

HIGH LEAD INGOT MATERIAL SAFETY DATA SHEET

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product Identity: This MSDS applies to the following grades of High Lead Ingot & Low Alpha High Lead Ingot:

- High Lead Ingot 90 (90% Pb/Balance Tin)
- High Lead Ingot 95 (95% Pb/Balance Tin)
- High Lead Ingot 97 (97% Pb/Balance Tin)

Manufacturer:

Teck Metals Ltd.
Trail Operations
Trail, British Columbia
V1R 4L8
Emergency Telephone: 250-364-4214

Supplier:

Teck Advanced Materials Inc.
13670 Danielson Street
Suite H & I
Poway, CA 92064

MSDS Preparer:

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

Date of Last MSDS Revision/Edit: June 1, 2009.

Product Use: Production of high lead metal powders, manufacture of electronic devices.

SECTION 2. COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous Ingredients	Approximate Percent by Weight	CAS Number	Occupational Exposure Limits (OELs)	LD ₅₀ /LC ₅₀ Species and Route	
Lead	90 – 97%	7439-92-1	OSHA PEL ACGIH TLV NIOSH REL	0.05 mg/m ³ 0.05 mg/m ³ <0.10 mg/m ³	No Data
Tin	3 – 10%	7440-31-5	OSHA PEL ACGIH TLV NIOSH REL	2.0 mg/m ³ 2.0 mg/m ³ 2.0 mg/m ³	No Data

NOTE: OELs for individual jurisdictions may differ from OSHA PELs. Check with local authorities for the applicable OELs in your jurisdiction. OSHA - Occupational Safety and Health Administration; ACGIH - American Conference of Governmental Industrial Hygienists; NIOSH - National Institute for Occupational Safety and Health. OEL – Occupational Exposure Limit, PEL – Permissible Exposure Limit, TLV – Threshold Limit Value, REL – Recommended Exposure Limit.

The OSHA PEL final rule limits for tin, inorganic compounds (except oxides) (as Sn) is 2 mg/m³. Note that the OSHA PEL final rule limits are currently non-enforceable due to a court decision. The OSHA PEL transitional limits therefore remain in force at present. The transitional PEL is also 2 mg/m³ and the NIOSH REL for tin and inorganic tin compounds (except tin oxide) is 2 mg/m³.

Trade Names and Synonyms: None.

SECTION 3. HAZARDS IDENTIFICATION

Emergency Overview: A bluish-white to silvery-grey heavy, soft metal that does not burn in bulk. Finely-divided lead dust clouds are a moderate fire hazard and moderate explosion hazard, however, when exposed to heat, flames or powerful oxidizers. The alloy contains 90 - 97% lead and fumes generated in a fire situation present the risk of lead inhalation and absorption. Inhalation or ingestion of lead dust or fume may produce both acute and chronic health effects. Possible cancer and reproductive hazard. SCBA and full protective clothing required for fire emergency response personnel.

Potential Health Effects: Inhalation or ingestion of lead dust or fumes may result in headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemias and leg, arm, and joint pain. Prolonged exposure may also cause central nervous system damage, hypertension, gastrointestinal disturbances, anemia, kidney dysfunction and possible reproductive effects. Pregnant women should be protected from excessive exposure in order 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)* while lead metal is listed as *Group 2B (Possibly Carcinogenic to Humans)*. The

NTP has recently listed lead and lead compounds as *Reasonably Anticipated to be a Human Carcinogen*. OSHA and the EU do not currently list lead as a human carcinogen. (see Toxicological Information, Section 11)

Potential Environmental Effects: Lead compounds are not particularly mobile in the aquatic environment but can be toxic to organisms, especially fish, at low concentrations. Water hardness, pH and dissolved organic carbon content are factors which regulate the degree of toxicity. In soil, lead is generally not very mobile or bioavailable as it can become strongly sorbed on soil particles, increasingly so over time, to a degree dependent on soil properties. Lead bioaccumulates in plants and animals in both the terrestrial and aquatic environments (see Ecological Information, Section 12).

EU Risk Phrase(s): R61 - May cause harm to the unborn child; R62 - Possible risk of impaired fertility; R20/22 - Harmful by inhalation and if swallowed; R33 - Danger of cumulative effects.

