FERROUS GRANULES
SAFETY DATA SHEET

SECTION 1. IDENTIFICATION

Product Identity: Ferrous Granules.

Trade Names and Synonyms: Slag, Lead Smelting, Zinc-Reduced.

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

Supplier:
In U.S.:
Teck American Metal Sales Incorporated
501 North Riverpoint Blvd, Suite 300
Spokane, WA
USA, 99202

Other than U.S.:
Teck Metals Ltd.
#1700 – 11 King Street West
Toronto, Ontario
M5H 4C7

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

Date of Last Review: July 23, 2018.

Date of Last Edit: July 23, 2018.

Product Use: Used in the production of Portland Cement.

SECTION 2. HAZARDS IDENTIFICATION

CLASSIFICATION:

NOTE: In the form in which it is sold, this product is not regulated as a Hazardous Product in the U.S. or Canada. This Safety Data Sheet is provided for information purposes only.

Health		Physical	Environmental
Acute Toxicity (Oral, Inhalation)	– Does not meet criteria	Does not meet criteria for any Physical Hazard	Aquatic Toxicity – Short Term/Long Term - 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	– Does not meet criteria		
Reproductive Toxicity	– Does not meet criteria		
Specific Target Organ Toxicity:			
Acute Exposure	– Does not meet criteria		
Chronic Exposure	– Does not meet criteria		

LABEL:

Symbols:	**Signal Word:**
None required	None required
Hazard Statements	**Precautionary Statements:**
None required	None required

Emergency Overview: A black granular material that is not flammable or combustible. This product is relatively non-toxic and does not pose an immediate hazard to the health of emergency response personnel or to the environment in an emergency situation.

Potential Health Effects: Acute exposure to very dusty conditions may result in mild respiratory irritation and possible eye and skin irritation due to abrasion of the granules on tissues. No chronic health effects have been identified for this material.

This product does not contain reportable levels of human carcinogens as defined by the Occupational Safety and Health Administration (OSHA), the National Toxicology Program (NTP), the International Agency for Research on Cancer (IARC), or the American Conference of Governmental Industrial Hygienists (ACGIH) (see Toxicological Information, Section 11).

Potential Environmental Effects: The product is considered to have a high degree of intrinsic physical and chemical stability and is therefore unlikely to be toxic to plants and animals in the environment. However, small quantities of dissolved constituent metals (i.e., cadmium, copper, lead, nickel, manganese and zinc) may be present in runoff or drainage from storage piles at concentrations which exceed water quality criteria (to protect aquatic life).

SECTION 3. COMPOSITION / INFORMATION ON INGREDIENTS

COMPONENTS	CAS Registry No.	CONCENTRATION (% wt/wt)
Ferrous Granules*	175448-53-0	95 – 98%
Consisting of:		
Iron (present as Iron Orthosilicate)	13918-37-1	24 – 31% (as Fe)
Calcium (present as Calcium Silicate & Calcium Aluminate)	12168-85-3 10034-77-2 12042-68-1	14 – 20% (as CaO)
Zinc (present as Zinc Silicate)	13597-65-4	0.3 – 3.5% (as Zn)
Manganese	7439-96-5	0.5 – 2.5% (as Mn)
Copper	7440-50-8	0.2 – 1.5% (as Cu)
Lead (present as Lead Silicate)	10099-76-0	0.01 – <0.10% (as Pb)

Note: See Section 8 for Occupational Exposure Guidelines.

*****Under the Canadian Environmental Protection Act 1999, New Substances Notification Regulations, Ferrous Granules is considered a single substance. Its associated CAS number is present on the Domestic Substances List. Under the U.S. Toxic Substances Control Act, Ferrous Granules is treated as a mixture of several components, each of which is present on the TSCA Chemical Inventory.

SECTION 4. FIRST AID MEASURES

Eye Contact: *Symptoms:* Mild irritation. If irritation occurs, cautiously rinse eye(s) with lukewarm, gently flowing water for 5 minutes, while holding the eyelids open. If eye irritation persists, get medical advice/attention.

Skin Contact: *Symptoms:* No health effects expected. If irritation does occur, flush with lukewarm, gently flowing water for 5 minutes. If irritation persists, obtain medical advice.

Inhalation: *Symptoms:* Possible respiratory irritation. If symptoms are experienced repair/shut down source of contamination or move victim from exposure area to fresh air immediately. Get medical advice/attention if you feel unwell or are concerned.

Ingestion: *Symptoms:* If swallowed, no specific intervention is indicated as this material is not likely to be hazardous by ingestion. However, if you feel unwell or are concerned, get medical advice/attention.

SECTION 5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: This product is not considered a fire or explosion hazard. It does not burn and will not support combustion.

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

Fire Fighting: As with any fire, fire fighters should be fully trained and wear full protective clothing including an approved, self-contained breathing apparatus which supplies a positive air pressure within a full face-piece mask.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup: Control source of spillage if possible to do so safely. Clean up spilled material immediately, observing precautions in Section 8, Personal Protection and using methods which 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 labelled containers for later 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 dust respirator (see also Section 8). Close-fitting safety goggles may be necessary in some circumstances to prevent eye contact with dust.

Environmental Precautions: Care should be taken to prevent the release of this product to both aquatic and terrestrial environments. Measures to control dust generation from storage piles should be applied in dry, dusty locations.

SECTION 7. HANDLING AND STORAGE

Precautions for Safe Handling: Minimize the release of dust into the workplace. Avoid breathing dust. Clean up any significant spills immediately. Good housekeeping is important to prevent accumulations of dust.

Conditions for Safe Storage: Store in a dry, covered area where possible. As the runoff or drainage from product storage piles may contain small concentrations of dissolved metals, care should be taken in its management and discharge to prevent impacts and satisfy local regulatory requirements.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

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

Component	ACGIH TLV	OSHA PEL	NIOSH REL
Iron (present as Iron Orthosilicate)	None established †	None established †	None established †
Calcium (present as Calcium Silicate & Calcium Aluminate)	10 mg/m^3 †	15 mg/m^3 (total) † 5 mg/m^3 (respirable)†	10 mg/m^3 (total) † 5 mg/m^3 (respirable)†
Zinc (present as Zinc Silicate)	None established †	None established †	None established †
Manganese	0.02 mg Mn/m^3 (respirable) 0.1 mg Mn/m^3 (inhalable)	5.mg Mn/m^3 (Ceiling)	1 mg Mn/m^3
Copper	1.mg Cu/m^3 †	1.mg Cu/m^3 †	1 mg Cu/m^3 †
Lead (present as Lead Silicate)	0.05 mg Pb/m^3	0.05 mg Pb/m^3	0.05 mg Pb/m^3

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.

† – NOTE: The oxide forms of these elements could be generated in the event of fuming of Ferrous Granules under very high heat, and these oxides do have specific occupational exposure limits in most jurisdictions.

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 dust in the work environment well below recommended occupational exposure limits.

Protective Clothing: Gloves and coveralls or other work clothing are recommended to prevent prolonged or repeated direct skin contact. Appropriate eye protection should be worn where dust is generated. Safety type boots are recommended.

Respirators: Where excessive 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-95 particulate filter cartridge).

General Hygiene Considerations: Always practice good personal hygiene. Refrain from eating, drinking, or smoking in work areas. Thoroughly wash hands before eating, drinking, or smoking in appropriate designated areas.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Black Granular Material	**Odour:** None	**Odour Threshold:** Not Applicable	**pH:** Not Applicable
Vapour Pressure: Negligible @ 25°C	**Vapour Density:** Not Applicable	**Melting Point/Range:** 1125 – 1150 °C	**Boiling Point/Range:** No Data
Relative Density (Water = 1)**:** 3.55	**Evaporation Rate:** Not Applicable	**Coefficient of Water/Oil Distribution:** Not Applicable	**Solubility:** Insoluble
Bulk Density: 2,430 lbs/yd^3 (1,442 kg/m^3)	**Particle Size:** 99% > 75 µm		
Flammability: Non-combustible solid	**Flammable Limits (LEL/UEL):** Not Applicable	**Auto-ignition Temperature:** None	**Decomposition Temperature:** None

SECTION 10. STABILITY AND REACTIVITY

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

Incompatibilities: None have been identified.

Hazardous Decomposition Products: Iron oxides as well as minor amounts of zinc, copper and manganese oxide fume may be liberated when in the molten state.

SECTION 11. TOXICOLOGICAL INFORMATION

General: In the solid granular form in which this material is sold it is relatively non-toxic. Normal handling should not cause either acute or chronic health effects.

Acute:
Skin/Eye: Eye or skin contact with Ferrous Granules may cause local irritation due to the mechanical abrasion of the granules but would not cause tissue damage.

Inhalation: High concentrations of airborne dust may be irritating to the nose, throat and respiratory passages. Lead and any other heavy metals are present at very low concentrations (i.e. <0.1% Pb) and in insoluble forms. Therefore, except under the most extreme conditions of overexposure, they are unlikely to represent a potential health risk. The major route of potential exposure would be through the generation and inhalation of fumes from molten Ferrous Granules. Such fumes would contain principally iron oxides as well as some zinc, copper and manganese oxides. The inhalation of iron oxide fume can lead to pulmonary siderosis, a relatively benign pneumoconiosis in which pulmonary reaction is minimal. If excessive quantities of zinc or copper oxide fume are inhaled, it can result in a condition called metal fume fever. The symptoms of metal fume fever will occur within 3 to 10 hours, and include immediate dryness and irritation of the throat, tightness of the chest, and coughing which may later be followed by flu-like symptoms of fever, malaise, perspiration, frontal headache, muscle cramps, low back pain, occasionally blurred vision, nausea, and vomiting. The symptoms are temporary and generally disappear, without medical intervention, within 24 to 48 hours of onset. There are no recognized complications, after effects, or chronic effects that result from this condition.

Ingestion: The constituents of Ferrous Granules have minimal oral toxicity. The lead content is sufficiently low and in an insoluble form so that acute lead poisoning would be extremely unlikely.

Chronic: No chronic health effects have been identified from the inhalation or ingestion of Ferrous Granules. There is no chronic form of metal fume fever but in rare instances an acute incident may be followed by complaints such as bronchitis or pneumonia. Chronic lead intoxication is extremely unlikely due to the very low lead content and the insoluble form of the lead present (lead silicate). The silica content of this material is present as various metal silicates and no measurable free silica is present, in either amorphous or crystalline form. This product does not contain reportable levels of human carcinogens as defined by the Occupational Safety and Health Administration (OSHA), the National Toxicology Program (NTP), the International Agency for Research on Cancer (IARC), and the American Conference of Governmental Industrial Hygienists (ACGIH).

Animal Toxicity:

Ingredient:	Acute Oral Toxicity:	Acute Dermal Toxicity:	Acute Inhalation Toxicity:
Iron (present as Iron Orthosilicate)	No data	No data	No data
Calcium (present as Calcium Silicate & Calcium Aluminate)	No data	No data	No data
Zinc (present as Zinc Silicate)	No data	No data	No data
Manganese	9,000 mg/kg†	No data	No data
Copper	>5,000 mg/kg†	No data	No data
Lead (present as Lead Silicate)	No data	No data	No data

† LD_{50}, Rat,Oral, ‡ LC_{50}, Rat, Inhalation, 4 hour

SECTION 12. ECOLOGICAL INFORMATION

The product is considered to have a high degree of intrinsic physical and chemical stability and is therefore unlikely to be toxic to plants and animals in the environment. However, small quantities of dissolved constituent metals (i.e., cadmium, copper, lead, nickel, manganese and zinc) as sulphate salts may be present in runoff or drainage from storage piles at concentrations which exceed water quality criteria (to protect aquatic life). The fate of the constituent metals in runoff and their respective bioavailabilities will be determined by specific physico-chemical conditions in the receiving environment.

SECTION 13. DISPOSAL CONSIDERATIONS

If material cannot be returned to process or salvage, dispose of in accordance with applicable regulations.

SECTION 14. TRANSPORT INFORMATION

TRANSPORT CANADA AND U.S. DOT CLASSIFICATION..... Not applicable.
TRANSPORT CANADA AND U.S. DOT PID ..... Not applicable.
PROPER SHIPPING NAME ..... Not applicable.
MARINE POLLUTANT ..... No.
IMO CLASSIFICATION..... Not applicable.

SECTION 15. REGULATORY INFORMATION

U.S.

INGREDIENTS LISTED ON TSCA INVENTORY ..... Yes

HAZARDOUS UNDER HAZARD COMMUNICATION STANDARD..... No

CERCLA SECTION 103 HAZARDOUS SUBSTANCES ..... Zinc Compound ..RQ: None established.
Copper.. .....RQ: 5000 lb. (2270 kg.)
Manganese Compound..... RQ: None established.
Lead Compound ..... RQ: None established.

EPCRA SECTION 302 EXTREMELY HAZARDOUS SUBSTANCE..... No ingredients apply.

EPCRA SECTION 311/312 HAZARD CATEGORIES..... No hazard categories apply.

EPCRA SECTION 313 TOXIC RELEASE INVENTORY:..... This product contains reportable levels of the following toxic chemicals subject to the Toxic Release Reporting Requirements:

Zinc Compound (Zinc Silicate) (as by-product Dust or Fume)
Percent by Weight: 0.3 – 3.5% (zinc elemental)
CAS No. 13597-65-4

Copper
Percent by Weight: 0.2 – 1.5%
CAS No. 7440-50-8

Manganese
Percent by Weight: 0.5 – 2.5%

SECTION 16. OTHER INFORMATION

Date of Original Issue: March 7, 2001 **Version:** 01 *(First edition)*

Date of Latest Revision: July 23, 2018 **Version:** 15

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, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.
- American Conference of Governmental Industrial Hygienists, 2018, Guide to Occupational Exposure Values.
- Bretherick's Handbook of Reactive Chemical Hazards, 20th Anniversary Edition. P.G. Urben Ed. 1995.
- Canadian Centre for Occupational Health and Safety (CCOHS) CHEMpendium On-Line Chemical Information Data Base.
- 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.
- Merck & Co., Inc., 2001, The Merck Index, An Encyclopedia of Chemicals, Drugs, and Biologicals, Thirteenth Edition.
- Patty's Toxicology, Fifth Edition, 2001: E. Bingham, B. Cohrssen & C.H. Powell, Ed.
- Sax, N. Irving & Lewis, Richard J., Sr., 1987, Hawley's Condensed Chemical Dictionary, Eleventh Edition.
- U.S. Dept. 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. Dept. of Health and Human Services, National Institute for Occupational Safety and Health, Registry of Toxic Effects of Chemical Substances (RTECS) CCOHS Web Access subscription.
- U.S. Occupational Safety and Health Administration, 1989, Code of Federal Regulations, Title 29, Part 1910.

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