been assessed), the classification criteria are not met because there are no constituents with eye damaging properties. Assessed by calculation: November 2014 MECLAS tool (http://www.meclas.eu)
Sensitisation	Based on the read-across from the elemental composition (% elemental Ni and Co) to NiS and CoS classifications, the classification criteria are not met (<=1% NiS or CoS) Assessed by calculation: November 2014 MECLAS tool (http://www.meclas.eu)
STOT - Single exposure	Based on the information on bio-accessible constituents, the classification criteria are not met. Assessed by calculation: MECLAS tool (http://www.meclas.eu)
STOT - Repeated exposure	Based on the information on bio-accessible constituents, the classification criteria are not met. Assessed by calculation: November 2014 MECLAS tool (http://www.meclas.eu)
Mutagenicity	Based on the information on bio-accessible constituents, the classification criteria are not met. Assessed by calculation: November 2014 MECLAS tool (http://www.meclas.eu)

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Carcinogenicity	Based on the information on bio-accessible constituents, the classification criteria are not met. Assessed by calculation: November 2014 MECLAS tool (http://www.meclas.eu)
Toxicity for reproduction	Based on the information on bio-accessible constituents, the classification criteria are not met. Assessed by calculation: November 2014 MECLAS tool (http://www.meclas.eu)
Aspiration hazard	Based on the information on bio-accessible constituents, the classification criteria are not met. Assessed by calculation: November 2014 MECLAS tool (http://www.meclas.eu)

SECTION 12: ECOLOGICAL INFORMATION

The physical form (solid) and the physico-chemical properties (constituents are poorly soluble in water) limit the solubility of constituents in aquatic environment and subsequently their potential uptake. The toxicity is therefore primarily related to the degree to which the metal mineral phases react with aquatic environment and release soluble, potentially bio available ionic species.

12.1 Acute Toxicity

Acute aquatic toxicity

Based on the information available, the EU classification criteria are not met.
Based on the information available, classify as acute 2 in accordance to GHS, 2011

Assessment summary-acute

Environmental classification

Short term transformation/dissolution tests (7 days, pH 6, loading of 1 and 100 mg/L in the standard aqueous medium) in accordance to a standard protocol (OECD 29) were carried out on 12 selected copper concentrates and 8 minerals (Rodriguez et al, 2010-2012). Relative metal release rates, measured at 1 and 100 mg/L, are usually a bit higher at 1 mg/L than at 100 mg/L

Consistent with the mineralogical profile of copper minerals and copper concentrates, metal release rates (Cu, Zn, Pb, As, Cd, Ni) after acute transformation/dissolution demonstrate lower bioavailability of the metals from the minerals and concentrates compared to the soluble metal compounds with known hazard profile.

The mineral-specific Cu release rates (0.8% Cu for Chalcopyrite, 0.8% for Diginite, 0.9% for covellite, 1.3% Cu for Enargite, 3.4% for Tennantite, 4.4 % Bornite and 9.9% for Chalcocite) and worst case release rates for the other metals (5.0% As, 9.1% Zn, 50% Pb, 7.3% Ni, 9.8% Cd, 12% Co), assessed at mass loadings of 1 mg/L, are applied to the composition (see section 3.1) to calculate the potential concentrations of the metal ions transformed/dissolved in the standard aqueous medium (OECD 29) at 1, 10 and 100mg/l. In accordance to the GHS hazard classification system, the evaluation of the short term aquatic toxicity is accomplished by comparison of (a) the calculate concentrations of the metal ions transformed/dissolved in the standard aqueous medium (OECD 29) at 1, 10 and 100mg/L and (b) the appropriate standard ecotoxicity data as determined from tests carried out with the soluble metal species (acute L(E)C50 values). To derive the aquatic hazard classification, a Toxic Unit (TU) approach was applied assuming additive metal toxicity (in accordance to the GHS guidance for mixtures). The assessment demonstrated that no acute environmental toxicity is observed at a loading of 1 mg/L (TU<1). Environmental toxicity is observed at loadings ≥ 10 mg/l (TU>1). In accordance to GHS 2011, this leads to acute 2 classification entry.

The comparison was done using the November 2014 Meclas tool (<http://www.meclas.eu>)

Chronic aquatic toxicity

Based on the information available, the classification criteria are not met.

Assessment summary-chronic

Long term transformation/dissolution tests (28 days, pH 6, loading of 1 mg/L in the standard aqueous medium), in accordance to a standard protocol (OECD 29), were carried out on 12 selected copper concentrates and 8 minerals (Rodriguez et al, 2010-2012). Consistent with the mineralogical profile of copper minerals and copper concentrates, metal release rates (Cu, Zn, Pb, As, Cd, Ni, Co, Ag) after long term transformation/dissolution demonstrate lower bioavailability of the metals from the concentrates compared to the soluble metal compounds with known hazard profile.