SECTION 4. FIRST AID MEASURES

Eye Contact: Do not allow victim to rub eye(s). Let the eye(s) water naturally for a few minutes. If particle/dust does not dislodge, flush with lukewarm, gently flowing water for 5 minutes or until particle/dust is removed, while holding eyelid(s) open. If irritation persists, immediately obtain medical attention. DO NOT attempt to manually remove anything stuck to the eye.

Skin Contact: *Dust:* Remove contaminated clothing, shoes and leather goods (e.g. watchbands, belts). Quickly and gently blot or brush away excess chemical. Wash gently and thoroughly with lukewarm gently flowing water and non-abrasive soap for 5 minutes. If irritation persists, repeat flushing. Obtain medical advice. Completely decontaminate clothing, shoes and leather goods before reuse or else discard. *Molten Metal:* Flush contact area to solidify and cool but do not attempt to remove encrusted material or clothing. Cover burns and seek medical attention immediately.

Inhalation: Remove victim from exposure area to fresh air immediately. If breathing has stopped, trained personnel should begin artificial respiration. Medical oxygen may be administered by trained personnel, where breathing is difficult. If the heart has stopped, immediately start cardiopulmonary resuscitation (CPR), or automated external defibrillation (AED). Quickly transport victim to an emergency care facility.

Ingestion: Never give anything by mouth if victim is rapidly losing consciousness, or is unconscious or convulsing. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. Have victim drink 2 – 8 oz. (60 – 240 ml) of water. If vomiting occurs naturally, have victim rinse mouth with water again. Obtain medical advice and bring a copy of this MSDS.

SECTION 5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Massive metal is not flammable or combustible. Finely-divided dust or powder is a moderate fire hazard and moderate explosion hazard when dispersed in the air at high concentrations and exposed to heat, flame, or other ignition sources. Explosions may also occur upon contact with certain incompatible materials (see Stability and Reactivity, Section 10).

Extinguishing Media: Use any means of extinction appropriate for surrounding fire conditions such as water spray, carbon dioxide, dry chemical, or foam. Do not use direct water streams on fires where molten metal is present.

Fire Fighting: If possible, move material from fire area and cool material exposed to flame. Highly toxic lead oxide fumes may evolve in a fire. 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.

Flashpoint and Method: Not Applicable.

Upper and Lower Flammable Limit: Not Applicable.

Autoignition Temperature: Not Applicable.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup: Material is recyclable. 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. Molten metal should be allowed to solidify before cleanup. If solid metal, wear gloves, pick up and return to process. If dust, wear recommended personal protective equipment and use methods which will minimize dust generation (e.g., vacuum solids). Return uncontaminated spilled material to the process if possible. Place contaminated material in suitable labelled 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 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. Where molten metal is involved, wear heat-resistant gloves and suitable clothing for protection from hot-metal splash as well as a

respirator to protect against inhalation of lead fume. Workers should wash and change clothing following cleanup of a spill to prevent personal contamination with lead-containing dust.

Environmental Precautions: In the form it is sold, this product does not pose an immediate ecological hazard. However, its processing or extended exposure in the aquatic and terrestrial environments may lead to the release of its contained metals in bioavailable forms. Contamination of water, soil and air should be prevented.

SECTION 7. HANDLING AND STORAGE

Store in a dry, covered area away from strong acids, other incompatible materials and food or feedstuffs. Use with adequate ventilation. Solid metal that is suspected of containing moisture should be THOROUGHLY DRIED before being added to a molten bath. Otherwise, entrained moisture could expand explosively and spatter molten metal out of the bath. Always follow good industrial hygiene and housekeeping practices. Do not eat, drink or smoke while working with this material. Thoroughly wash hands before eating, drinking or smoking in appropriate, designated areas and also at the end of the workday. No special packaging materials are required.

EU Safety Phrase(s): S53 - Avoid exposure - obtain special instructions before use; S45 - In case of accident, or if you feel unwell, seek medical advice immediately (show the label where possible); S37/39 – Wear suitable gloves and eye/face protection.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Protective Clothing: Gloves and shop coat or other work clothing with long sleeves are recommended to prevent prolonged or repeated direct skin contact when this product is processed. Appropriate eye protection should be worn where fume or dust is generated. Where hot or molten metal is handled, heat resistant gloves, goggles or face shield, and clothing to protect from hot metal splash should be worn. Safety type boots are recommended.

