

### SECTION 1: IDENTIFICATION

#### 1.1. Product Identifier

**Product Form:** Mixture

**Product Name:** Carbon and Alloy Steels

**Synonyms:** Bar, Sheet, Plate, Tubing, Pipe, Structural

#### 1.2. Intended Use of the Product

Solid Product, Various Forms and Uses.

#### 1.3. Name, Address, and Telephone of the Responsible Party

##### Company

Joseph T. Ryerson & Son, Inc.

227 W Monroe St., 27th Floor

Chicago, Illinois 60606

T (312) 292-5000

[www.ryerson.com](http://www.ryerson.com)

#### 1.4. Emergency Telephone Number

**Emergency Number** : CHEMTREC (US Transportation): (800) 424-9300 CANUTEC (Canadian Transportation): (613) 996-6666  
For Chemical Emergency, Spill, Leak, Fire, Exposure, or Accident, call CHEMTREC – Day or Night

### SECTION 2: HAZARDS IDENTIFICATION

#### 2.1. Classification of the Substance or Mixture

##### GHS-US/CA Classification

Skin Sens. 1 H317

Carc. 2 H351

Repr. 1B H360

Full text of hazard classes and H-statements : see Section 16.

#### 2.2. Label Elements

##### GHS-US/CA Labeling

##### Hazard Pictograms (GHS-US/CA)



##### Signal Word (GHS-US/CA)

: Danger

##### Hazard Statements (GHS-US/CA)

: H317 - May cause an allergic skin reaction.  
H351 - Suspected of causing cancer.  
H360 - May damage fertility or the unborn child.

##### Precautionary Statements (GHS-US/CA)

: P201 - Obtain special instructions before use.  
P202 - Do not handle until all safety precautions have been read and understood.  
P261 - Avoid breathing fume, dust.  
P272 - Contaminated work clothing should not be allowed out of the workplace.  
P280 - Wear protective gloves, protective clothing, and eye protection.  
P302+P352 - IF ON SKIN: Wash with plenty of water.  
P308+P313 - If exposed or concerned: Get medical advice/attention.  
P321 - Specific treatment (see Section 4 on this SDS).  
P333+P313 - If skin irritation or rash occurs: Get medical advice/attention.  
P362+P364 - Take off contaminated clothing and wash it before reuse.  
P405 - Store locked up.  
P501 - Dispose of contents/container in accordance with local, regional, national, territorial, provincial, and international regulations.

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### 2.3. Other Hazards

This product as shipped is physiologically inert in its solid form. However, user-generated dust and/or fumes may pose a physiological hazard if inhaled or ingested. Avoid inhalation of metal dusts and fumes. May cause an influenza-like illness. Avoid skin and eye contact with dusts to prevent mechanical irritation. User-generated dust is easily ignited and difficult to extinguish. The below listing is a summary of elements used in carbon and alloy steels. Various grades will contain different combinations of these elements. Other trace elements may also be present in minute amounts. These small quantities (less than 0.1%) are frequently referred to as "trace" or "residual" elements; generally they originate in the raw material used. Such elements would include arsenic (As), beryllium (Be), cobalt (Co), lead (Pb), mercury (Hg) less than 0.01%, oil mist (mineral1), oxygen (O), selenium (Se), tellurium (Te), and zirconium (Zr). Various byproducts of processing from these trace elements may include lead chromate, ozone, polybrominated biphenyls (PBB), and polybrominated diphenyl ether (PBDE), cadmium (Cd) less than 0.01%, and these byproducts may also be considered trace. If listed in the above table, the ingredient is considered to be a component rather than trace. \*Carbon and alloy steel products as provided contain chromium metal in the zero valence state. As such, chromium metal does not present any unusual health hazard. However, welding, torch cutting, brazing, or grinding of chromium metal in carbon and alloy steel may generate airborne concentrations of hexavalent chromium.

### 2.4. Unknown Acute Toxicity (GHS-US/CA)

No data available

## SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1. Substance

Not applicable

### 3.2. Mixture

| Name                 | Product Identifier  | % *    | GHS Ingredient Classification   |
|----------------------|---------------------|--------|---|
| Iron                 | (CAS-No.) 7439-89-6 | > 80   | Comb. Dust  |
| Chromium             | (CAS-No.) 7440-47-3 | <= 11  | Comb. Dust  |
| Zinc                 | (CAS-No.) 7440-66-6 | <= 10  | Comb. Dust  |
| Nickel               | (CAS-No.) 7440-02-0 | <= 9.5 | Skin Sens. 1, H317<br>Carc. 2, H351<br>STOT RE 1, H372<br>Comb. Dust  |
| Carbon               | (CAS-No.) 7440-44-0 | <= 5.5 | Comb. Dust  |
| Molybdenum           | (CAS-No.) 7439-98-7 | <= 5   | Comb. Dust  |
| Silicon              | (CAS-No.) 7440-21-3 | <= 4   | Comb. Dust  |
| Manganese            | (CAS-No.) 7439-96-5 | <= 3   | Comb. Dust  |
| Copper               | (CAS-No.) 7440-50-8 | <= 2.5 | Comb. Dust  |
| Aluminum             | (CAS-No.) 7429-90-5 | <= 2   | Comb. Dust  |
| Sulfur               | (CAS-No.) 7704-34-9 | <= 2   | Skin Irrit. 2, H315<br>Aquatic Acute 3, H402<br>Comb. Dust  |
| Bismuth              | (CAS-No.) 7440-69-9 | <= 1.5 | Comb. Dust  |
| Titanium             | (CAS-No.) 7440-32-6 | <= 1   | Comb. Dust  |
| Vanadium             | (CAS-No.) 7440-62-2 | <= 1   | Comb. Dust  |
| Tungsten             | (CAS-No.) 7440-33-7 | <= 0.9 | Comb. Dust  |
| Antimony             | (CAS-No.) 7440-36-0 | <= 0.9 | Comb. Dust  |
| Boron                | (CAS-No.) 7440-42-8 | <= 0.9 | Comb. Dust  |
| Tin                  | (CAS-No.) 7440-31-5 | <= 0.9 | Comb. Dust  |
| Nitrogen             | (CAS-No.) 7727-37-9 | <= 0.9 | Simple Asphy<br>Press. Gas (Comp.), H280  |
| Phosphorus elemental | (CAS-No.) 7723-14-0 | <= 0.9 | Flam. Sol. 1, H228<br>Acute Tox. 1 (Oral), H300<br>Acute Tox. 2 (Dermal), H310<br>Acute Tox. 4 (Inhalation:dust,mist), H332<br>Aquatic Acute 1, H400<br>Aquatic Chronic 3, H412 |

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|           |                      |        |  |
|-----------|----------------------|--------|--|
| Magnesium | (CAS-No.) 7439-95-4  | <= 0.9 | Flam. Sol. 1, H228<br>Self-heat. 1, H251<br>Water-react. 2, H261<br>Comb. Dust   |
| Calcium   | (CAS-No.) 7440-70-2  | <= 0.9 | Water-react. 2, H261<br>Comb. Dust   |
| Selenium  | (CAS-No.) 7782-49-2  | <= 0.9 | Acute Tox. 3 (Oral), H301<br>Acute Tox. 3 (Inhalation:dust,mist), H331<br>STOT RE 2, H373<br>Aquatic Chronic 4, H413                                     |
| Niobium   | (CAS-No.) 7440-03-1  | <= 0.9 | Not classified   |
| Tellurium | (CAS-No.) 13494-80-9 | <= 0.5 | Acute Tox. 3 (Oral), H301<br>Acute Tox. 4 (Inhalation:dust,mist), H332<br>Skin Sens. 1B, H317<br>Repr. 1B, H360<br>Aquatic Chronic 4, H413<br>Comb. Dust |

Full text of H-phrases: see Section 16.

\*Percentages are listed in weight by weight percentage (w/w%) for liquid and solid ingredients. Gas ingredients are listed in volume by volume percentage (v/v%).

## SECTION 4: FIRST AID MEASURES

### 4.1. Description of First-aid Measures

**General:** If injury occurs or if you feel unwell seek medical advice.

**Inhalation:** If inhaled, remove to fresh air and keep at rest in a position comfortable for breathing. Obtain medical attention if breathing difficulty persists.

**Skin Contact:** Cool skin rapidly with cold water after contact with molten product. Removal of solidified molten material from skin requires medical assistance. Remove contaminated clothing. Wash contaminated clothing before reuse. Obtain medical attention if irritation develops or persists.

**Eye Contact:** Immediately rinse with water for a prolonged period (at least 15 minutes) while holding the eyelids wide open. Remove contact lenses, if present and easy to do. Continue rinsing. Obtain medical attention if irritation develops or persists.

**Ingestion:** If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

### 4.2. Most Important Symptoms and Effects Both Acute and Delayed

**General:** Skin sensitization. Suspected of causing cancer. May damage fertility or the unborn child. Under normal conditions of use not expected to present a significant hazard. Under milling, or physical alteration metal dusts may be produced that cause irritation of the respiratory tract, skin, and may be harmful. Molten material may release toxic, and irritating fumes.

**Inhalation:** During processing, the most significant route of exposure is by the inhalation (breathing) of fumes. If fumes are inhaled, they can cause a condition commonly known as metal fume fever with symptoms which resemble influenza; Symptoms may be delayed 4-12 hours and begin with a sudden onset of thirst, and a sweet, metallic or foul taste in the mouth. Other symptoms may include upper respiratory tract irritation accompanied by coughing and a dryness of the mucous membranes, lassitude and a generalized feeling of malaise. Fever, chills, muscular pain, mild to severe headache, nausea, occasional vomiting, exaggerated mental activity, profuse sweating, excessive urination, diarrhea and prostration may also occur.

**Skin Contact:** Dust may cause irritation in skin folds or by contact in combination with tight clothing. Contact with hot, molten metal will cause thermal burns. Removal of solidified molten material from skin requires medical assistance.

**Eye Contact:** Dust generated from material cutting may cause a slight irritation. Slivers may be generated, which could cause mechanical irritation or injure the eye. Dusts caused from milling and physical alteration will likely cause eye irritation. Fumes from thermal decomposition or molten material will likely be irritating to the eyes.

**Ingestion:** If large amounts are ingested: Gastrointestinal irritation.

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**Chronic Symptoms:** Suspected of causing cancer. May damage fertility or the unborn child. Inhalation of iron oxide fumes undergoing decomposition may cause irritation and flu-like symptoms, otherwise iron oxide is not hazardous. Repeated inhalation of iron oxide dust can cause siderosis a benign condition. Chromium: Certain hexavalent chromium compounds have been demonstrated to be carcinogenic on the basis of epidemiological investigations on workers and experimental studies in animals. Increased incidences of respiratory cancer have been found in chromium (VI) workers. There is an increased incidence of lung cancer in industrial workers exposed to chromium (VI) compounds. Please refer to IARC volume 23 for a more detailed discussion. Zinc: Prolonged exposure to high concentrations of zinc fumes may cause "zinc shakes", an involuntary twitching of the muscles. Otherwise, zinc is non-toxic. Inhalation of Nickel compounds has been shown in studies to provide an increased incidence of cancer of the nasal cavity, lung and possibly larynx in nickel refinery workers. Nickel metal powder, when respirable, is a suspected human carcinogen, and is known to cause damage to the lungs through inhalation. Molybdenum: Chronic exposure to molybdenum compounds is suspected of causing cancer. Compounds are also known to cause irritation to the skin, eyes, and respiratory tract. Silicon: Can cause chronic bronchitis and narrowing of the airways. Manganese: Chronic exposure can cause inflammation of the lung tissue, scarring the lungs (pulmonary fibrosis). Chronic exposure to excessive manganese levels can lead to a variety of psychiatric and motor disturbances, termed manganism. Copper: Overexposure to fumes may cause metal fume fever (chills, muscle aches, nausea, fever, dry throat, cough, weakness, lassitude); metallic or sweet taste; discoloration of skin and hair. Tissue damage of mucous membranes may follow chronic dust exposure. Aluminum: Inhalation of finely divided aluminum powder may cause pulmonary fibrosis. Chronic dermal exposure to sulfur dust has been linked to headache, vertigo, irritation to the airways, breathing difficulties, coordination disturbances, accelerated pulse, hypotonia, cramps and unconsciousness. Frequent dermal contact with sulfur dusts mainly caused skin damage in the form of eczematous or ulcerous changes. Vanadium: May cause gastrointestinal discomfort, renal damage, nervous system depression and irritation of the respiratory passages. May also cause cardiac palpitations and asthma. Antimony: Exposure to antimony dusts and fume may result in irritation eyes, skin, nose, throat, mouth; cough; dizziness; headache; nausea, vomiting, diarrhea; stomach cramps; insomnia; anorexia; unable to smell properly. Tin: Has been shown to increase incidence of sarcoma in animal tests. Chronic exposure to tin dusts and fume may result in "stannosis", a mild form of pneumoconiosis.