The mineral-specific Cu release rates (0.9% for Chalcopyrite, 2.2% for Enargite 2.2% for covellite, 2.7% for Diginite, 5.8% for Tennantite, 7 % Bornite and 20.9% for Chalcocite) and the worst case release rates for the other metals (14% As, 12% Zn, 53% Pb, 29% Ni, 10% Cd, 30% Co) are applied to the composition (see section 3.1) to calculate the potential concentrations of the metal ions transformed/dissolved in the standard aqueous medium (OECD 29) at 1, 0.1, and 0.01 mg/l. In accordance to the GHS hazard classification system, the evaluation of the long term aquatic toxicity is accomplished by comparison of (a) the calculated concentrations of the metal ions transformed/dissolved in the standard aqueous medium (OECD 29) at 1, 0.1, 0.01 mg/l (loading depending if the metal is rapidly remove) and (b) the appropriate standard eco toxicity data as determined from tests carried out with the soluble metal species (chronic NOEC/EC10 values). To derive the aquatic hazard classification, a Toxic Unit (TU) approach was applied assuming additive metal toxicity (in accordance to the GHS guidance for mixtures). The comparison was done using the December 2014 MECLAS tool (<http://www.meclas.eu>) and demonstrated that the chronic environmental classification criteria are not met.

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12.2 Persistence and degradability

It has been recognized (GHS guidance) that “rapid degradability” as defined for organic substances does not apply to metals. In accordance to GHS 2011, information on changes in metal speciation, absorption, deposition and remobilization in the water-column and sediment have been assessed for copper (Rader et al, 2013), lead, zinc and other single metals (Rader et al, 2013b) and copper concentrates (Rader et al, 2012b).

The model simulations are based on “The Tableau Input Coupled Kinetics Equilibrium Transport Unit World Model for Metals in Lakes” (<http://blog.unitworldmodel.net>), which was developed to address the complexities of metal speciation and its influence on the fate and effects of metals in the environment. The model output was validated with information from laboratory mesocosm and field tests. The assessed showed that at least for “copper, zinc, lead, nickel and cadmium” the information on “removal rates from the water-column, deposition and absence of remobilization” can be considered as equivalent to “rapid degradation” of organic substances.

12.3 Bio accumulative potential

The copper Risk Assessment Report (2008) and REACH Chemical Safety Report (2010) have provided detailed information on (1) the essentiality of copper; (2) the homeostatic control of copper; (3) the mechanisms of action of copper-ions; (4) the comparison between copper toxicity from dietary versus waterborne exposures. From the information it has been concluded that the bio-accumulation criterion does not apply to the essential element copper.

In the zinc risk assessment and chemical safety report (2010), it has been concluded that the bio-accumulation criterion does not apply to the essential element zinc.

No assessment for the other minor metals

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

Not applicable to inorganic substances

12.6 Other adverse effects

Not expected to contribute to ozone depletion, ozone formation, global warming or acidification.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility.

SECTION 14: TRANSPORT INFORMATION-

ADR/AND/RID/IATA :	Not regulated
IMDG :	Not regulated
MARPOL annex V :	Not harmful to the marine environment
IMSBC :	Materials hazardous only in bulk (MHB) - part toxic solid : Not classified
BSCN :	Copper concentrates
Group :	A+B
Class :	Not applicable

SECTION 15: REGULATORY INFORMATION

15.1. Safety, health and environmental regulations/legislation specific for the substance

15.1.1 Worldwide Chemical Inventories

EINECS (EU): not listed	ENCS (Japan): not listed
TSCA (USA): not listed	ECL(Korea): not listed
NDSL(Canada): not listed	PICCS (Philippines): not listed
AICS (Australia):not listed	IECSC(China): not listed

15.1.2 Other regulatory information

Not available

15.2. Chemical safety assessment (CSA)

In accordance with Article 17 and 18 of EU commission regulation N° 1907/2006/EC (REACH), a chemical safety assessment was not required for the UVCB substance.

SECTION 16: OTHER INFORMATION

Data are based on our latest knowledge but do not constitute a guarantee for any specific product features and do not establish a legally valid contractual relationship.

Revised from previous version 0. All the chapters have been reviewed in this version 0.

Abbreviations used

Check www.eurocopper.org or on request via your supplier

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References

Full list of used references can be provided on further request via your supplier.

Disclaimer: Bayhorse Silver Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. Furthermore, this safety data sheet is made up based on the legal requirements as set by EC 1907/2006 (REACH) based on information as is available per December 1, 2010. Further information received following the time scale as foreseen by REACH and the guidance policies as described in the REACH Implementation Programs will be added when it becomes available

Glossary

UVCB substance: CHEMICAL SUBSTANCES OF UNKNOWN OR VARIABLE COMPOSITION, COMPLEX REACTION PRODUCTS AND BIOLOGICAL MATERIAL