Do not eat, drink or smoke in work areas. Thoroughly wash hands before eating, drinking, or smoking in appropriate, designated areas and also at the end of the workday. A double locker-shower system with separate clean and dirty sides is usually required for lead handling operations. Remove contaminated clothing promptly and discard or launder before reuse. Inform laundry personnel of contaminants' hazards. Workers should not take dirty work clothes home and launder them with other personal clothing.

Ventilation: Use adequate local or general ventilation to maintain the concentration of lead fumes in the work environment well below recommended occupational exposure limits. Supply sufficient replacement air to make up for air removed by the exhaust system. Local exhaust is recommended for melting, casting, grinding, burning, and use of powders.

Respirators: Where lead and tin dust or fumes are 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). When exposure levels are obviously high but the actual concentration is unknown, a self-contained breathing apparatus which supplies a positive air pressure within a full facepiece mask should be worn.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Malleable, bluish-white or silvery-grey metal	Odour: None	Physical State: Solid	pH: Not Applicable
Vapour Pressure: 1 mmHg @ 973°C (Lead) (negligible at ambient)	Vapour Density: Not Applicable	Boiling Point/Range: 1740°C (Lead)	Freezing/Melting Point/Range: 216 – 232°C
Specific Gravity: Approx. 11	Evaporation Rate: Not Applicable	Coefficient of Water/Oil Distribution: Not Applicable	Odour Threshold: None
Solubility: Insoluble in water			

SECTION 10. STABILITY AND REACTIVITY

Stability & Reactivity: Massive metal is stable and not considered reactive under normal temperatures and pressures. Fresh cut or cast lead surfaces tarnish rapidly due to the formation of an insoluble protective layer of basic lead carbonate.

Incompatibilities: Lead metal reacts vigorously with strong oxidizers, such as hydrogen peroxide or chlorine trifluoride, and active metals such as sodium, potassium, lithium and calcium. Powdered lead metal in contact with disodium acetylide, chlorine trifluoride, sodium carbide or fused ammonium nitrate poses a risk of explosion. Solutions of sodium azide in contact with lead

can form lead azide, which is a detonating compound. Avoid spark, open flames or other potential sources of ignition in dusty conditions.

Hazardous Decomposition Products: High temperature operations such as oxy-acetylene cutting and electric arc welding or overheating a molten metal bath will generate highly toxic lead oxide fumes. Lead oxide is 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.

SECTION 11. TOXICOLOGICAL INFORMATION

General: The major route of exposure is inhalation of fumes generated from high temperature processing. Lead accumulates in bone and body organs once it enters the body. Elimination from the body is slow. Initial and periodic medical examinations are advised for persons repeatedly exposed to levels above the exposure limits of lead.

Acute:

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

Inhalation: Exposure to dust or fume may cause respiratory irritation and headache, nausea, vomiting, abdominal pain, fatigue, sleep disturbances, weight loss, anemia and pain in legs, arms, and joints. An acute, short-term dose of lead could cause acute encephalopathy with seizures, coma, and death. However, short-term exposure of this magnitude is unlikely in industry today. Kidney damage, as well as anemia, can occur from extreme acute exposures.

Ingestion: May cause headache, nausea, vomiting, dizziness and/or gastrointestinal irritation. Kidney damage, as well as anemia, can occur from extremely high acute doses of lead. Other health effects such as metallic taste in the mouth and constipation or bloody diarrhea might also be expected to occur.

Chronic:

Lead can be harmful when ingested or inhaled. Overexposure to lead can cause lead poisoning, which is characterized by fatigue, sleep disturbance, headache, aching bones and muscles, constipation, abdominal pains, decreased appetite, tremors and hypertension. These symptoms are reversible and complete recovery is possible. However, continued over-exposure to lead can lead to increased symptoms and chronic systemic disorders. The kidneys, blood, gastrointestinal tract, and central nervous systems can be adversely affected by concentrations of lead in the body. Chronic over-exposure to lead has been implicated as a causative agency for the impairment of male and female reproductive capacity. Pregnant women should be protected from excessive exposure to prevent lead crossing the placental barrier and causing infant neurological disorders. Teratogenic and mutagenic effects from exposure to lead have been reported in some studies but not in others. The literature is inconsistent and no firm conclusions can be drawn at this time. 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)* while lead metal is listed as *Group 2B (Possibly Carcinogenic to Humans)*. The NTP has recently listed lead and lead compounds as *Reasonably Anticipated to be a Human Carcinogen*. OSHA and the EU do not currently list lead as a human carcinogen.