### 4.3. Indication of Any Immediate Medical Attention and Special Treatment Needed

If medical advice is needed, have product container or label at hand.

## SECTION 5: FIRE-FIGHTING MEASURES

### 5.1. Extinguishing Media

**Suitable Extinguishing Media:** Use extinguishing media appropriate for surrounding fire.

**Unsuitable Extinguishing Media:** Do not use halogenated extinguishing agents on small chips or fines. Do not use water when molten material is involved, contact of hot product with water will result in a violent expansion as the water turns to steam causing explosion with massive force.

### 5.2. Special Hazards Arising From the Substance or Mixture

**Fire Hazard:** Not considered flammable but will burn at high temperatures. Small chips, turnings, dust and fines from processing may be readily ignitable.

**Explosion Hazard:** Product is not explosive. Dust generated from processing may present a dust explosion hazard.

**Reactivity:** Hazardous reactions will not occur under normal conditions.

### 5.3. Advice for Firefighters

**Precautionary Measures Fire:** Exercise caution when fighting any chemical fire. Under fire conditions, hazardous fumes will be present.

**Firefighting Instructions:** Do not breathe fumes from fires or vapors from decomposition. Keep upwind. Use water spray or fog for cooling exposed containers.

**Protection During Firefighting:** Firefighters must use full bunker gear including NIOSH-approved positive-pressure self-contained breathing apparatus to protect against potential hazardous combustion and decomposition products.

**Hazardous Combustion Products:** Metallic oxides. Nickel oxides. Iron oxides. If heated to the point of fume generation zinc fumes may cause metal fume fever. Otherwise, zinc is non-toxic.

### Reference to Other Sections

Refer to Section 9 for flammability properties.

## SECTION 6: ACCIDENTAL RELEASE MEASURES

### 6.1. Personal Precautions, Protective Equipment and Emergency Procedures

**General Measures:** Do not get in eyes, on skin, or on clothing. Do not breathe dust or fumes.

#### 6.1.1. For Non-Emergency Personnel

**Protective Equipment:** Use appropriate personal protective equipment (PPE).

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**Emergency Procedures:** Evacuate unnecessary personnel.

### 6.1.2. For Emergency Personnel

**Protective Equipment:** Equip cleanup crew with proper protection.

**Emergency Procedures:** Upon arrival at the scene, a first responder is expected to recognize the presence of dangerous goods, protect oneself and the public, secure the area, and call for the assistance of trained personnel as soon as conditions permit.

### 6.2. Environmental Precautions

Do not allow to enter drains or water courses.

### 6.3. Methods and Materials for Containment and Cleaning Up

**For Containment:** Contain solid spills with appropriate barriers and prevent migration and entry into sewers or streams. Collect scrap for recycling. If molten: contain the flow using dry sand or salt flux as a dam. Do not use shovels or hand tools to halt the flow of molten material. Allow the spill to cool before re-melting as scrap.

**Methods for Cleaning Up:** Avoid generation of dust during clean-up of spills. Take up mechanically (sweeping, shoveling) and collect in suitable container for disposal. Vacuum must be fitted with HEPA filter to prevent release of particulates during clean-up. Use only non-sparking tools. Use explosion-proof equipment.

### 6.4. Reference to Other Sections

See Section 8 for exposure controls and personal protection and Section 13 for disposal considerations.

## SECTION 7: HANDLING AND STORAGE

### 7.1. Precautions for Safe Handling

**Additional Hazards When Processed:** Risk of thermal burns on contact with molten product. Accumulation and dispersion of dust with an ignition source can cause a combustible dust explosion. Keep dust levels to a minimum and follow applicable regulations. May be a potential hazard under the following conditions:

- Small chunks, dust or fines in contact with water can generate flammable or toxic gases. These gases could present an explosion hazard in confined or poorly ventilated spaces.
- Molten metal in contact with water/moisture or certain metal oxides (e.g., rust, copper oxide). Moisture entrapped by molten metal can be explosive. Contact of molten aluminum with certain metal oxides can initiate a thermite reaction. Finely divided metals (e.g., powders or wire) may have enough surface oxide to produce thermite reactions/explosions.

**Precautions for Safe Handling:** Do not breathe dust. Do not get in eyes, on skin, or on clothing. Avoid creating or spreading dust. Always wash hands after handling the product. Do not eat, drink or smoke when using this product. Ensure there is adequate ventilation. Wear recommended personal protective equipment.

**Hygiene Measures:** Handle in accordance with good industrial hygiene and safety procedures. Always wash your hands immediately after handling this product, and once again before leaving the workplace. Wash contaminated clothing before reuse. Do not eat, drink or smoke in areas where product is used.

### 7.2. Conditions for Safe Storage, Including Any Incompatibilities

**Technical Measures:** Comply with applicable regulations.

**Storage Conditions:** Store in original container. Store in a dry, cool place. Store in a well-ventilated place. Keep container tightly closed.

**Incompatible Materials:** Oxidizers. Acids. Bases. Mineral acids. Corrosive substances in contact with metals may produce flammable hydrogen gas.

### 7.3. Specific End Use(s)

Solid Product, Various Forms and Uses.

## SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1. Control Parameters

For substances listed in Section 3 that are not listed here, there are no established Exposure limits from the manufacturer, supplier, importer, or the appropriate advisory agency including: ACGIH (TLV), AIHA (WEEL), NIOSH (REL), OSHA (PEL), or Canadian provincial governments.

| Chromium (7440-47-3) |                                      |  |
|----------------------|--------------------------------------|--|
| USA ACGIH            | ACGIH TWA (mg/m <sup>3</sup> )       | 0.5 mg/m <sup>3</sup>                  |
| USA ACGIH            | ACGIH chemical category              | Not Classifiable as a Human Carcinogen |
| USA OSHA             | OSHA PEL (TWA) (mg/m <sup>3</sup> )  | 1 mg/m <sup>3</sup>                    |
| USA NIOSH            | NIOSH REL (TWA) (mg/m <sup>3</sup> ) | 0.5 mg/m <sup>3</sup>                  |
| USA IDLH             | US IDLH (mg/m <sup>3</sup> )         | 250 mg/m <sup>3</sup>                  |
| Alberta              | OEL TWA (mg/m <sup>3</sup> )         | 0.5 mg/m <sup>3</sup>                  |

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|------------------------------------|--------------------------------------|---|
| <b>British Columbia</b>            | OEL TWA (mg/m <sup>3</sup> )         | 0.5 mg/m <sup>3</sup>   |
| <b>Manitoba</b>                    | OEL TWA (mg/m <sup>3</sup> )         | 0.5 mg/m <sup>3</sup>   |
| <b>New Brunswick</b>               | OEL TWA (mg/m <sup>3</sup> )         | 0.5 mg/m <sup>3</sup>   |
| <b>Newfoundland &amp; Labrador</b> | OEL TWA (mg/m <sup>3</sup> )         | 0.5 mg/m <sup>3</sup>   |
| <b>Nova Scotia</b>                 | OEL TWA (mg/m <sup>3</sup> )         | 0.5 mg/m <sup>3</sup>   |
| <b>Nunavut</b>                     | OEL STEL (mg/m <sup>3</sup> )        | 1.5 mg/m <sup>3</sup> (metal)   |
| <b>Nunavut</b>                     | OEL TWA (mg/m <sup>3</sup> )         | 0.5 mg/m <sup>3</sup> (metal)   |
| <b>Northwest Territories</b>       | OEL STEL (mg/m <sup>3</sup> )        | 1.5 mg/m <sup>3</sup> (metal)   |
| <b>Northwest Territories</b>       | OEL TWA (mg/m <sup>3</sup> )         | 0.5 mg/m <sup>3</sup> (metal)   |
| <b>Ontario</b>                     | OEL TWA (mg/m <sup>3</sup> )         | 0.5 mg/m <sup>3</sup>   |
| <b>Prince Edward Island</b>        | OEL TWA (mg/m <sup>3</sup> )         | 0.5 mg/m <sup>3</sup>   |
| <b>Québec</b>                      | VEMP (mg/m <sup>3</sup> )            | 0.5 mg/m <sup>3</sup>   |
| <b>Saskatchewan</b>                | OEL STEL (mg/m <sup>3</sup> )        | 1.5 mg/m <sup>3</sup>   |
| <b>Saskatchewan</b>                | OEL TWA (mg/m <sup>3</sup> )         | 0.5 mg/m <sup>3</sup>   |
| <b>Yukon</b>                       | OEL STEL (mg/m <sup>3</sup> )        | 3 mg/m <sup>3</sup>   |
| <b>Yukon</b>                       | OEL TWA (mg/m <sup>3</sup> )         | 0.1 mg/m <sup>3</sup>   |
| <b>Nickel (7440-02-0)</b>          |                                      |   |
| <b>USA ACGIH</b>                   | ACGIH TWA (mg/m <sup>3</sup> )       | 1.5 mg/m <sup>3</sup> (inhalable particulate matter)  |
| <b>USA ACGIH</b>                   | ACGIH chemical category              | Not Suspected as a Human Carcinogen   |
| <b>USA OSHA</b>                    | OSHA PEL (TWA) (mg/m <sup>3</sup> )  | 1 mg/m <sup>3</sup>   |
| <b>USA NIOSH</b>                   | NIOSH REL (TWA) (mg/m <sup>3</sup> ) | 0.015 mg/m <sup>3</sup>   |
| <b>USA IDLH</b>                    | US IDLH (mg/m <sup>3</sup> )         | 10 mg/m <sup>3</sup>  |
| <b>Alberta</b>                     | OEL TWA (mg/m <sup>3</sup> )         | 1.5 mg/m <sup>3</sup>   |
| <b>British Columbia</b>            | OEL TWA (mg/m <sup>3</sup> )         | 0.05 mg/m <sup>3</sup>  |
| <b>Manitoba</b>                    | OEL TWA (mg/m <sup>3</sup> )         | 1.5 mg/m <sup>3</sup> (inhalable particulate matter)  |
| <b>New Brunswick</b>               | OEL TWA (mg/m <sup>3</sup> )         | 1 mg/m <sup>3</sup>   |
| <b>Newfoundland &amp; Labrador</b> | OEL TWA (mg/m <sup>3</sup> )         | 1.5 mg/m <sup>3</sup> (inhalable particulate matter)  |
| <b>Nova Scotia</b>                 | OEL TWA (mg/m <sup>3</sup> )         | 1.5 mg/m <sup>3</sup> (inhalable particulate matter)  |
| <b>Nunavut</b>                     | OEL STEL (mg/m <sup>3</sup> )        | 3 mg/m <sup>3</sup> (inhalable fraction)  |
| <b>Nunavut</b>                     | OEL TWA (mg/m <sup>3</sup> )         | 1.5 mg/m <sup>3</sup> (inhalable fraction)  |
| <b>Northwest Territories</b>       | OEL STEL (mg/m <sup>3</sup> )        | 3 mg/m <sup>3</sup> (inhalable fraction)  |
| <b>Northwest Territories</b>       | OEL TWA (mg/m <sup>3</sup> )         | 1.5 mg/m <sup>3</sup> (inhalable fraction)  |
| <b>Ontario</b>                     | OEL TWA (mg/m <sup>3</sup> )         | 1 mg/m <sup>3</sup> (inhalable)   |
| <b>Prince Edward Island</b>        | OEL TWA (mg/m <sup>3</sup> )         | 1.5 mg/m <sup>3</sup> (inhalable particulate matter)  |
| <b>Québec</b>                      | VEMP (mg/m <sup>3</sup> )            | 1 mg/m <sup>3</sup>   |
| <b>Saskatchewan</b>                | OEL STEL (mg/m <sup>3</sup> )        | 3 mg/m <sup>3</sup> (inhalable fraction)  |
| <b>Saskatchewan</b>                | OEL TWA (mg/m <sup>3</sup> )         | 1.5 mg/m <sup>3</sup> (inhalable fraction)  |
| <b>Yukon</b>                       | OEL STEL (mg/m <sup>3</sup> )        | 3 mg/m <sup>3</sup>   |
| <b>Yukon</b>                       | OEL TWA (mg/m <sup>3</sup> )         | 1 mg/m <sup>3</sup>   |
| <b>Molybdenum (7439-98-7)</b>      |                                      |   |
|                                    | Internal TWA (mg/m <sup>3</sup> )    | 5 mg/m <sup>3</sup> (Molybdenum (as Mo), Soluble Compounds)   |
| <b>USA ACGIH</b>                   | ACGIH TWA (mg/m <sup>3</sup> )       | 10 mg/m <sup>3</sup> (inhalable particulate matter)<br>3 mg/m <sup>3</sup> (respirable particulate matter)                                    |
| <b>USA OSHA</b>                    | OSHA PEL (TWA) (mg/m <sup>3</sup> )  | 5 mg/m <sup>3</sup> (Molybdenum (as Mo), Soluble Compounds)<br>15 mg/m <sup>3</sup> (Molybdenum (as Mo), Insoluble Compounds)<br>(Total dust) |
| <b>USA NIOSH</b>                   | NIOSH REL (TWA) (mg/m <sup>3</sup> ) | 5 mg/m <sup>3</sup> (Molybdenum (as Mo), Soluble Compounds)   |
| <b>USA IDLH</b>                    | US IDLH (mg/m <sup>3</sup> )         | 5000 mg/m <sup>3</sup>  |
| <b>Alberta</b>                     | OEL TWA (mg/m <sup>3</sup> )         | 10 mg/m <sup>3</sup> (total)<br>3 mg/m <sup>3</sup> (respirable)  |
| <b>British Columbia</b>            | OEL TWA (mg/m <sup>3</sup> )         | 3 mg/m <sup>3</sup> (respirable)<br>10 mg/m <sup>3</sup> (inhalable)  |

