

LEAD CONCENTRATE SAFETY DATA SHEET

SECTION 1. IDENTIFICATION

Product Identity: Pend Oreille Lead Concentrate.

Trade Names and Synonyms: Lead Concentrate.

Manufacturer:

Teck Washington Incorporated
Pend Oreille Mine
1382 Pend Oreille Mine Road
P.O. Box 7
Metaline Falls, WA 99153
Emergency Telephone: (250) 364-4214

Supplier:

Teck Washington Incorporated
Pend Oreille Mine
1382 Pend Oreille Mine Road
P.O. Box 7
Metaline Falls, WA 99153

Preparer:

Teck Metals Ltd.
Suite 3300 – 550 Burrard Street
Vancouver, British Columbia
V6C 0B3

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Product Use: Lead concentrate is used in the production of lead metal and lead alloys.

SECTION 2. HAZARDS IDENTIFICATION

CLASSIFICATION:

Health	Physical	Environmental
Acute Toxicity (Oral, Inhalation) – Does not meet criteria Skin Corrosion/Irritation – Does not meet criteria Eye Damage/Eye Irritation – Does not meet criteria Respiratory or Skin Sensitization – Does not meet criteria Mutagenicity – Does not meet criteria Carcinogenicity – Category 1 Reproductive Toxicity – Category 1A Specific Target Organ Toxicity: Acute Exposure – Does not meet criteria Chronic Exposure – Does not meet criteria	Does not meet criteria for any Physical Hazard	Aquatic Toxicity – Long Term (Chronic) – Category 2

LABEL:

<p>Symbols:</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>	<p>Signal Word:</p> <p style="text-align: center;">DANGER</p>
<p style="text-align: center;"><u>Hazard Statements</u></p> <p>DANGER! May damage fertility or the unborn child. May cause cancer. Toxic to aquatic life with long lasting effects.</p>	<p style="text-align: center;"><u>Precautionary Statements:</u></p> <p>Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves and protective clothing. Avoid release to the environment. Collect spillage. If exposed or concerned: get medical advice/attention.</p>

Emergency Overview: A dark black-grey, heavy, soil-like material that is not flammable or combustible under normal conditions of transport and storage. However, when heated strongly in air it will burn, releasing toxic and irritating sulfur dioxide gas as well as possible lead and zinc oxide fumes. Contact with strong acids will generate flammable and highly toxic hydrogen sulfide gas (H₂S). Possible cancer hazard due to lead and silica content. Possible reproductive hazard due to lead content. SCBA and full protective clothing required for fire emergency response personnel, especially due to the potential for release of highly irritating SO₂ gas in a fire situation.

Potential Health Effects: *Caution: The toxicological properties of this material have not been fully investigated. The information contained in this SDS is therefore based on information in the technical and scientific literature about the material's constituent compounds.*

Inhalation or ingestion of large quantities of concentrate dust may result in lead absorption and possible lead intoxication. Symptoms include headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia and leg, arm, and joint pain. Prolonged exposure may also cause central nervous system damage (e.g., fatigue, headaches, tremors, hypertension), gastrointestinal disturbances, anemia, kidney dysfunction and possible reproductive effects. Pregnant women should be protected from excessive exposure to prevent lead crossing the placental barrier and causing infant neurological disorders. Lead and lead compounds are listed as an *A3 Carcinogen (Confirmed Animal Carcinogen with Unknown Relevance to Humans)* by the ACGIH. IARC has listed lead compounds as *Group 2A Carcinogens (Probably Carcinogenic to Humans)*. The NTP has listed lead and lead compounds as *Reasonably Anticipated to be a Human Carcinogen*. OSHA does not currently list lead as a human carcinogen. Silica is classified as an *A2 Carcinogen* by the ACGIH and as a *Group 1 Carcinogen* by IARC (see Toxicological Information, Section 11).

Potential Environmental Effects: Lead concentrate is relatively insoluble in water and its constituent metals have low direct bioavailability. However, extended exposure in aquatic and terrestrial environments can lead to the release of constituent metals in bioavailable forms, which may result in toxicity to organisms in these environments.

SECTION 3. COMPOSITION / INFORMATION ON INGREDIENTS

HAZARDOUS COMPONENTS	CAS Registry No.	CONCENTRATION (% wgt/wgt)
Lead Sulfide	1314-87-0	23 – 70%
Zinc Sulfide	1314-98-3	1.5 - 4.5%
Iron Sulfide	1317-37-9	20 – 90%
Silica	14808-60-7	0.1 to 0.2%

Note: See Section 8 for Occupational Exposure Guidelines.