SECTION 12. ECOLOGICAL INFORMATION

This alloy does not pose an immediate ecological hazard but its processing or extended exposure in the aquatic and terrestrial environments may lead to the release of its contained metals in bioavailable forms. Lead compounds are not particularly mobile in the aquatic environment but can be toxic to organisms, especially fish, at low concentrations. Water hardness, pH and dissolved organic carbon content are factors which regulate the degree of toxicity. In soil, lead is generally not very mobile or bioavailable as it can become strongly sorbed on soil particles, increasingly so over time, to a degree dependent on soil properties. Lead bioaccumulates in plants and animals in both the terrestrial and aquatic environments.

Tin compounds have similar geochemical and ecological properties to those of lead but are considerably less toxic to aquatic and terrestrial organisms.

SECTION 13. DISPOSAL CONSIDERATIONS

If material cannot be returned to process or salvage, dispose of only in accordance with applicable local, regional and national regulations.

SECTION 14. TRANSPORT INFORMATION

Transport Canada and U.S. DOT Classification..... Not a regulated product in ingot form.
Product Identification Number..... Not applicable
Marine Pollutant..... No
IMO Classification..... Not regulated.

SECTION 15. REGULATORY INFORMATION

U.S.:

Ingredients Listed on TSCA Inventory..... Yes
Hazardous Under Hazard Communication Standard Yes
CERCLA Section 103 Hazardous Substances Lead.....RQ: 10lb. (4.54kg.)*
* reporting not required when diameter of the pieces of solid metal released is equal to or exceeds 100 micrometers.
EPCRA Section 302 Extremely Hazardous Substance No 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 (Supplier Notification):
Lead.....CAS No. 7439-92-1
Percent by Weight: At least 90%

CANADIAN:

Ingredients Listed on DSL:..... Yes
WHMIS Classification:..... D2A - Materials Causing other Toxic Effects - Very Toxic

EUROPEAN UNION:

Ingredients Listed on the European Inventory
of Existing Commercial Chemical Substances (EINECS): Yes
EU Classification:..... Category 1 and 3 Reproductive Toxin, Harmful.

SECTION 16. OTHER INFORMATION

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

- American Conference of Governmental Industrial Hygienists, 2007, Documentation of the Threshold Limit Values and Biological Exposure Indices, Seventh Edition plus updates.
- American Conference of Governmental Industrial Hygienists, 2007, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.
- American Conference of Governmental Industrial Hygienists, 2007. Guide to Occupational Exposure Values.
- Bretherick's Handbook of Reactive Chemical Hazards, 20th Anniversary Edition. (P. G. Urban, Ed), 1995.
- Commission de la santé et la sécurité du travail, Service du répertoire toxicologique, Plomb 2003-01.
- Canadian Centre for Occupational Health and Safety (CCOHS), Hamilton, Ontario, CHEMINFO Record No. 608 – Lead.
- European Economic Community, Commission Directives 91/155/EEC and 67/548/EEC.
- Industry Canada, SOR/88-66, Controlled Products Regulations, as amended.
- International Agency for Research on Cancer (IARC), Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, 1972 – 2007, (multi-volume work), World Health Organization, Geneva.
- International Chemical Safety Cards (WHO/IPCS/ILO), ICSC:0052 - Lead.
- Merck & Co., Inc., 2001, The Merck Index, An Encyclopedia of Chemicals, Drugs, and Biologicals, Thirteenth Edition.
- National Library of Medicine, National Toxicology Information Program, Hazardous Substance Data Bank. On-Line.
- Patty's Toxicology, Fifth Edition, 2001: E. Bingham, B. Cohrssen & C.H. Powell, Ed.
- Sax, N. Irving, 1989, Dangerous Properties of Industrial Materials, Seventh Edition.
- U.S. Department of Health and Human Services, National Institute of Environmental Health Sciences, National Toxicology Program (NTP), 11th Report on Carcinogens, January 2005.
- 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. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, 1999, Toxicological Profile for Lead.
- U.S. Department of Health and Human Services, National Institute of Occupational Safety and Health, Registry of Toxic Effects of Chemical Substances (RTECS) On-Line.
- U.S. Occupational Safety and Health Administration, 1989, Code of Federal Regulations, Title 29, Part 1910.

Notice to Reader

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