Thompson Creek Metals
SAFETY DATA SHEET

MOLYBDENUM DISULFIDE

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

Substance name: Molybdenum Disulfide
Chemical Formula: MoS_2
Synonyms/Trade names of the substance: HPM®, Moly Sulfide, Molybdenum Sulfide
CAS Number: 1317-33-5
EC No.: EC # 215-263-9
REACH Registration: Molybdenum Disulfide is exempt per Annex V.

Product Use: Elevated temperature lubricants in greases, anti-seize compounds, and powders.

Thompson Creek Mine
A Subsidiary of Thompson Creek Metals Company Inc.
P.O. Box 600
Challis, ID 83226

Emergency Source Information:
PRODUCTION: (208) 838-2200
SALES: (303) 761-8801
FAX: (303) 761-7420

CHEMTREC:
Domestic: (800)-424-9300
International: (202) 483-7616 [collect]

SECTION 2: HAZARDS IDENTIFICATION

Description: Odourless, blue-grey to black crystalline power.

Classification:
Not classified under Regulation (EC) No. 1272/2008 (CLP)
Not classified under directive 67/548/EEC
Category 5 Acute toxicity, no symbol, under UN GHS CLP 3rd edition
No physical hazards identified
No environmental hazards identified

Labelling:

Under EC No. 1272/2008 (CLP) and UN GHS CLP

Pictogram: EC CLP, none; UN GHS CLP, none

Signal Word: EC CLP, none; UN GHS CLP, none

Hazard Statement: EC CLP, none; UN GHS, May be harmful if swallowed

Precautionary Statements:

Prevention:

P201 – Obtain special instructions before use.

P202 – Do not handle until all safety precautions have been read and understood

P281 – Use personal equipment as required

P261 - Avoid breathing dust

P264 – Wash hands and face thoroughly after handling

Response:

P314 - Get medical advice/attention if you feel unwell.

P305+P351+P338 – IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do and continue rising.

Storage:

P404 – Store in a closed container

Disposal:

P501 – Dispose of contents/container in accordance with local/regional/national/international regulations

Risk Phrase(s):

None

Safety Phrases:

S 22 - Do not breathe dust.

S 46 – If swallowed, immediately contact a doctor and show this container label.

Other Hazards – None identified

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Substance

Component:	Molybdenum Disulfide
CAS No.:	1317-33-5
EC No.:	215-263-9
Percentage:	Greater than 99

Remainder is made up of multiple trace constituents that do not contribute to classification of this product.

SECTION 4: FIRST AID MEASURES

General Advice:

First-aid responders should wear suitable personal protective equipment (see Section 8) in case of insufficient ventilation or possible inhalation or eye contact. These precautions should be applied to handling any chemical.

First Aid Procedures:

Following Inhalation:
Remove patient from exposure and bring to fresh air. If breathing has stopped, perform artificial respiration and get medical advice/attention immediately.

Following skin contact:
Remove contaminated clothing and shoes. Wash skin with water and soap, and rinse thoroughly until no evidence of chemical remains (approximately 15-21 minutes). Get medical advice/attention.

Following eye contact:
Wash eyes immediately with large amounts of water or normal saline, occasionally lifting upper and lower eyelids, until no evidence of chemical remains (approximately 15-20 minutes). Get medical advice/attention.

After ingestion:
Seek medical advice/attention. If vomiting occurs, keep head lower then hips to prevent aspiration. Do not induce vomiting.

SECTION 5: FIREFIGHTING MEASURES

Extinguishing Media:
Standard extinguishing media such as water, sand, foam. Use fire fighting measures that suit the location and surroundings.

Unsuitable extinguishing media:
None. Use fire fighting measures that suit the location and surroundings.

Special Hazards Arising from the Substance or Mixture:
Thermal decomposition may release toxic and/or hazardous gases of sulphur dioxide and molybdenum trioxide.

Advice for Firefighters:
Wear self-contained breathing apparatus and a fully protective suit and gloves. Dispose of fire debris and contaminated firefighting media in accordance with local regulations. If using water, contain the run-off if possible, for recovery treatment and/or to be disposed of as waste as described in Section 13.

SECTION 6: ACCIDENTAL RELEASE MEASURES

For non-emergency personnel:
No acute hazard. Avoid formation and inhalation of dust. Seek to ensure ventilation that maintains airborne concentrations below Occupational Exposure Limits. Keep unprotected persons away. Although the substance has no acute toxicity, it is advised to avoid contact with skin, eyes, and clothing – wear suitable protective equipment.