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|                                    |   |  |
|------------------------------------|---|--|
| <b>Manitoba</b>                    | OEL TWA (mg/m <sup>3</sup> )            | 3 mg/m <sup>3</sup> (respirable particulate matter)<br>10 mg/m <sup>3</sup> (inhalable particulate matter)     |
| <b>Newfoundland &amp; Labrador</b> | OEL TWA (mg/m <sup>3</sup> )            | 3 mg/m <sup>3</sup> (respirable particulate matter)<br>10 mg/m <sup>3</sup> (inhalable particulate matter)     |
| <b>Nova Scotia</b>                 | OEL TWA (mg/m <sup>3</sup> )            | 3 mg/m <sup>3</sup> (respirable particulate matter)<br>10 mg/m <sup>3</sup> (inhalable particulate matter)     |
| <b>Nunavut</b>                     | OEL STEL (mg/m <sup>3</sup> )           | 20 mg/m <sup>3</sup> (metal-inhalable fraction)<br>6 mg/m <sup>3</sup> (metal-respirable fraction)             |
| <b>Nunavut</b>                     | OEL TWA (mg/m <sup>3</sup> )            | 10 mg/m <sup>3</sup> (metal-inhalable fraction)<br>3 mg/m <sup>3</sup> (metal-respirable fraction)             |
| <b>Northwest Territories</b>       | OEL STEL (mg/m <sup>3</sup> )           | 20 mg/m <sup>3</sup> (metal-inhalable fraction)<br>6 mg/m <sup>3</sup> (metal-respirable fraction)             |
| <b>Northwest Territories</b>       | OEL TWA (mg/m <sup>3</sup> )            | 10 mg/m <sup>3</sup> (metal-inhalable fraction)<br>3 mg/m <sup>3</sup> (metal-respirable fraction)             |
| <b>Ontario</b>                     | OEL TWA (mg/m <sup>3</sup> )            | 10 mg/m <sup>3</sup> (metal-inhalable)<br>3 mg/m <sup>3</sup> (metal-respirable)                               |
| <b>Prince Edward Island</b>        | OEL TWA (mg/m <sup>3</sup> )            | 3 mg/m <sup>3</sup> (respirable particulate matter)<br>10 mg/m <sup>3</sup> (inhalable particulate matter)     |
| <b>Saskatchewan</b>                | OEL STEL (mg/m <sup>3</sup> )           | 20 mg/m <sup>3</sup> (inhalable fraction)<br>6 mg/m <sup>3</sup> (respirable fraction)                         |
| <b>Saskatchewan</b>                | OEL TWA (mg/m <sup>3</sup> )            | 10 mg/m <sup>3</sup> (inhalable fraction)<br>3 mg/m <sup>3</sup> (respirable fraction)                         |
| <b>Silicon (7440-21-3)</b>         |   |  |
| <b>USA OSHA</b>                    | OSHA PEL (TWA) (mg/m <sup>3</sup> )     | 15 mg/m <sup>3</sup> (total dust)<br>5 mg/m <sup>3</sup> (respirable fraction)                                 |
| <b>USA NIOSH</b>                   | NIOSH REL (TWA) (mg/m <sup>3</sup> )    | 10 mg/m <sup>3</sup> (total dust)<br>5 mg/m <sup>3</sup> (respirable dust)                                     |
| <b>British Columbia</b>            | OEL TWA (mg/m <sup>3</sup> )            | 10 mg/m <sup>3</sup> (total dust)<br>3 mg/m <sup>3</sup> (respirable fraction)                                 |
| <b>New Brunswick</b>               | OEL TWA (mg/m <sup>3</sup> )            | 10 mg/m <sup>3</sup>   |
| <b>Nunavut</b>                     | OEL STEL (mg/m <sup>3</sup> )           | 20 mg/m <sup>3</sup>   |
| <b>Nunavut</b>                     | OEL TWA (mg/m <sup>3</sup> )            | 10 mg/m <sup>3</sup>   |
| <b>Northwest Territories</b>       | OEL STEL (mg/m <sup>3</sup> )           | 20 mg/m <sup>3</sup>   |
| <b>Northwest Territories</b>       | OEL TWA (mg/m <sup>3</sup> )            | 10 mg/m <sup>3</sup>   |
| <b>Québec</b>                      | VEMP (mg/m <sup>3</sup> )               | 10 mg/m <sup>3</sup> (containing no Asbestos and <1% Crystalline silica-total dust)                            |
| <b>Saskatchewan</b>                | OEL STEL (mg/m <sup>3</sup> )           | 20 mg/m <sup>3</sup>   |
| <b>Saskatchewan</b>                | OEL TWA (mg/m <sup>3</sup> )            | 10 mg/m <sup>3</sup>   |
| <b>Yukon</b>                       | OEL STEL (mg/m <sup>3</sup> )           | 20 mg/m <sup>3</sup>   |
| <b>Yukon</b>                       | OEL TWA (mg/m <sup>3</sup> )            | 30 mppcf<br>10 mg/m <sup>3</sup>   |
| <b>Manganese (7439-96-5)</b>       |   |  |
| <b>USA ACGIH</b>                   | ACGIH TWA (mg/m <sup>3</sup> )          | 0.02 mg/m <sup>3</sup> (respirable particulate matter)<br>0.1 mg/m <sup>3</sup> (inhalable particulate matter) |
| <b>USA ACGIH</b>                   | ACGIH chemical category                 | Not Classifiable as a Human Carcinogen   |
| <b>USA OSHA</b>                    | OSHA PEL (Ceiling) (mg/m <sup>3</sup> ) | 5 mg/m <sup>3</sup> (fume)   |
| <b>USA NIOSH</b>                   | NIOSH REL (TWA) (mg/m <sup>3</sup> )    | 1 mg/m <sup>3</sup> (fume)   |
| <b>USA NIOSH</b>                   | NIOSH REL (STEL) (mg/m <sup>3</sup> )   | 3 mg/m <sup>3</sup>  |
| <b>USA IDLH</b>                    | US IDLH (mg/m <sup>3</sup> )            | 500 mg/m <sup>3</sup>  |
| <b>Alberta</b>                     | OEL TWA (mg/m <sup>3</sup> )            | 0.2 mg/m <sup>3</sup>  |
| <b>British Columbia</b>            | OEL TWA (mg/m <sup>3</sup> )            | 0.2 mg/m <sup>3</sup>  |
| <b>Manitoba</b>                    | OEL TWA (mg/m <sup>3</sup> )            | 0.02 mg/m <sup>3</sup> (respirable particulate matter)   |