SECTION 4. FIRST AID MEASURES

Eye Contact: *Symptoms:* Eye irritation, redness. Gently brush product off face if necessary. Do not rub eye(s). Let the eye(s) water naturally for a few minutes. Look right and left, then up and down. If particle/dust does not dislodge, cautiously rinse eye(s) with lukewarm, gently flowing water for 5 minutes or until particle/dust is removed, while holding eyelid(s) open. If irritation persists, get medical advice/attention. DO NOT attempt to manually remove anything stuck to the eye.

Skin Contact: *Symptoms:* Skin soiling, mild irritation. Wash gently and thoroughly with lukewarm, gently flowing water and non-abrasive soap for 5 minutes, or until product is removed. If skin irritation occurs or you feel unwell, get medical advice/attention.

Inhalation: *Symptoms:* Respiratory irritation. Remove source of exposure or move person to fresh air and keep comfortable for breathing. Seek medical attention if you feel unwell.

Ingestion: *Symptoms:* Stomach upset. If you feel unwell or are concerned, get medical advice/attention.

SECTION 5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Product is not considered a fire or explosion hazard. However, concentrate will burn if heated strongly in a fire situation, releasing toxic and irritating sulfur dioxide gas (SO₂). Contact with strong acids will generate flammable and highly toxic hydrogen sulfide gas (H₂S). The ignition temperature of lead concentrate is approximately 500 – 600°C.

Extinguishing Media: Use any means of extinction appropriate for surrounding fire conditions such as water spray, carbon dioxide, dry chemical, or foam.

Fire Fighting: Toxic fumes of sulfur dioxide will result from combustion. Fire fighters must be fully trained and wear full protective clothing including an approved, self-contained breathing apparatus which supplies a positive air pressure within a full facepiece mask.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup: Control source of spillage if possible to do so safely. Restrict access to the area until completion of clean-up. Clean up spilled material immediately, observing precautions in Section 8, Personal Protection and using methods that will minimize dust generation (e.g., vacuum solids, dampen material and shovel or wet sweep). Return uncontaminated spilled material to the process if possible. Place contaminated material in suitable labeled containers for recovery or disposal. Treat or dispose of waste material in accordance with all local, regional, and national requirements.

Personal Precautions: Persons responding to an accidental release should wear coveralls or other protective clothing, gloves and a respirator (see also Section 8). Close-fitting safety goggles may be necessary in some circumstances to prevent eye

contact with dust. Workers should wash and change clothing following cleanup of a spill to prevent personal contamination with lead-containing dust.

Environmental Precautions: The handling, shipment, storage and processing of this material requires appropriate controls and care to prevent spillage or gradual accumulation in terrestrial and aquatic environments. Spilled material should be promptly cleaned up.

SECTION 7. HANDLING AND STORAGE

Precautions for Safe Handling: Some sulfide concentrates may slowly oxidize in storage and generate sulfur 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. Avoid excessive heat. Avoid contact with acids, oxidizers and combustible materials. Minimize dust generation and accumulation.

Conditions for Safe Storage: Store in a cool, dry area.

Autoignition: Some sulfide concentrates may oxidize and generate heat which accumulates in storage piles. If material is to be stored for an extended period, the temperature of piles should be monitored.

Means of Control: If heating of the concentrate is detected, the material should be sealed from air or oxygen in one of the following ways:

1. Leave the piles totally intact, do not open them up or try to spread them around.
2. Tamp or compact the surface of the piles.
3. Spray the pile with water. Resort to an organic binder only if needed because it can cause formation of hard lumps and subsequent problems for processing. Suggestions for organic binders include Aerospray 70A Binder, Coherex, Igepal CA-720 and lignin sulphonate, a pulp mill by-product.
4. For smaller piles, cover them with a tarp that will prevent exposure of the material to air.
5. If inside a building or ship's hold, keep all doors closed as much as possible.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Guidelines: (*Time-Weighted Average (TWA) concentration over 8 hr unless otherwise indicated*)

<u>Component</u>	<u>ACGIH TLV</u>	<u>OSHA PEL</u>	<u>NIOSH REL</u>
Lead Sulfide	0.05 mg Pb/m ³	0.05 mg Pb/m ³	0.05 mg Pb/m ³
Zinc Sulfide	None Established*	None Established*	None Established*
Iron Sulfide	None Established*	None Established*	None Established*
Silica	0.025 mg/m ³ Respirable SiO ₂	4.5 mg/m ³ (respirable dust)** 13 mg/m ³ (total dust)**	0.05 mg/m ³ (respirable SiO ₂)

NOTE: OEGs for individual jurisdictions may differ from those given above. Check with local authorities for the applicable OEGs in your jurisdiction.

ACGIH - American Conference of Governmental Industrial Hygienists; OSHA - Occupational Safety and Health Administration; NIOSH - National Institute for Occupational Safety and Health. TLV – Threshold Limit Value, PEL – Permissible Exposure Limit, REL – Recommended Exposure Limit.

* - While there are no established OELs for zinc sulfide and iron sulfide as such, there are OELs for their respective oxides, which may be formed during burning, welding or other fuming processes. The OSHA PEL for zinc oxide dust is 15 mg/m³ (total) and 5 mg/m³ (respirable); the OSHA PEL for zinc oxide fume is 5 mg/m³. The ACGIH TLV for zinc oxide is 2 mg/m³ (respirable fraction) with a Short Term Exposure Limit (STEL) of 10 mg/m³ (respirable fraction). The NIOSH REL for zinc oxide (dust or fume) is 5 mg/m³ 10 hr TWA with a 15 mg/m³ ceiling for zinc oxide dust and a 10 mg/m³ STEL for zinc oxide fume (15 min. sample).

The OSHA PEL for iron oxide fume is 10 mg/m³. The NIOSH REL for iron oxide dust and fume is 5 mg/m³ (as Fe) and the ACGIH TLV is 5 mg/m³ of iron oxide dust/fume (respirable fraction).

** – The OSHA PEL for silica applies to the total airborne lead concentrate dust concentration and has been calculated based on the maximum percent SiO₂ in the sample using the formulas: Respirable Dust PEL = 10 mg/m³/(%SiO₂ + 2); Total Dust PEL = 30 mg/m³/(%SiO₂ + 2).

NOTE: The selection of the necessary level of engineering controls and personal protective equipment will vary depending upon the conditions of use and the potential for exposure. The following are therefore only general guidelines that may not fit all circumstances. Control measures to consider include:

Ventilation: Use adequate local or general ventilation to maintain the concentration of lead concentrate dust in the working environment well below the appropriate occupational exposure limit. Supply sufficient replacement air to make up for air removed by the exhaust system.

Protective Clothing: Coveralls or other work clothing and gloves are recommended to prevent prolonged or repeated direct skin contact. Work clothing should be removed immediately if it becomes heavily contaminated and should be changed daily and laundered before reuse if there is reasonable probability that the clothing may be contaminated.

Respirators: Where lead concentrate dust is generated and cannot be controlled to within acceptable levels by engineering means, use appropriate NIOSH-approved respiratory protection equipment (a 42CFR84 Class N, R or P-100 particulate filter cartridge).

General Hygiene Considerations: Avoid breathing dust. Always practice good personal hygiene. Refrain from eating, drinking, or smoking in work areas. Thoroughly wash hands after handling and before eating, drinking, or smoking in appropriate designated areas only.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Dark black-grey, fine powder	Odour: Weak organic odour from entrained flotation reagents	Odour Threshold: Not Available	pH: 7.5 to 8.5
Vapour Pressure: Negligible @ 20°C	Vapour Density: Not Applicable	Melting Point/Range: Will burn first unless in an inert atmosphere	Boiling Point/Range: Not Applicable
Relative Density (Water = 1): 3.5 (Bulk Sp. Gr.)	Evaporation Rate: Not Applicable	Coefficient of Water/Oil Distribution: Not Applicable	Solubility: Essentially insoluble
Flammability Non-combustible solid.	Flammable Limits (LEL/UEL): Not Applicable.	Auto-ignition Temperature: Not Applicable.	Decomposition Temperature: Not Available.
Percent Volatiles: 9 – 12% (moisture)			

SECTION 10. STABILITY AND REACTIVITY

Stability & Reactivity: Material is stable and not considered reactive under normal temperatures and pressures. Hazardous polymerization or runaway reactions will not occur.

Incompatibilities: Reacts violently with iodine pentachloride. Incompatible with iodine monochloride, hydrogen peroxide, strong oxidizers, and strong acids.

Hazardous Decomposition Products: May release highly toxic and flammable hydrogen sulfide gas on contact with strong acids. This material can decompose at high temperatures forming toxic and irritating sulfur dioxide gas as well as lead and zinc oxides.

SECTION 11. TOXICOLOGICAL INFORMATION

General: In the powder form in which this product is sold, the metals are present as sulfides that are relatively insoluble and poorly absorbed within the body. However, high temperature operations such as oxy-acetylene cutting, electric arc welding or arc-air gouging on dust-contaminated surfaces will generate highly toxic lead oxide fume that also contains some zinc oxide. These oxides are highly soluble in body fluids and the particle size of the metal fumes is largely within the respirable size range, which increases the likelihood of inhalation and deposition of the fume within the body. The primary route of exposure would be through inhalation of metal oxide fumes, composed principally of lead oxide and including some zinc oxide as well.

NOTE: The toxicological properties of this material have not been fully investigated. The information contained in this SDS is therefore based on information in the technical and scientific literature about the material's constituent compounds.

Acute:

Skin/Eye: Contact with dust or fume may cause local irritation but would not cause tissue damage.

Inhalation: Exposure to dust or fume is irritating to the nose, throat and respiratory tract with dryness and irritation of the nose and throat, tightness of the chest, coughing and metallic taste. It may cause headache, as well as gastrointestinal disturbances with nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia, and pain in legs, arms, and joints. An intense, short-term exposure to welding/burning fumes could cause congestion and pulmonary edema as well as acute encephalopathy with seizures, coma, and death. However, short-term exposures of this magnitude are unlikely in industry today.

TRANSPORT CANADA AND U.S. DOT
PRODUCT IDENTIFICATION NUMBER UN3077
MARINE POLLUTANT Yes
IMO IMSBC Code CLASSIFICATION MHB - Materials Hazardous Only in Bulk, Group A and B
IMO MARPOL V Classification: Harmful to the Marine Environment

SECTION 15. REGULATORY INFORMATION

U.S.

INGREDIENTS LISTED ON TSCA INVENTORY Yes

HAZARDOUS UNDER HAZARD COMMUNICATION STANDARD..... Lead Sulfide.....Yes
SilicaYes

CERCLA SECTION 103 HAZARDOUS SUBSTANCES Lead Sulfide.....Yes ... RQ: 10 lbs. (4.54 kg.)
Zinc Compounds.....Yes ... RQ: None assigned

EPCRA SECTION 302 EXTREMELY HAZARDOUS SUBSTANCE None of the ingredients qualify

EPCRA SECTION 311/312 HAZARD CATEGORIES..... Delayed (Chronic) Health Hazard - Carcinogen
Delayed (Chronic) Health Hazard – Reproductive Toxin

EPCRA SECTION 313 TOXIC RELEASE INVENTORY:..... Lead Compounds (Lead Sulfide)
CAS No 1314-87-0
Percent by Weight: 23 to 70%

Zinc Compounds (Zinc Sulphide)
CAS No 1314-98-3
Percent by Weight: 1.5 to 4.5%

SECTION 16. OTHER INFORMATION

Date of Original Issue: January 27, 2004 **Version:** 01

Date of Latest Revision: September 10, 2018 **Version:** 09

The information in this Safety Data Sheet is based on the following references:

- American Conference of Governmental Industrial Hygienists, 2004, Documentation of the Threshold Limit Values and Biological Exposure Indices, Seventh Edition plus updates.
- American Conference of Governmental Industrial Hygienists, 2018, Guide to Occupational Exposure Values.
- American Conference of Governmental Industrial Hygienists, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices - 2018.
- Bretherick's Handbook of Reactive Chemical Hazards, 20th Anniversary Edition. (P. G. Urben, Ed.) 1995.
- Canadian Centre for Occupational Health and Safety (CCOHS), Hamilton, ON, CHEMINFO Record No. 608 Lead (Rev. 2009-05).
- Canadian Centre for Occupational Health and Safety (CCOHS), Hamilton, ON, CHEMINFO Record No. 548 – Zinc (Rev. 2009-05).
- European Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures, amending and repealing directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 (REACH).
- Health Canada, SOR/2015-17, Hazardous Products Regulations, 11 February 2015.
- International Agency for Research on Cancer (IARC), Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, 1972 – present, (multi-volume work), World Health Organization, Geneva.
- International Chemical Safety Cards (WHO/IPCS/ILO), ICSC:0052 – Lead, ICSC 0208 – Zinc Oxide.
- Merck & Co., Inc., 2001, The Merck Index, An Encyclopedia of Chemicals, Drugs, and Biologicals, 13th Edition.
- National Library of Medicine, National Toxicology Information Program, Hazardous Substance Data Bank (HSDB) online.
- Patty's Toxicology; 5th Edition, 2001, Bingham, Cohnsen & Powell, Editors.
- U.S. Department of Health and Human Services, National Institute of Environmental Health Sciences, National Toxicology Program (NTP), 14th Report on Carcinogens, November 2016.
- U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Update Toxicological Profile for Lead.
- U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Update Toxicological Profile for Zinc.
- U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health, NIOSH Pocket Guide to Chemical Hazards. CD-ROM Edition September 2005.
- U.S. Occupational Safety and Health Administration, 1989, Code of Federal Regulations, Title 29, Part 1910.1000 and Part 1910.1200.

Acronyms not spelled out elsewhere in the SDS:

CAS: Chemical Abstract Service

CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act

DOT: Department of Transportation

EPCRA: Emergency Planning and Community Right-to-Know Act

IMO: International Maritime Organization

LD50 LC50: Lethal Dose 50%, Lethal Concentration 50%

TSCA: Toxic Substances Control Act

Wt.: Weight

Notice to Reader

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