For emergency responders:

Avoid formation and inhalation of dust. Seek to ensure ventilation that maintains airborne concentrations below Occupational Exposure Limits. Keep unprotected persons away. Although the substance has no acute toxicity, it is advised to avoid contact with skin, eyes, and clothing – wear suitable protective equipment.

Environmental Precautions:

Although the substance is not classified as dangerous to the environment, it is advised that in the event of an accidental release the product should be prevented from reaching the sewage system or any water course, and from penetrating the ground/soil. Dispose of spilled material in accordance with the relevant local regulations. See Section 13 for disposal considerations.

Methods and Material for Containment and Cleaning Up:

Avoid formation and inhalation of dust. Use an appropriate industrial vacuum cleaner, equipped with ULPA or HEPA filters. Collect spilled material in suitable containers or bags for recovery or disposal. In the case of disposal, spilled material or contaminated material should be disposed of as waste as described in Section 13.

SECTION 7: HANDLING AND STORAGE

Handling Protective Measures:

Avoid formation of dust, inhalation and ingestion. As precautionary general occupational hygiene measure, the wearing of gloves, appropriate protective clothing and equipment, designed to minimize skin contact is suggested for all workplaces.

Advice on general occupational hygiene;

Avoid formation of dust, inhalation and ingestion. Remove contaminated clothing and protective equipment before entering eating areas. Wash hands after handling and prior to eating.

Conditions for Safe Storage, Including any Incompatibilities;

Store in a well-ventilated, dry area. Do not store in open, inadequate, or mislabelled packaging. Observe all federal, state and local regulations when storing or disposing of this substance. Store away from incompatible substances.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Limits: US OSHA PEL

Constituents	Type	Value	Form
Molybdenum, Insoluble	OSHA TWA	15mg/m^3	total dust
		5mg/m^3	resp. dust
	ACGIH	10mg/m^3	

Biological limit values: No biological exposure limits noted for the ingredient(s).

Appropriate engineering controls: Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below

	recommended exposure limits. If no exposure limits are stated, follow the recommended ACGIH exposure limit of 10 mg/m3 for total nuisance dust. Use explosion-proof equipment if high dust/air concentrations are possible**.**
General information:	Use personal protective equipment as required. Personal protective equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment.
Eye/face protection:	Wear splash-proof or dust-resistant safety goggles where there is danger of eye contact.
Skin protection:	
- Hand protection	Employee should wear appropriate protective gloves to prevent contact with this substance.
- Other	Employee should wear appropriate protective clothing and equipment to prevent repeated or prolonged skin contact with this substance.
Respiratory protection:	In case of inadequate ventilation or risk of inhalation of dust, use suitable respiratory equipment with particle filter (type P2). Seek advice from local supervisor.
Thermal hazards:	Wear appropriate thermal protective clothing, when necessary.
Hygiene measures:	Wash hands after handling. Routinely wash work clothing and protective equipment to remove contaminants. Follow up on any medical surveillance requirements.
Environmental exposure controls	Contain spills and prevent releases and observe national regulations on emissions.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

(a) Appearance	Blue-grey to black crystalline powder.
(b) Odour	Odourless.
(c) Odour threshold	Not applicable as odourless.
(d) pH	Not applicable.
(e) Melting point	Approximately 1185 C/2165 F.
(f) Initial boiling point and boiling range	Not applicable.
(g) Flash point	Not applicable.

(h) Evaporation rate	Not applicable.
(i) Flammability (solid, gas)	Not flammable.
(j) Upper/lower flammability or explosive limits	Not explosive.
(k) Vapour pressure	0 kPa @ 20 °C.
(l) Vapour density	Not applicable.
(m) Relative density	4.8 grams/cm^3 at room temp.
(n) Solubility(ies)	Insoluble in water.
(m) Partition Coefficient n-octanol/water	Not applicable to inorganic substances.
(p) Auto-ignition temperature	Will decompose at >315 °C.
(q) Decomposition temperature	Greater than 315 °C where it begins to oxidize to MoO_3 with release of SO_2.
(r) Viscosity	Not applicable.
(s) Explosive properties	Dust clouds of greater than 125 g/m^3 can exceed minimum explosive concentration for micronized material.
(t) Oxidizing properties	None.