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|                                    |                                      |  |
|------------------------------------|--------------------------------------|--|
|                                    |                                      | 0.1 mg/m <sup>3</sup> (inhalable particulate matter)   |
| <b>New Brunswick</b>               | OEL TWA (mg/m <sup>3</sup> )         | 0.2 mg/m <sup>3</sup>  |
| <b>Newfoundland &amp; Labrador</b> | OEL TWA (mg/m <sup>3</sup> )         | 0.02 mg/m <sup>3</sup> (respirable particulate matter)<br>0.1 mg/m <sup>3</sup> (inhalable particulate matter) |
| <b>Nova Scotia</b>                 | OEL TWA (mg/m <sup>3</sup> )         | 0.02 mg/m <sup>3</sup> (respirable particulate matter)<br>0.1 mg/m <sup>3</sup> (inhalable particulate matter) |
| <b>Nunavut</b>                     | OEL STEL (mg/m <sup>3</sup> )        | 0.6 mg/m <sup>3</sup>  |
| <b>Nunavut</b>                     | OEL TWA (mg/m <sup>3</sup> )         | 0.2 mg/m <sup>3</sup>  |
| <b>Northwest Territories</b>       | OEL STEL (mg/m <sup>3</sup> )        | 0.6 mg/m <sup>3</sup>  |
| <b>Northwest Territories</b>       | OEL TWA (mg/m <sup>3</sup> )         | 0.2 mg/m <sup>3</sup>  |
| <b>Ontario</b>                     | OEL TWA (mg/m <sup>3</sup> )         | 0.2 mg/m <sup>3</sup>  |
| <b>Prince Edward Island</b>        | OEL TWA (mg/m <sup>3</sup> )         | 0.02 mg/m <sup>3</sup> (respirable particulate matter)<br>0.1 mg/m <sup>3</sup> (inhalable particulate matter) |
| <b>Québec</b>                      | VEMP (mg/m <sup>3</sup> )            | 0.2 mg/m <sup>3</sup> (total dust and fume)  |
| <b>Saskatchewan</b>                | OEL STEL (mg/m <sup>3</sup> )        | 0.6 mg/m <sup>3</sup>  |
| <b>Saskatchewan</b>                | OEL TWA (mg/m <sup>3</sup> )         | 0.2 mg/m <sup>3</sup>  |
| <b>Yukon</b>                       | OEL Ceiling (mg/m <sup>3</sup> )     | 5 mg/m <sup>3</sup>  |
| <b>Copper (7440-50-8)</b>          |                                      |  |
| <b>USA ACGIH</b>                   | ACGIH TWA (mg/m <sup>3</sup> )       | 0.2 mg/m <sup>3</sup> (fume)   |
| <b>USA OSHA</b>                    | OSHA PEL (TWA) (mg/m <sup>3</sup> )  | 0.1 mg/m <sup>3</sup> (fume)<br>1 mg/m <sup>3</sup> (dust and mist)  |
| <b>USA NIOSH</b>                   | NIOSH REL (TWA) (mg/m <sup>3</sup> ) | 1 mg/m <sup>3</sup> (dust and mist)<br>0.1 mg/m <sup>3</sup> (fume)  |
| <b>USA IDLH</b>                    | US IDLH (mg/m <sup>3</sup> )         | 100 mg/m <sup>3</sup> (dust, fume and mist)  |
| <b>Alberta</b>                     | OEL TWA (mg/m <sup>3</sup> )         | 0.2 mg/m <sup>3</sup> (fume)<br>1 mg/m <sup>3</sup> (dust and mist)  |
| <b>British Columbia</b>            | OEL TWA (mg/m <sup>3</sup> )         | 1 mg/m <sup>3</sup> (dust and mist)<br>0.2 mg/m <sup>3</sup> (fume)  |
| <b>Manitoba</b>                    | OEL TWA (mg/m <sup>3</sup> )         | 0.2 mg/m <sup>3</sup> (fume)   |
| <b>New Brunswick</b>               | OEL TWA (mg/m <sup>3</sup> )         | 0.2 mg/m <sup>3</sup> (fume)<br>1 mg/m <sup>3</sup> (dust and mist)  |
| <b>Newfoundland &amp; Labrador</b> | OEL TWA (mg/m <sup>3</sup> )         | 0.2 mg/m <sup>3</sup> (fume)   |
| <b>Nova Scotia</b>                 | OEL TWA (mg/m <sup>3</sup> )         | 0.2 mg/m <sup>3</sup> (fume)   |
| <b>Nunavut</b>                     | OEL STEL (mg/m <sup>3</sup> )        | 3 mg/m <sup>3</sup> (dust and mist)<br>0.6 mg/m <sup>3</sup> (fume)  |
| <b>Nunavut</b>                     | OEL TWA (mg/m <sup>3</sup> )         | 0.2 mg/m <sup>3</sup> (fume)<br>1 mg/m <sup>3</sup> (dust and mist)  |
| <b>Northwest Territories</b>       | OEL STEL (mg/m <sup>3</sup> )        | 3 mg/m <sup>3</sup> (dust and mist)<br>0.6 mg/m <sup>3</sup> (fume)  |
| <b>Northwest Territories</b>       | OEL TWA (mg/m <sup>3</sup> )         | 0.2 mg/m <sup>3</sup> (fume)<br>1 mg/m <sup>3</sup> (dust and mist)  |
| <b>Ontario</b>                     | OEL TWA (mg/m <sup>3</sup> )         | 0.2 mg/m <sup>3</sup> (fume)<br>1 mg/m <sup>3</sup> (dust and mist)  |
| <b>Prince Edward Island</b>        | OEL TWA (mg/m <sup>3</sup> )         | 0.2 mg/m <sup>3</sup> (fume)   |
| <b>Québec</b>                      | VEMP (mg/m <sup>3</sup> )            | 0.2 mg/m <sup>3</sup> (fume)<br>1 mg/m <sup>3</sup> (dust and mist)  |
| <b>Saskatchewan</b>                | OEL STEL (mg/m <sup>3</sup> )        | 0.6 mg/m <sup>3</sup> (fume)<br>3 mg/m <sup>3</sup> (dust and mist)  |
| <b>Saskatchewan</b>                | OEL TWA (mg/m <sup>3</sup> )         | 0.2 mg/m <sup>3</sup> (fume)<br>1 mg/m <sup>3</sup> (dust and mist)  |
| <b>Yukon</b>                       | OEL STEL (mg/m <sup>3</sup> )        | 0.2 mg/m <sup>3</sup> (fume)<br>2 mg/m <sup>3</sup> (dust and mist)  |



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|                                    |   |  |
|------------------------------------|---|--|
| <b>Yukon</b>                       | OEL TWA (mg/m <sup>3</sup> )            | 0.2 mg/m <sup>3</sup> (fume)<br>1 mg/m <sup>3</sup> (dust and mist)            |
| <b>Aluminum (7429-90-5)</b>        |   |  |
| <b>USA ACGIH</b>                   | ACGIH TWA (mg/m <sup>3</sup> )          | 1 mg/m <sup>3</sup> (respirable particulate matter)                            |
| <b>USA ACGIH</b>                   | ACGIH chemical category                 | Not Classifiable as a Human Carcinogen   |
| <b>USA OSHA</b>                    | OSHA PEL (TWA) (mg/m <sup>3</sup> )     | 15 mg/m <sup>3</sup> (total dust)<br>5 mg/m <sup>3</sup> (respirable fraction) |
| <b>USA NIOSH</b>                   | NIOSH REL (TWA) (mg/m <sup>3</sup> )    | 10 mg/m <sup>3</sup> (total dust)<br>5 mg/m <sup>3</sup> (respirable dust)     |
| <b>Alberta</b>                     | OEL TWA (mg/m <sup>3</sup> )            | 10 mg/m <sup>3</sup> (dust)  |
| <b>British Columbia</b>            | OEL TWA (mg/m <sup>3</sup> )            | 1 mg/m <sup>3</sup> (respirable)   |
| <b>Manitoba</b>                    | OEL TWA (mg/m <sup>3</sup> )            | 1 mg/m <sup>3</sup> (respirable particulate matter)                            |
| <b>New Brunswick</b>               | OEL TWA (mg/m <sup>3</sup> )            | 10 mg/m <sup>3</sup> (metal dust)  |
| <b>Newfoundland &amp; Labrador</b> | OEL TWA (mg/m <sup>3</sup> )            | 1 mg/m <sup>3</sup> (respirable particulate matter)                            |
| <b>Nova Scotia</b>                 | OEL TWA (mg/m <sup>3</sup> )            | 1 mg/m <sup>3</sup> (respirable particulate matter)                            |
| <b>Nunavut</b>                     | OEL STEL (mg/m <sup>3</sup> )           | 20 mg/m <sup>3</sup> (metal-dust)  |
| <b>Nunavut</b>                     | OEL TWA (mg/m <sup>3</sup> )            | 10 mg/m <sup>3</sup> (metal-dust)  |
| <b>Northwest Territories</b>       | OEL STEL (mg/m <sup>3</sup> )           | 20 mg/m <sup>3</sup> (metal-dust)  |
| <b>Northwest Territories</b>       | OEL TWA (mg/m <sup>3</sup> )            | 10 mg/m <sup>3</sup> (metal-dust)  |
| <b>Ontario</b>                     | OEL TWA (mg/m <sup>3</sup> )            | 1 mg/m <sup>3</sup> (respirable)   |
| <b>Prince Edward Island</b>        | OEL TWA (mg/m <sup>3</sup> )            | 1 mg/m <sup>3</sup> (respirable particulate matter)                            |
| <b>Québec</b>                      | VEMP (mg/m <sup>3</sup> )               | 10 mg/m <sup>3</sup>   |
| <b>Saskatchewan</b>                | OEL STEL (mg/m <sup>3</sup> )           | 20 mg/m <sup>3</sup> (dust)  |
| <b>Saskatchewan</b>                | OEL TWA (mg/m <sup>3</sup> )            | 10 mg/m <sup>3</sup> (dust)  |
| <b>Sulfur (7704-34-9)</b>          |   |  |
| <b>Alberta</b>                     | OEL TWA (mg/m <sup>3</sup> )            | 10 mg/m <sup>3</sup>   |
| <b>Vanadium (7440-62-2)</b>        |   |  |
| <b>USA OSHA</b>                    | OSHA PEL (Ceiling) (mg/m <sup>3</sup> ) | 0.5 mg/m <sup>3</sup> (respirable dust)<br>0.1 mg/m <sup>3</sup> (fume)        |
| <b>USA NIOSH</b>                   | NIOSH REL (TWA) (mg/m <sup>3</sup> )    | 1 mg/m <sup>3</sup>  |
| <b>USA NIOSH</b>                   | NIOSH REL (STEL) (mg/m <sup>3</sup> )   | 3 mg/m <sup>3</sup>  |
| <b>Tungsten (7440-33-7)</b>        |   |  |
| <b>USA ACGIH</b>                   | ACGIH TWA (mg/m <sup>3</sup> )          | 3 mg/m <sup>3</sup> (respirable particulate matter)                            |
| <b>USA NIOSH</b>                   | NIOSH REL (TWA) (mg/m <sup>3</sup> )    | 5 mg/m <sup>3</sup>  |
| <b>USA NIOSH</b>                   | NIOSH REL (STEL) (mg/m <sup>3</sup> )   | 10 mg/m <sup>3</sup>   |
| <b>Alberta</b>                     | OEL STEL (mg/m <sup>3</sup> )           | 10 mg/m <sup>3</sup>   |
| <b>Alberta</b>                     | OEL TWA (mg/m <sup>3</sup> )            | 5 mg/m <sup>3</sup>  |
| <b>British Columbia</b>            | OEL STEL (mg/m <sup>3</sup> )           | 10 mg/m <sup>3</sup>   |
| <b>British Columbia</b>            | OEL TWA (mg/m <sup>3</sup> )            | 5 mg/m <sup>3</sup>  |
| <b>Manitoba</b>                    | OEL TWA (mg/m <sup>3</sup> )            | 3 mg/m <sup>3</sup> (respirable particulate matter)                            |
| <b>Newfoundland &amp; Labrador</b> | OEL TWA (mg/m <sup>3</sup> )            | 3 mg/m <sup>3</sup> (respirable particulate matter)                            |
| <b>Nova Scotia</b>                 | OEL TWA (mg/m <sup>3</sup> )            | 3 mg/m <sup>3</sup> (respirable particulate matter)                            |
| <b>Nunavut</b>                     | OEL STEL (mg/m <sup>3</sup> )           | 10 mg/m <sup>3</sup>   |
| <b>Nunavut</b>                     | OEL TWA (mg/m <sup>3</sup> )            | 5 mg/m <sup>3</sup>  |
| <b>Northwest Territories</b>       | OEL STEL (mg/m <sup>3</sup> )           | 10 mg/m <sup>3</sup>   |
| <b>Northwest Territories</b>       | OEL TWA (mg/m <sup>3</sup> )            | 5 mg/m <sup>3</sup>  |
| <b>Ontario</b>                     | OEL STEL (mg/m <sup>3</sup> )           | 10 mg/m <sup>3</sup>   |
| <b>Ontario</b>                     | OEL TWA (mg/m <sup>3</sup> )            | 5 mg/m <sup>3</sup>  |
| <b>Prince Edward Island</b>        | OEL TWA (mg/m <sup>3</sup> )            | 3 mg/m <sup>3</sup> (respirable particulate matter)                            |
| <b>Saskatchewan</b>                | OEL STEL (mg/m <sup>3</sup> )           | 10 mg/m <sup>3</sup>   |
| <b>Saskatchewan</b>                | OEL TWA (mg/m <sup>3</sup> )            | 5 mg/m <sup>3</sup>  |

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|   |                                      |  |
|---|--------------------------------------|--|
| <b>Yukon</b>                            | OEL STEL (mg/m <sup>3</sup> )        | 10 mg/m <sup>3</sup>                                     |
| <b>Yukon</b>                            | OEL TWA (mg/m <sup>3</sup> )         | 5 mg/m <sup>3</sup>                                      |
| <b>Antimony (7440-36-0)</b>             |                                      |  |
| <b>USA ACGIH</b>                        | ACGIH TWA (mg/m <sup>3</sup> )       | 0.5 mg/m <sup>3</sup>                                    |
| <b>USA OSHA</b>                         | OSHA PEL (TWA) (mg/m <sup>3</sup> )  | 0.5 mg/m <sup>3</sup>                                    |
| <b>USA NIOSH</b>                        | NIOSH REL (TWA) (mg/m <sup>3</sup> ) | 0.5 mg/m <sup>3</sup>                                    |
| <b>USA IDLH</b>                         | US IDLH (mg/m <sup>3</sup> )         | 50 mg/m <sup>3</sup>                                     |
| <b>Alberta</b>                          | OEL TWA (mg/m <sup>3</sup> )         | 0.5 mg/m <sup>3</sup>                                    |
| <b>British Columbia</b>                 | OEL TWA (mg/m <sup>3</sup> )         | 0.5 mg/m <sup>3</sup>                                    |
| <b>Manitoba</b>                         | OEL TWA (mg/m <sup>3</sup> )         | 0.5 mg/m <sup>3</sup>                                    |
| <b>New Brunswick</b>                    | OEL TWA (mg/m <sup>3</sup> )         | 0.5 mg/m <sup>3</sup>                                    |
| <b>Newfoundland &amp; Labrador</b>      | OEL TWA (mg/m <sup>3</sup> )         | 0.5 mg/m <sup>3</sup>                                    |
| <b>Nova Scotia</b>                      | OEL TWA (mg/m <sup>3</sup> )         | 0.5 mg/m <sup>3</sup>                                    |
| <b>Nunavut</b>                          | OEL STEL (mg/m <sup>3</sup> )        | 1.5 mg/m <sup>3</sup>                                    |
| <b>Nunavut</b>                          | OEL TWA (mg/m <sup>3</sup> )         | 0.5 mg/m <sup>3</sup>                                    |
| <b>Northwest Territories</b>            | OEL STEL (mg/m <sup>3</sup> )        | 1.5 mg/m <sup>3</sup>                                    |
| <b>Northwest Territories</b>            | OEL TWA (mg/m <sup>3</sup> )         | 0.5 mg/m <sup>3</sup>                                    |
| <b>Ontario</b>                          | OEL TWA (mg/m <sup>3</sup> )         | 0.5 mg/m <sup>3</sup>                                    |
| <b>Prince Edward Island</b>             | OEL TWA (mg/m <sup>3</sup> )         | 0.5 mg/m <sup>3</sup>                                    |
| <b>Québec</b>                           | VEMP (mg/m <sup>3</sup> )            | 0.5 mg/m <sup>3</sup>                                    |
| <b>Saskatchewan</b>                     | OEL STEL (mg/m <sup>3</sup> )        | 1.5 mg/m <sup>3</sup>                                    |
| <b>Saskatchewan</b>                     | OEL TWA (mg/m <sup>3</sup> )         | 0.5 mg/m <sup>3</sup>                                    |
| <b>Yukon</b>                            | OEL STEL (mg/m <sup>3</sup> )        | 0.75 mg/m <sup>3</sup>                                   |
| <b>Yukon</b>                            | OEL TWA (mg/m <sup>3</sup> )         | 0.5 mg/m <sup>3</sup>                                    |
| <b>Tin (7440-31-5)</b>                  |                                      |  |
| <b>USA ACGIH</b>                        | ACGIH TWA (mg/m <sup>3</sup> )       | 2 mg/m <sup>3</sup>                                      |
| <b>USA NIOSH</b>                        | NIOSH REL (TWA) (mg/m <sup>3</sup> ) | 2 mg/m <sup>3</sup>                                      |
| <b>USA IDLH</b>                         | US IDLH (mg/m <sup>3</sup> )         | 100 mg/m <sup>3</sup>                                    |
| <b>Alberta</b>                          | OEL TWA (mg/m <sup>3</sup> )         | 2 mg/m <sup>3</sup>                                      |
| <b>British Columbia</b>                 | OEL TWA (mg/m <sup>3</sup> )         | 2 mg/m <sup>3</sup>                                      |
| <b>Manitoba</b>                         | OEL TWA (mg/m <sup>3</sup> )         | 2 mg/m <sup>3</sup>                                      |
| <b>New Brunswick</b>                    | OEL TWA (mg/m <sup>3</sup> )         | 2 mg/m <sup>3</sup>                                      |
| <b>Newfoundland &amp; Labrador</b>      | OEL TWA (mg/m <sup>3</sup> )         | 2 mg/m <sup>3</sup>                                      |
| <b>Nova Scotia</b>                      | OEL TWA (mg/m <sup>3</sup> )         | 2 mg/m <sup>3</sup>                                      |
| <b>Nunavut</b>                          | OEL STEL (mg/m <sup>3</sup> )        | 4 mg/m <sup>3</sup> (metal)                              |
| <b>Nunavut</b>                          | OEL TWA (mg/m <sup>3</sup> )         | 2 mg/m <sup>3</sup> (metal)                              |
| <b>Northwest Territories</b>            | OEL STEL (mg/m <sup>3</sup> )        | 4 mg/m <sup>3</sup> (metal)                              |
| <b>Northwest Territories</b>            | OEL TWA (mg/m <sup>3</sup> )         | 2 mg/m <sup>3</sup> (metal)                              |
| <b>Ontario</b>                          | OEL TWA (mg/m <sup>3</sup> )         | 2 mg/m <sup>3</sup>                                      |
| <b>Prince Edward Island</b>             | OEL TWA (mg/m <sup>3</sup> )         | 2 mg/m <sup>3</sup>                                      |
| <b>Québec</b>                           | VEMP (mg/m <sup>3</sup> )            | 2 mg/m <sup>3</sup>                                      |
| <b>Saskatchewan</b>                     | OEL STEL (mg/m <sup>3</sup> )        | 4 mg/m <sup>3</sup>                                      |
| <b>Saskatchewan</b>                     | OEL TWA (mg/m <sup>3</sup> )         | 2 mg/m <sup>3</sup>                                      |
| <b>Nitrogen (7727-37-9)</b>             |                                      |  |
| <b>USA ACGIH</b>                        | ACGIH chemical category              | Simple asphyxiant See Appendix F: Minimal Oxygen Content |
| <b>Phosphorus elemental (7723-14-0)</b> |                                      |  |
| <b>Alberta</b>                          | OEL TWA (mg/m <sup>3</sup> )         | 0.1 mg/m <sup>3</sup> (yellow)                           |
| <b>New Brunswick</b>                    | OEL TWA (mg/m <sup>3</sup> )         | 0.1 mg/m <sup>3</sup> (yellow)                           |
| <b>New Brunswick</b>                    | OEL TWA (ppm)                        | 0.02 ppm (yellow)  |
| <b>Québec</b>                           | VEMP (mg/m <sup>3</sup> )            | 0.1 mg/m <sup>3</sup> (yellow)                           |

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| Selenium (7782-49-2)    |                                      |                       |
|-------------------------|--------------------------------------|-----------------------|
| USA ACGIH               | ACGIH TWA (mg/m <sup>3</sup> )       | 0.2 mg/m <sup>3</sup> |
| USA NIOSH               | NIOSH REL (TWA) (mg/m <sup>3</sup> ) | 0.2 mg/m <sup>3</sup> |
| USA IDLH                | US IDLH (mg/m <sup>3</sup> )         | 1 mg/m <sup>3</sup>   |
| Alberta                 | OEL TWA (mg/m <sup>3</sup> )         | 0.2 mg/m <sup>3</sup> |
| British Columbia        | OEL TWA (mg/m <sup>3</sup> )         | 0.1 mg/m <sup>3</sup> |
| Manitoba                | OEL TWA (mg/m <sup>3</sup> )         | 0.2 mg/m <sup>3</sup> |
| New Brunswick           | OEL TWA (mg/m <sup>3</sup> )         | 0.2 mg/m <sup>3</sup> |
| Newfoundland & Labrador | OEL TWA (mg/m <sup>3</sup> )         | 0.2 mg/m <sup>3</sup> |
| Nova Scotia             | OEL TWA (mg/m <sup>3</sup> )         | 0.2 mg/m <sup>3</sup> |
| Nunavut                 | OEL STEL (mg/m <sup>3</sup> )        | 0.6 mg/m <sup>3</sup> |
| Nunavut                 | OEL TWA (mg/m <sup>3</sup> )         | 0.2 mg/m <sup>3</sup> |
| Northwest Territories   | OEL STEL (mg/m <sup>3</sup> )        | 0.6 mg/m <sup>3</sup> |
| Northwest Territories   | OEL TWA (mg/m <sup>3</sup> )         | 0.2 mg/m <sup>3</sup> |
| Ontario                 | OEL TWA (mg/m <sup>3</sup> )         | 0.2 mg/m <sup>3</sup> |
| Prince Edward Island    | OEL TWA (mg/m <sup>3</sup> )         | 0.2 mg/m <sup>3</sup> |
| Québec                  | VEMP (mg/m <sup>3</sup> )            | 0.2 mg/m <sup>3</sup> |
| Saskatchewan            | OEL STEL (mg/m <sup>3</sup> )        | 0.6 mg/m <sup>3</sup> |
| Saskatchewan            | OEL TWA (mg/m <sup>3</sup> )         | 0.2 mg/m <sup>3</sup> |
| Tellurium (13494-80-9)  |                                      |                       |
| USA ACGIH               | ACGIH TWA (mg/m <sup>3</sup> )       | 0.1 mg/m <sup>3</sup> |
| USA OSHA                | OSHA PEL (TWA) (mg/m <sup>3</sup> )  | 0.1 mg/m <sup>3</sup> |
| USA NIOSH               | NIOSH REL (TWA) (mg/m <sup>3</sup> ) | 0.1 mg/m <sup>3</sup> |
| USA IDLH                | US IDLH (mg/m <sup>3</sup> )         | 25 mg/m <sup>3</sup>  |
| Alberta                 | OEL TWA (mg/m <sup>3</sup> )         | 0.1 mg/m <sup>3</sup> |
| British Columbia        | OEL TWA (mg/m <sup>3</sup> )         | 0.1 mg/m <sup>3</sup> |
| Manitoba                | OEL TWA (mg/m <sup>3</sup> )         | 0.1 mg/m <sup>3</sup> |
| New Brunswick           | OEL TWA (mg/m <sup>3</sup> )         | 0.1 mg/m <sup>3</sup> |
| Newfoundland & Labrador | OEL TWA (mg/m <sup>3</sup> )         | 0.1 mg/m <sup>3</sup> |
| Nova Scotia             | OEL TWA (mg/m <sup>3</sup> )         | 0.1 mg/m <sup>3</sup> |
| Nunavut                 | OEL STEL (mg/m <sup>3</sup> )        | 0.3 mg/m <sup>3</sup> |
| Nunavut                 | OEL TWA (mg/m <sup>3</sup> )         | 0.1 mg/m <sup>3</sup> |
| Northwest Territories   | OEL STEL (mg/m <sup>3</sup> )        | 0.3 mg/m <sup>3</sup> |
| Northwest Territories   | OEL TWA (mg/m <sup>3</sup> )         | 0.1 mg/m <sup>3</sup> |
| Ontario                 | OEL TWA (mg/m <sup>3</sup> )         | 0.1 mg/m <sup>3</sup> |
| Prince Edward Island    | OEL TWA (mg/m <sup>3</sup> )         | 0.1 mg/m <sup>3</sup> |
| Québec                  | VEMP (mg/m <sup>3</sup> )            | 0.1 mg/m <sup>3</sup> |
| Saskatchewan            | OEL STEL (mg/m <sup>3</sup> )        | 0.3 mg/m <sup>3</sup> |
| Saskatchewan            | OEL TWA (mg/m <sup>3</sup> )         | 0.1 mg/m <sup>3</sup> |
| Yukon                   | OEL STEL (mg/m <sup>3</sup> )        | 0.1 mg/m <sup>3</sup> |
| Yukon                   | OEL TWA (mg/m <sup>3</sup> )         | 0.1 mg/m <sup>3</sup> |

### 8.2. Exposure Controls

**Appropriate Engineering Controls:** Emergency eye wash fountain capability should be available in the immediate vicinity of any potential exposure. Ensure adequate ventilation, especially in confined areas. In powdered form: Avoid dust production. Take precautionary measures against static discharges. Use explosion-proof equipment.

**Personal Protective Equipment:** Gloves. Protective clothing. Protective goggles. Insufficient ventilation: wear respiratory protection.



**Materials for Protective Clothing:** Chemically resistant materials and fabrics.

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**Hand Protection:** Impermeable protective gloves.

**Eye and Face Protection:** Chemical safety goggles. Welders should wear goggles or safety glasses with side shields that comply with ANSI Z87.1 under welding helmets and always wear goggles or other suitable eye protection when gas welding or oxygen cutting.

**Skin and Body Protection:** Wear suitable protective clothing.

**Respiratory Protection:** Fumes and dust : If exposure limits are exceeded or irritation is experienced, approved respiratory protection should be worn.

**Thermal Hazard Protection:** When working with hot material, use suitable thermally protective clothing.

## SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

### 9.1. Information on Basic Physical and Chemical Properties

|  |                       |
|--|-----------------------|
| Physical State                         | : Solid               |
| Appearance                             | : Gray; Metallic      |
| Odor                                   | : Odorless            |
| Odor Threshold                         | : Not available       |
| pH                                     | : Not available       |
| Evaporation Rate                       | : Not available       |
| Melting Point                          | : 1538 °C (2800.4 °F) |
| Freezing Point                         | : Not available       |
| Boiling Point                          | : Not available       |
| Flash Point                            | : Not available       |
| Auto-ignition Temperature              | : Not available       |
| Decomposition Temperature              | : Not available       |
| Flammability (solid, gas)              | : Not available       |
| Lower Flammable Limit                  | : Not available       |
| Upper Flammable Limit                  | : Not available       |
| Vapor Pressure                         | : Not available       |
| Relative Vapor Density at 20°C         | : Not available       |
| Relative Density                       | : Not available       |
| Specific Gravity                       | : 7.6 - 7.8           |
| Solubility                             | : Water: Insoluble    |
| Partition Coefficient: N-Octanol/Water | : Not available       |
| Viscosity                              | : Not available       |
| VOC content                            | : 0 %                 |

## SECTION 10: STABILITY AND REACTIVITY

**10.1. Reactivity:** Hazardous reactions will not occur under normal conditions.

**10.2. Chemical Stability:** Stable under recommended handling and storage conditions (see Section 7).

**10.3. Possibility of Hazardous Reactions:** Hazardous polymerization will not occur.

**10.4. Conditions to Avoid:** Dust, chips, or ribbons can be ignited more easily, by an ignition source, by improper machining, or by spontaneous combustion if finely divided and damp.

**10.5. Incompatible Materials:** Oxidizers. Acids. Bases. Mineral acids. Corrosive substances in contact with metals may produce flammable hydrogen gas.

**10.6. Hazardous Decomposition Products:** None expected under normal conditions of use.

## SECTION 11: TOXICOLOGICAL INFORMATION

### 11.1. Information on Toxicological Effects - Product

**Acute Toxicity (Oral):** Oral: Not classified

**Acute Toxicity (Dermal):** Not classified

**Acute Toxicity (Inhalation):** Not classified

**LD50 and LC50 Data:** Not available

**Skin Corrosion/Irritation:** Not classified

**Eye Damage/Irritation:** Not classified

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**Respiratory or Skin Sensitization:** Not classified. May cause an allergic skin reaction.

**Germ Cell Mutagenicity:** Not classified

**Carcinogenicity:** Suspected of causing cancer.

**Specific Target Organ Toxicity (Repeated Exposure):** Not classified.

**Reproductive Toxicity:** May damage fertility or the unborn child.

**Specific Target Organ Toxicity (Single Exposure):** Not classified

**Aspiration Hazard:** Not classified

**Symptoms/Injuries After Inhalation:** During processing, the most significant route of exposure is by the inhalation (breathing) of fumes. If fumes are inhaled, they can cause a condition commonly known as metal fume fever with symptoms which resemble influenza; Symptoms may be delayed 4-12 hours and begin with a sudden onset of thirst, and a sweet, metallic or foul taste in the mouth. Other symptoms may include upper respiratory tract irritation accompanied by coughing and a dryness of the mucous membranes, lassitude and a generalized feeling of malaise. Fever, chills, muscular pain, mild to severe headache, nausea, occasional vomiting, exaggerated mental activity, profuse sweating, excessive urination, diarrhea and prostration may also occur.

**Symptoms/Injuries After Skin Contact:** Dust may cause irritation in skin folds or by contact in combination with tight clothing. Contact with hot, molten metal will cause thermal burns. Removal of solidified molten material from skin requires medical assistance.

**Symptoms/Injuries After Eye Contact:** Dust generated from material cutting may cause a slight irritation. Slivers may be generated, which could cause mechanical irritation or injure the eye. Dusts caused from milling and physical alteration will likely cause eye irritation. Fumes from thermal decomposition or molten material will likely be irritating to the eyes.

**Symptoms/Injuries After Ingestion:** If large amounts are ingested: Gastrointestinal irritation.

**Chronic Symptoms:** Suspected of causing cancer. May damage fertility or the unborn child. Inhalation of iron oxide fumes undergoing decomposition may cause irritation and flu-like symptoms, otherwise iron oxide is not hazardous. Repeated inhalation of iron oxide dust can cause siderosis a benign condition. Chromium: Certain hexavalent chromium compounds have been demonstrated to be carcinogenic on the basis of epidemiological investigations on workers and experimental studies in animals. Increased incidences of respiratory cancer have been found in chromium (VI) workers. There is an increased incidence of lung cancer in industrial workers exposed to chromium (VI) compounds. Please refer to IARC volume 23 for a more detailed discussion. Zinc: Prolonged exposure to high concentrations of zinc fumes may cause "zinc shakes", an involuntary twitching of the muscles. Otherwise, zinc is non-toxic. Inhalation of Nickel compounds has been shown in studies to provide an increased incidence of cancer of the nasal cavity, lung and possibly larynx in nickel refinery workers. Nickel metal powder, when respirable, is a suspected human carcinogen, and is known to cause damage to the lungs through inhalation. Molybdenum: Chronic exposure to molybdenum compounds is suspected of causing cancer. Compounds are also known to cause irritation to the skin, eyes, and respiratory tract. Silicon: Can cause chronic bronchitis and narrowing of the airways. Manganese: Chronic exposure can cause inflammation of the lung tissue, scarring the lungs (pulmonary fibrosis). Chronic exposure to excessive manganese levels can lead to a variety of psychiatric and motor disturbances, termed manganism. Copper: Overexposure to fumes may cause metal fume fever (chills, muscle aches, nausea, fever, dry throat, cough, weakness, lassitude); metallic or sweet taste; discoloration of skin and hair. Tissue damage of mucous membranes may follow chronic dust exposure. Aluminum: Inhalation of finely divided aluminum powder may cause pulmonary fibrosis. Chronic dermal exposure to sulfur dust has been linked to headache, vertigo, irritation to the airways, breathing difficulties, coordination disturbances, accelerated pulse, hypotonia, cramps and unconsciousness. Frequent dermal contact with sulfur dusts mainly caused skin damage in the form of eczematous or ulcerous changes. Vanadium: May cause gastrointestinal discomfort, renal damage, nervous system depression and irritation of the respiratory passages. May also cause cardiac palpitations and asthma. Antimony: Exposure to antimony dusts and fume may result in irritation eyes, skin, nose, throat, mouth; cough; dizziness; headache; nausea, vomiting, diarrhea; stomach cramps; insomnia; anorexia; unable to smell properly. Tin: Has been shown to increase incidence of sarcoma in animal tests. Chronic exposure to tin dusts and fume may result in "stannosis", a mild form of pneumoconiosis.

### 11.2. Information on Toxicological Effects - Ingredient(s)

#### LD50 and LC50 Data:

|                             |                |
|-----------------------------|----------------|
| <b>Iron (7439-89-6)</b>     |                |
| LD50 Oral Rat               | 98.6 g/kg      |
| <b>Chromium (7440-47-3)</b> |                |
| LD50 Oral Rat               | > 5000 mg/kg   |
| LC50 Inhalation Rat         | > 5.41 mg/l/4h |
| <b>Nickel (7440-02-0)</b>   |                |
| LD50 Oral Rat               | > 9000 mg/kg   |
| <b>Carbon (7440-44-0)</b>   |                |

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|   |  |
|---|--|
| LD50 Oral Rat                             | > 10000 mg/kg                                  |
| <b>Molybdenum (7439-98-7)</b>             |  |
| LD50 Oral Rat                             | > 2000 mg/kg                                   |
| LD50 Dermal Rat                           | > 2000 mg/kg                                   |
| LC50 Inhalation Rat                       | > 3.92 mg/l/4h                                 |
| <b>Silicon (7440-21-3)</b>                |  |
| LD50 Oral Rat                             | 3160 mg/kg                                     |
| <b>Manganese (7439-96-5)</b>              |  |
| LD50 Oral Rat                             | > 2000 mg/kg                                   |
| LC50 Inhalation Rat                       | > 5.14 mg/l/4h                                 |
| <b>Sulfur (7704-34-9)</b>                 |  |
| LD50 Oral Rat                             | > 3000 mg/kg                                   |
| LD50 Dermal Rabbit                        | > 2000 mg/kg                                   |
| LC50 Inhalation Rat                       | > 9.23 mg/l/4h                                 |
| <b>Bismuth (7440-69-9)</b>                |  |
| LD50 Oral Rat                             | 5 g/kg   |
| <b>Antimony (7440-36-0)</b>               |  |
| LD50 Oral Rat                             | 7 g/kg   |
| <b>Boron (7440-42-8)</b>                  |  |
| LD50 Oral Rat                             | > 2000 mg/kg                                   |
| <b>Niobium (7440-03-1)</b>                |  |
| LD50 Oral Rat                             | > 10 g/kg                                      |
| <b>Phosphorus elemental (7723-14-0)</b>   |  |
| LD50 Oral Rat                             | 3030 µg/kg                                     |
| LD50 Dermal Rat                           | 100 mg/kg                                      |
| LC50 Inhalation Rat                       | 4.3 mg/l (Exposure time: 1 h)                  |
| <b>Selenium (7782-49-2)</b>               |  |
| LD50 Oral Rat                             | 6700 mg/kg                                     |
| ATE US/CA (oral)                          | 100.00 mg/kg body weight                       |
| ATE US/CA (dust, mist)                    | 0.50 mg/l/4h                                   |
| <b>Tellurium (13494-80-9)</b>             |  |
| LD50 Oral Rat                             | 83 mg/kg                                       |
| LC50 Inhalation Rat                       | > 2420 mg/m <sup>3</sup> (Exposure time: 4 h)  |
| LC50 Inhalation Rat                       | 2.42 mg/l/4h                                   |
| <b>Chromium (7440-47-3)</b>               |  |
| IARC Group                                | 3  |
| <b>Nickel (7440-02-0)</b>                 |  |
| IARC Group                                | 2B   |
| National Toxicology Program (NTP) Status  | Reasonably anticipated to be Human Carcinogen. |
| OSHA Hazard Communication Carcinogen List | In OSHA Hazard Communication Carcinogen list.  |
| <b>Selenium (7782-49-2)</b>               |  |
| IARC Group                                | 3  |

## SECTION 12: ECOLOGICAL INFORMATION

### 12.1. Toxicity

**Ecology - General:** This product contains components that are environmentally hazardous and small chips and dust from processing may be toxic to aquatic life.

|                           |   |
|---------------------------|---|
| <b>Nickel (7440-02-0)</b> |   |
| LC50 Fish 1               | 100 mg/l (Exposure time: 96 h - Species: Brachydanio rerio) |
| EC50 Daphnia 1            | > 100 mg/l (Exposure time: 48 h - Species: Daphnia magna)   |

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|   |  |
|---|--|
| LC50 Fish 2                             | 15.3 mg/l  |
| EC50 Daphnia 2                          | 1 mg/l (Exposure time: 48 h - Species: Daphnia magna [Static])                   |
| <b>Manganese (7439-96-5)</b>            |  |
| NOEC Chronic Fish                       | 3.6 mg/l (Exposure time: 96h; Species: Oncorhynchus mykiss)                      |
| <b>Sulfur (7704-34-9)</b>               |  |
| LC50 Fish 1                             | 866 mg/l (Exposure time: 96 h - Species: Brachydanio rerio [static])             |
| EC50 Daphnia 1                          | 736 mg/l (Exposure time: 48 h - Species: Daphnia magna)                          |
| LC50 Fish 2                             | 14 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [static])            |
| <b>Phosphorus elemental (7723-14-0)</b> |  |
| LC50 Fish 1                             | 33.2 mg/l Red Phosphorous (Exposure time: 96 h - Species Danio rerio [static])   |
| EC50 Daphnia 1                          | 0.03 mg/l (Exposure time: 48 h - Species: Daphnia magna)                         |
| LC50 Fish 2                             | 0.001 - 0.004 mg/l (Exposure time: 96 h - Species: Lepomis macrochirus [static]) |
| EC50 Daphnia 2                          | 0.025 - 0.037 mg/l (Exposure time: 48 h - Species: Daphnia magna [Static])       |

### 12.2. Persistence and Degradability

|                                |                            |
|--------------------------------|----------------------------|
| <b>Carbon and Alloy Steels</b> |                            |
| Persistence and Degradability  | Not readily biodegradable. |
| <b>Copper (7440-50-8)</b>      |                            |
| Persistence and Degradability  | Not readily biodegradable. |

### 12.3. Bioaccumulative Potential

|   |       |
|---|-------|
| <b>Phosphorus elemental (7723-14-0)</b> |       |
| BCF Fish 1                              | < 200 |

### 12.4. Mobility in Soil

Not available

### 12.5. Other Adverse Effects

**Other Information:** Avoid unnecessary release into the environment.

## SECTION 13: DISPOSAL CONSIDERATIONS

### 13.1. Waste treatment methods

**Waste Disposal Recommendations:** Dispose of waste material in accordance with all local, regional, national, provincial, territorial and international regulations.

**Additional Information:** Recycle where possible and/or dispose of spent material such as metals and metal-bearing waste and submerged arc welding (SAW) flux/slag appropriately.

## SECTION 14: TRANSPORT INFORMATION

The shipping description(s) stated herein were prepared in accordance with certain assumptions at the time the SDS was authored, and can vary based on a number of variables that may or may not have been known at the time the SDS was issued.

- 14.1. **In Accordance with DOT** Not regulated for transport
- 14.2. **In Accordance with IMDG** Not regulated for transport
- 14.3. **In Accordance with IATA** Not regulated for transport
- 14.4. **In Accordance with TDG** Not regulated for transport

## SECTION 15: REGULATORY INFORMATION

### 15.1. US Federal Regulations

|  |  |
|--|--|
| <b>Carbon and Alloy Steels</b>   |  |
| SARA Section 311/312 Hazard Classes  | Delayed (chronic) health hazard<br>Immediate (acute) health hazard |
| <b>Iron (7439-89-6)</b>  |  |
| Listed on the United States TSCA (Toxic Substances Control Act) inventory  |  |
| <b>Chromium (7440-47-3)</b>  |  |
| Listed on the United States TSCA (Toxic Substances Control Act) inventory<br>Subject to reporting requirements of United States SARA Section 313 |  |
| CERCLA RQ  | 5000 lb no reporting of releases of this hazardous substance is    |

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|  |   |
|--|---|
|  | required if the diameter of the pieces of the solid metal released is >100 µm   |
| <b>SARA Section 313 - Emission Reporting</b>   | 1 %   |
| <b>Zinc (7440-66-6)</b>  |   |
| Listed on the United States TSCA (Toxic Substances Control Act) inventory<br>Subject to reporting requirements of United States SARA Section 313 |   |
| <b>CERCLA RQ</b>   | 454 kg no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm  |
| <b>SARA Section 313 - Emission Reporting</b>   | 1 % (dust or fume only)   |
| <b>Nickel (7440-02-0)</b>  |   |
| Listed on the United States TSCA (Toxic Substances Control Act) inventory<br>Subject to reporting requirements of United States SARA Section 313 |   |
| <b>CERCLA RQ</b>   | 100 lb (only applicable if particles are < 100 µm)  |
| <b>SARA Section 313 - Emission Reporting</b>   | 0.1 %   |
| <b>Carbon (7440-44-0)</b>  |   |
| Listed on the United States TSCA (Toxic Substances Control Act) inventory  |   |
| <b>Molybdenum (7439-98-7)</b>  |   |
| Listed on the United States TSCA (Toxic Substances Control Act) inventory  |   |
| <b>Silicon (7440-21-3)</b>   |   |
| Listed on the United States TSCA (Toxic Substances Control Act) inventory  |   |
| <b>Manganese (7439-96-5)</b>   |   |
| Listed on the United States TSCA (Toxic Substances Control Act) inventory<br>Subject to reporting requirements of United States SARA Section 313 |   |
| <b>SARA Section 313 - Emission Reporting</b>   | 1 %   |
| <b>Copper (7440-50-8)</b>  |   |
| Listed on the United States TSCA (Toxic Substances Control Act) inventory<br>Subject to reporting requirements of United States SARA Section 313 |   |
| <b>CERCLA RQ</b>   | 5000 lb no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm |
| <b>SARA Section 313 - Emission Reporting</b>   | 1 %   |
| <b>Aluminum (7429-90-5)</b>  |   |
| Listed on the United States TSCA (Toxic Substances Control Act) inventory<br>Subject to reporting requirements of United States SARA Section 313 |   |
| <b>SARA Section 313 - Emission Reporting</b>   | 1 % (dust or fume only)   |
| <b>Sulfur (7704-34-9)</b>  |   |
| Listed on the United States TSCA (Toxic Substances Control Act) inventory  |   |
| <b>Bismuth (7440-69-9)</b>   |   |
| Listed on the United States TSCA (Toxic Substances Control Act) inventory  |   |
| <b>Titanium (7440-32-6)</b>  |   |
| Listed on the United States TSCA (Toxic Substances Control Act) inventory  |   |
| <b>Vanadium (7440-62-2)</b>  |   |
| Listed on the United States TSCA (Toxic Substances Control Act) inventory<br>Subject to reporting requirements of United States SARA Section 313 |   |
| <b>SARA Section 313 - Emission Reporting</b>   | 1 % (except when contained in an alloy)   |
| <b>Tungsten (7440-33-7)</b>  |   |
| Listed on the United States TSCA (Toxic Substances Control Act) inventory  |   |
| <b>Antimony (7440-36-0)</b>  |   |
| Listed on the United States TSCA (Toxic Substances Control Act) inventory  |   |



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|   |   |                               |                                     |                                   |
|---|---|-------------------------------|-------------------------------------|-----------------------------------|
| Subject to reporting requirements of United States SARA Section 313   |   |                               |                                     |                                   |
| <b>CERCLA RQ</b>  | 5000 lb no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm |                               |                                     |                                   |
| <b>SARA Section 313 - Emission Reporting</b>  | 1 %   |                               |                                     |                                   |
| <b>Boron (7440-42-8)</b>  |   |                               |                                     |                                   |
| Listed on the United States TSCA (Toxic Substances Control Act) inventory   |   |                               |                                     |                                   |
| <b>Calcium (7440-70-2)</b>  |   |                               |                                     |                                   |
| Listed on the United States TSCA (Toxic Substances Control Act) inventory   |   |                               |                                     |                                   |
| <b>Tin (7440-31-5)</b>  |   |                               |                                     |                                   |
| Listed on the United States TSCA (Toxic Substances Control Act) inventory   |   |                               |                                     |                                   |
| <b>Niobium (7440-03-1)</b>  |   |                               |                                     |                                   |
| Listed on the United States TSCA (Toxic Substances Control Act) inventory   |   |                               |                                     |                                   |
| <b>Nitrogen (7727-37-9)</b>   |   |                               |                                     |                                   |
| Listed on the United States TSCA (Toxic Substances Control Act) inventory   |   |                               |                                     |                                   |
| <b>Phosphorus elemental (7723-14-0)</b>   |   |                               |                                     |                                   |
| Listed on the United States TSCA (Toxic Substances Control Act) inventory   |   |                               |                                     |                                   |
| Listed on the United States SARA Section 302  |   |                               |                                     |                                   |
| Subject to reporting requirements of United States SARA Section 313   |   |                               |                                     |                                   |
| <b>CERCLA RQ</b>  | 1 lb  |                               |                                     |                                   |
| <b>SARA Section 302 Threshold Planning Quantity (TPQ)</b>   | 100 lb (this material is a reactive solid, the TPQ does not default to 10000 pounds for non-powder, non-molten, non-solution form)            |                               |                                     |                                   |
| <b>SARA Section 313 - Emission Reporting</b>  | 1 % (yellow or white)   |                               |                                     |                                   |
| <b>Magnesium (7439-95-4)</b>  |   |                               |                                     |                                   |
| Listed on the United States TSCA (Toxic Substances Control Act) inventory   |   |                               |                                     |                                   |
| <b>Selenium (7782-49-2)</b>   |   |                               |                                     |                                   |
| Listed on the United States TSCA (Toxic Substances Control Act) inventory   |   |                               |                                     |                                   |
| Subject to reporting requirements of United States SARA Section 313   |   |                               |                                     |                                   |
| <b>CERCLA RQ</b>  | 100 lb no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm  |                               |                                     |                                   |
| <b>SARA Section 313 - Emission Reporting</b>  | 1 %   |                               |                                     |                                   |
| <b>Tellurium (13494-80-9)</b>   |   |                               |                                     |                                   |
| Listed on the United States TSCA (Toxic Substances Control Act) inventory   |   |                               |                                     |                                   |
| <b>15.2. US State Regulations</b>   |   |                               |                                     |                                   |
| <b>Carbon and Alloy Steels</b>  |   |                               |                                     |                                   |
| <b>U.S. - California - Proposition 65 - Carcinogens List</b>  | WARNING: This product contains chemicals known to the State of California to cause cancer.  |                               |                                     |                                   |
| <b>California Proposition 65</b>  |   |                               |                                     |                                   |
|  This product can expose you to Nickel, which is known to the State of California to cause cancer. For more information go to <a href="http://www.P65Warnings.ca.gov">www.P65Warnings.ca.gov</a> . |   |                               |                                     |                                   |
| <b>Chemical Name (CAS No.)</b>  | <b>Carcinogenicity</b>  | <b>Developmental Toxicity</b> | <b>Female Reproductive Toxicity</b> | <b>Male Reproductive Toxicity</b> |
| Nickel (7440-02-0)  | X   |                               |                                     |                                   |
| <b>Chromium (7440-47-3)</b>   |   |                               |                                     |                                   |
| U.S. - Massachusetts - Right To Know List   |   |                               |                                     |                                   |
| U.S. - New Jersey - Right to Know Hazardous Substance List  |   |                               |                                     |                                   |
| U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List   |   |                               |                                     |                                   |
| U.S. - Pennsylvania - RTK (Right to Know) - Special Hazardous Substances  |   |                               |                                     |                                   |
| U.S. - Pennsylvania - RTK (Right to Know) List  |   |                               |                                     |                                   |
| <b>Zinc (7440-66-6)</b>   |   |                               |                                     |                                   |

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U.S. - Massachusetts - Right To Know List  
U.S. - New Jersey - Right to Know Hazardous Substance List  
U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List  
U.S. - Pennsylvania - RTK (Right to Know) List

### **Nickel (7440-02-0)**

U.S. - Massachusetts - Right To Know List  
U.S. - New Jersey - Right to Know Hazardous Substance List  
U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List  
U.S. - Pennsylvania - RTK (Right to Know) - Special Hazardous Substances  
U.S. - Pennsylvania - RTK (Right to Know) List

### **Molybdenum (7439-98-7)**

U.S. - Massachusetts - Right To Know List  
U.S. - New Jersey - Right to Know Hazardous Substance List  
U.S. - Pennsylvania - RTK (Right to Know) List

### **Silicon (7440-21-3)**

U.S. - Massachusetts - Right To Know List  
U.S. - New Jersey - Right to Know Hazardous Substance List  
U.S. - Pennsylvania - RTK (Right to Know) List

### **Manganese (7439-96-5)**

U.S. - Massachusetts - Right To Know List  
U.S. - New Jersey - Right to Know Hazardous Substance List  
U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List  
U.S. - Pennsylvania - RTK (Right to Know) List

### **Copper (7440-50-8)**

U.S. - Massachusetts - Right To Know List  
U.S. - New Jersey - Right to Know Hazardous Substance List  
U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List  
U.S. - Pennsylvania - RTK (Right to Know) List

### **Aluminum (7429-90-5)**

U.S. - Massachusetts - Right To Know List  
U.S. - New Jersey - Right to Know Hazardous Substance List  
U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List  
U.S. - Pennsylvania - RTK (Right to Know) List

### **Sulfur (7704-34-9)**

U.S. - Massachusetts - Right To Know List  
U.S. - New Jersey - Right to Know Hazardous Substance List  
U.S. - Pennsylvania - RTK (Right to Know) List

### **Titanium (7440-32-6)**

U.S. - New Jersey - Right to Know Hazardous Substance List

### **Vanadium (7440-62-2)**

U.S. - Massachusetts - Right To Know List  
U.S. - New Jersey - Right to Know Hazardous Substance List  
U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List  
U.S. - Pennsylvania - RTK (Right to Know) List

### **Tungsten (7440-33-7)**

U.S. - Massachusetts - Right To Know List  
U.S. - New Jersey - Right to Know Hazardous Substance List  
U.S. - Pennsylvania - RTK (Right to Know) List

### **Antimony (7440-36-0)**

U.S. - Massachusetts - Right To Know List  
U.S. - New Jersey - Right to Know Hazardous Substance List  
U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List

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|   |
|---|
| U.S. - Pennsylvania - RTK (Right to Know) List                        |
| <b>Boron (7440-42-8)</b>  |
| U.S. - New Jersey - Right to Know Hazardous Substance List            |
| <b>Calcium (7440-70-2)</b>  |
| U.S. - Massachusetts - Right To Know List                             |
| U.S. - New Jersey - Right to Know Hazardous Substance List            |
| U.S. - Pennsylvania - RTK (Right to Know) List                        |
| <b>Tin (7440-31-5)</b>  |
| U.S. - Massachusetts - Right To Know List                             |
| U.S. - New Jersey - Right to Know Hazardous Substance List            |
| U.S. - Pennsylvania - RTK (Right to Know) List                        |
| <b>Nitrogen (7727-37-9)</b>   |
| U.S. - Massachusetts - Right To Know List                             |
| U.S. - New Jersey - Right to Know Hazardous Substance List            |
| U.S. - Pennsylvania - RTK (Right to Know) List                        |
| <b>Phosphorus elemental (7723-14-0)</b>                               |
| U.S. - Massachusetts - Right To Know List                             |
| U.S. - New Jersey - Right to Know Hazardous Substance List            |
| U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List |
| U.S. - Pennsylvania - RTK (Right to Know) List                        |
| <b>Magnesium (7439-95-4)</b>  |
| U.S. - Massachusetts - Right To Know List                             |
| U.S. - New Jersey - Right to Know Hazardous Substance List            |
| U.S. - Pennsylvania - RTK (Right to Know) List                        |
| <b>Selenium (7782-49-2)</b>   |
| U.S. - Massachusetts - Right To Know List                             |
| U.S. - New Jersey - Right to Know Hazardous Substance List            |
| U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List |
| U.S. - Pennsylvania - RTK (Right to Know) List                        |
| <b>Tellurium (13494-80-9)</b>   |
| U.S. - Massachusetts - Right To Know List                             |
| U.S. - New Jersey - Right to Know Hazardous Substance List            |
| U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List |
| U.S. - Pennsylvania - RTK (Right to Know) List                        |

### 15.3. Canadian Regulations

|   |
|---|
| <b>Iron (7439-89-6)</b>                               |
| Listed on the Canadian DSL (Domestic Substances List) |
| <b>Chromium (7440-47-3)</b>                           |
| Listed on the Canadian DSL (Domestic Substances List) |
| <b>Zinc (7440-66-6)</b>                               |
| Listed on the Canadian DSL (Domestic Substances List) |
| <b>Nickel (7440-02-0)</b>                             |
| Listed on the Canadian DSL (Domestic Substances List) |
| <b>Carbon (7440-44-0)</b>                             |
| Listed on the Canadian DSL (Domestic Substances List) |
| <b>Molybdenum (7439-98-7)</b>                         |
| Listed on the Canadian DSL (Domestic Substances List) |
| <b>Silicon (7440-21-3)</b>                            |
| Listed on the Canadian DSL (Domestic Substances List) |

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|   |
|---|
| <b>Manganese (7439-96-5)</b>                          |
| Listed on the Canadian DSL (Domestic Substances List) |
| <b>Copper (7440-50-8)</b>                             |
| Listed on the Canadian DSL (Domestic Substances List) |
| <b>Aluminum (7429-90-5)</b>                           |
| Listed on the Canadian DSL (Domestic Substances List) |
| <b>Sulfur (7704-34-9)</b>                             |
| Listed on the Canadian DSL (Domestic Substances List) |
| <b>Bismuth (7440-69-9)</b>                            |
| Listed on the Canadian DSL (Domestic Substances List) |
| <b>Titanium (7440-32-6)</b>                           |
| Listed on the Canadian DSL (Domestic Substances List) |
| <b>Vanadium (7440-62-2)</b>                           |
| Listed on the Canadian DSL (Domestic Substances List) |
| <b>Tungsten (7440-33-7)</b>                           |
| Listed on the Canadian DSL (Domestic Substances List) |
| <b>Antimony (7440-36-0)</b>                           |
| Listed on the Canadian DSL (Domestic Substances List) |
| <b>Boron (7440-42-8)</b>                              |
| Listed on the Canadian DSL (Domestic Substances List) |
| <b>Calcium (7440-70-2)</b>                            |
| Listed on the Canadian DSL (Domestic Substances List) |
| <b>Tin (7440-31-5)</b>                                |
| Listed on the Canadian DSL (Domestic Substances List) |
| <b>Niobium (7440-03-1)</b>                            |
| Listed on the Canadian DSL (Domestic Substances List) |
| <b>Nitrogen (7727-37-9)</b>                           |
| Listed on the Canadian DSL (Domestic Substances List) |
| <b>Phosphorus elemental (7723-14-0)</b>               |
| Listed on the Canadian DSL (Domestic Substances List) |
| <b>Magnesium (7439-95-4)</b>                          |
| Listed on the Canadian DSL (Domestic Substances List) |
| <b>Selenium (7782-49-2)</b>                           |
| Listed on the Canadian DSL (Domestic Substances List) |
| <b>Tellurium (13494-80-9)</b>                         |
| Listed on the Canadian DSL (Domestic Substances List) |

## SECTION 16: OTHER INFORMATION, INCLUDING DATE OF PREPARATION OR LAST REVISION

**Date of Preparation or Latest** : 08/28/2018

### Revision

**Other Information** : This document has been prepared in accordance with the SDS requirements of the OSHA Hazard Communication Standard 29 CFR 1910.1200 and Canada's Hazardous Products Regulations (HPR) SOR/2015-17.

### GHS Full Text Phrases:

|  |  |
|--|--|
| Acute Tox. 1 (Oral)                    | Acute toxicity (oral) Category 1                 |
| Acute Tox. 2 (Dermal)                  | Acute toxicity (dermal) Category 2               |
| Acute Tox. 3<br>(Inhalation:dust,mist) | Acute toxicity (inhalation:dust,mist) Category 3 |
| Acute Tox. 3 (Oral)                    | Acute toxicity (oral) Category 3                 |

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|  |   |
|--|---|
| Acute Tox. 4<br>(Inhalation:dust,mist) | Acute toxicity (inhalation:dust,mist) Category 4                                    |
| Aquatic Acute 1                        | Hazardous to the aquatic environment - Acute Hazard Category 1                      |
| Aquatic Acute 3                        | Hazardous to the aquatic environment - Acute Hazard Category 3                      |
| Aquatic Chronic 3                      | Hazardous to the aquatic environment - Chronic Hazard Category 3                    |
| Aquatic Chronic 4                      | Hazardous to the aquatic environment - Chronic Hazard Category 4                    |
| Carc. 2                                | Carcinogenicity Category 2  |
| Comb. Dust                             | Combustible Dust  |
| Flam. Sol. 1                           | Flammable solids Category 1   |
| Press. Gas (Comp.)                     | Gases under pressure Compressed gas   |
| Repr. 1B                               | Reproductive toxicity Category 1B   |
| Self-heat. 1                           | Self-heating substances and mixtures Category 1                                     |
| Simple Asphy                           | Simple Asphyxiant   |
| Skin Irrit. 2                          | Skin corrosion/irritation Category 2  |
| Skin Sens. 1                           | Skin sensitization, Category 1  |
| Skin Sens. 1B                          | Skin sensitization, category 1B   |
| STOT RE 1                              | Specific target organ toxicity (repeated exposure) Category 1                       |
| STOT RE 2                              | Specific target organ toxicity (repeated exposure) Category 2                       |
| Water-react. 2                         | Substances and mixtures which in contact with water emit flammable gases Category 2 |
| H228                                   | Flammable solid   |
| H251                                   | Self-heating; may catch fire  |
| H261                                   | In contact with water releases flammable gas  |
| H280                                   | Contains gas under pressure; may explode if heated                                  |
| H300                                   | Fatal if swallowed  |
| H301                                   | Toxic if swallowed  |
| H310                                   | Fatal in contact with skin  |
| H315                                   | Causes skin irritation  |
| H317                                   | May cause an allergic skin reaction   |
| H331                                   | Toxic if inhaled  |
| H332                                   | Harmful if inhaled  |
| H351                                   | Suspected of causing cancer   |
| H360                                   | May damage fertility or the unborn child  |
| H372                                   | Causes damage to organs through prolonged or repeated exposure                      |
| H373                                   | May cause damage to organs through prolonged or repeated exposure                   |
| H400                                   | Very toxic to aquatic life  |
| H402                                   | Harmful to aquatic life   |
| H412                                   | Harmful to aquatic life with long lasting effects                                   |
| H413                                   | May cause long lasting harmful effects to aquatic life                              |
|  | May displace oxygen and cause rapid suffocation                                     |

*This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.*

NA GHS SDS 2015 (Can, US)