SECTION 10: STABILITY AND REACTIVITY

(a) Reactivity	Stable under normal temperatures and pressures
(b) Chemical Stability	Stable at normal conditions.
(c) Possibility of Hazardous Reactions	Hazardous polymerization has not been reported.
(d) Conditions to Avoid	Prevent dispersion of dust in air.
(e) Incompatible Materials	Hydrogen Peroxide- vigorous or violent reaction Oxidizers (Strong) - fire and explosive hazard Potassium Nitrate- forms explosive mixture
(f) Hazardous Decomposition Product	Thermal decomposition may release toxic and/or hazardous gases, SO_2 and molybdenum trioxide.

SECTION 11: TOXICOLOGICAL INFORMATION

Molybdenum Disulfide is very insoluble and relatively inert. Route of entry can be via ingestion or inhalation, and very limited entry via dermal route. Due to the low solubility, orally ingested MoS2 will be eliminated via faeces. Any solubilized Mo will likely be eliminated via renal excretion.

Toxicity data:

Carcinogen Status:	Not a carcinogen.
Acute Toxicity Level:	Insoluble Mo compounds exhibit low toxicity LD50 (rat) >5000 mg/kg. No specific data available for MoS2.
Skin corrosion/irritation	Not irritating/not corrosive to the skin (LD50 (rat) > 16,000 mg/kg.
Serious eye damage/irritation	Not irritating or corrosive to eyes.
Skin sensitization	Not sensitizing to skin.
STOT	There are no specific target organ effects after single exposure to molybdenum substances.
Reproductive toxicity	No reliable studies indicating a reproductive effect.

SECTION 12: ECOLOGICAL INFORMATION

Due to very low solubility, acute and chronic aquatic toxicity is not expected under normal environmental conditions. Extensive toxicological information is available for soluble forms of Mo.

SECTION 13: DISPOSAL CONSIDERATIONS

Waste Treatment Methods:

Observe all federal, state and local regulations when disposing of this substance.

SECTION 14: TRANSPORT INFORMATION

Regulation (Abbreviation)	Regulation (Title)	Transport Classification
ADR	European Agreement concerning the International Carriage of Dangerous Goods by **Road**	None
RID	Regulations concerning the International Carriage of Dangerous Goods by **Rail**	None
ADN	European Agreement concerning the International Carriage of Dangerous Goods by **Inland Waterways**	None
IMDG	International **Maritime** Dangerous Goods	None
IATA	Technical Instructions for the Safe Transport of Dangerous Goods by **Air**	None
USDOT	49 CFR addressing Transportation of Hazardous Substances	None
Canada	Canadian Transportation of Dangerous Goods	None

UN Number None, Not Dangerous for Transport.

UN Proper Shipping Name	None, Not Dangerous for Transport
Transport Hazard Class (es)	None, Not Dangerous for Transport
Packing Group	None, Not Dangerous for Transport
Environmental Hazards	None, Not Dangerous for Transport
Special Precautions for User	None, Not Dangerous for Transport
Transport in Bulk According to Annex II of MARPOL 73/78 and the IBC Code	None.

SECTION 15: REGULATORY INFORMATION

TSCA STATUS:	Y
OTHER REGULATORY INFORMATION AVAILABLE:	
CERCLA SECTION 103 (40 CFR 302.4):	N
SARA SECTION 302 (40 CFR 355.30):	N
SARA SECTION 304 (40 CFR 355.40):	N
SARA SECTION 313 (40 CFR 372.65):	N
OSHA PROCESS SAFETY (29 CFR 1910.119):	N
CALIFORNIA PROPOSITION 65:	N
SARA HAZARD CATEGORIES, SARA SECTIONS 311/312 (40 CFR 370.21):	
ACUTE HAZARD:	N
CHRONIC HAZARD:	N
FIRE HAZARD:	N
REACTIVITY HAZARD:	N
SUDDEN RELEASE HAZARD:	N

Molybdenum Disulfide in not a persistent organic pollutant, not an ozone depleting substance and not listed as a SEVESCO substance.

SECTION 16: OTHER INFORMATION

Reason for Change: to comply with new SDS format and UN GHS SDS guidelines.

No warranty is made, either express or implied. The information contained on this safety data sheet is offered in good faith as accurate. We have reviewed the information and believe it to be correct but cannot guarantee its accuracy or completeness. Some individuals and/or situations may require health and safety precautions not included on this data sheet. It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations.