

Safety Data Sheet

Section 1: Identification of the Substance/Mixture and of the Company/Undertaking

1.1 Product identifier

Product Name • **Iron Based Metal Alloys**

1.2 Relevant identified uses of the substance or mixture and uses advised against

Relevant identified use(s) • Raw material used in the manufacturing of other metal alloys.

1.3 Details of the supplier of the safety data sheet

Manufacturer • Greenville Metals, Inc.
 99 Crestview Drive – Extension
 Transfer, PA 16154
 United States
<http://www.pccforgedproducts.com/brands/greenville>
SDS@greenvillemetals.com

Telephone (General) • 724-509-1861

1.4 Emergency telephone number

Manufacturer • 724-509-1861

Section 2: Hazards Identification

EU/EEC

According to: Regulation (EC) No 1272/2008 (CLP)/REACH 1907/2006 [amended by 2015/830]

2.1 Classification of the substance or mixture

CLP

- Skin Sensitization 1 - H317
- Eye Irritation 2 - H319
- Respiratory Sensitization 1 - H334
- Reproductive Toxicity 1B - H360D
- Specific Target Organ Toxicity Single Exposure 2 - H371
- Specific Target Organ Toxicity Repeated Exposure 1 - H372
- Hazardous to the aquatic environment Acute 1 - H400
- Hazardous to the aquatic environment Chronic 1 - H410

2.2 Label Elements

CLP

DANGER



Hazard statements • H317 - May cause an allergic skin reaction
 H319 - Causes serious eye irritation
 H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled
 H360D - May damage the unborn child.
 H371 - May cause damage to organs.
 H372 - Causes damage to organs through prolonged or repeated exposure.
 H400 - Very toxic to aquatic life

- H410 - Very toxic to aquatic life with long lasting effects
- Prevention** • P201 - Obtain special instructions before use.
P202 - Do not handle until all safety precautions have been read and understood.
P260 - Do not breathe dust.
P264 - Wash thoroughly after handling.
P270 - Do not eat, drink or smoke when using this product.
P272 - Contaminated work clothing should not be allowed out of the workplace.
P273 - Avoid release to the environment.
P280 - Wear protective gloves/protective clothing/eye protection/face protection.
P284 - In case of inadequate ventilation wear respiratory protection.
- Response** • P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P342+P311 - If experiencing respiratory symptoms: Call a POISON CENTER/doctor.
P302+P352 - IF ON SKIN: Wash with plenty of water.
P362+P364 - Take off contaminated clothing and wash it before reuse.
P321 - Specific treatment, see supplemental first aid information.
P333+P313 - If skin irritation or rash occurs: Get medical advice/attention.
P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337+P313 - If eye irritation persists: Get medical advice/attention.
P308+P311 - IF exposed or concerned: Call a POISON CENTER or doctor/physician.
P308+P313 - IF exposed or concerned: Get medical advice/attention.
P314 - Get medical advice/attention if you feel unwell.
P391 - Collect spillage.
- Storage/Disposal** • P405 - Store locked up.
P501 - Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

2.3 Other Hazards

- CLP**
- Heating above the melting point releases metallic oxides which may cause metal fume fever by inhalation. The symptoms are shivering, fever, malaise and muscular pain. According to Regulation (EC) No. 1272/2008 (CLP) this material is considered hazardous.

United States (US)

According to: OSHA 29 CFR 1910.1200 HCS

2.1 Classification of the substance or mixture

- OSHA HCS 2012**
- Skin Sensitization 1
 - Eye Irritation 2
 - Respiratory Sensitization 1
 - Carcinogenicity 2
 - Reproductive Toxicity 1B
 - Specific Target Organ Toxicity Single Exposure 1
 - Specific Target Organ Toxicity Repeated Exposure 1
 - Specific Target Organ Toxicity Repeated Exposure 2
 - Hazards Not Otherwise Classified - Health Hazards - Metal Fume Fever

2.2 Label elements

OSHA HCS 2012

DANGER



- Hazard statements** • May cause an allergic skin reaction
Causes serious eye irritation
May cause allergy or asthma symptoms or breathing difficulties if inhaled
Suspected of causing cancer.

May damage fertility or the unborn child.
 Causes damage to organs.
 Causes damage to organs through prolonged or repeated exposure.
 May cause damage to organs through prolonged or repeated exposure.

Precautionary statements

- Prevention** • Obtain special instructions before use.
 Do not handle until all safety precautions have been read and understood.
 Do not breathe dust.
 Wash thoroughly after handling.
 Do not eat, drink or smoke when using this product.
 Contaminated work clothing should not be allowed out of the workplace.
 Wear protective gloves/protective clothing/eye protection/face protection.
 In case of inadequate ventilation wear respiratory protection.
- Response** • IF INHALED: Remove person to fresh air and keep comfortable for breathing.
 If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician.
 If on skin: Wash with plenty of water.
 Specific treatment, see supplemental first aid information.
 Wash contaminated clothing before reuse.
 If skin irritation or rash occurs: Get medical advice/attention.
 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
 If eye irritation persists: Get medical advice/attention.
 IF exposed: Call POISON CENTER or doctor/physician.
 IF exposed or concerned: Get medical advice/attention.
 Get medical advice/attention if you feel unwell.
- Storage/Disposal** • Store locked up.
 Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

2.3 Other hazards

OSHA HCS 2012

- Heating above the melting point releases metallic oxides which may cause metal fume fever by inhalation. The symptoms are shivering, fever, malaise and muscular pain. Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.

Canada

According to: WHMIS 2015

2.1 Classification of the substance or mixture

WHMIS 2015

- Skin Sensitization 1
- Eye Irritation 2
- Respiratory Sensitization 1
- Carcinogenicity 2
- Reproductive Toxicity 1B
- Specific Target Organ Toxicity Single Exposure 1
- Specific Target Organ Toxicity Repeated Exposure 1
- Specific Target Organ Toxicity Repeated Exposure 2
- Health Hazards Not Otherwise Classified 1

2.2 Label elements

WHMIS 2015

DANGER



- Hazard statements** • May cause an allergic skin reaction
 Causes serious eye irritation
 May cause allergy or asthma symptoms or breathing difficulties if inhaled

Suspected of causing cancer.
 May damage fertility or the unborn child.
 Causes damage to organs.
 Causes damage to organs through prolonged or repeated exposure.
 May cause damage to organs through prolonged or repeated exposure.
 Heating above the melting point releases metallic oxides which may cause metal fume fever by inhalation. The symptoms are shivering, fever, malaise and muscular pain.

Precautionary statements

- Prevention** • Obtain special instructions before use.
 Do not handle until all safety precautions have been read and understood.
 Do not breathe dust.
 Wash thoroughly after handling.
 Do not eat, drink or smoke when using this product.
 Contaminated work clothing should not be allowed out of the workplace.
 Wear protective gloves/protective clothing/eye protection/face protection.
 In case of inadequate ventilation wear respiratory protection.
- Response** • IF INHALED: Remove person to fresh air and keep comfortable for breathing.
 If experiencing respiratory symptoms: Call a POISON CENTER/doctor.
 IF ON SKIN: Wash with plenty of water.
 Take off contaminated clothing and wash it before reuse.
 Specific treatment, see supplemental first aid information.
 If skin irritation or rash occurs: Get medical advice/attention.
 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
 If eye irritation persists: Get medical advice/attention.
 IF exposed or concerned: Call a POISON CENTER/doctor.
 IF exposed or concerned: Get medical advice/attention.
 Get medical advice/attention if you feel unwell.
- Storage/Disposal** • Store locked up.
 Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

2.3 Other hazards

WHMIS 2015

- In Canada, the product mentioned above is considered hazardous under the Workplace Hazardous Materials Information System (WHMIS).

Section 3 - Composition/Information on Ingredients

3.1 Substances

- Material does not meet the criteria of a substance.

3.2 Mixtures

Composition					
Chemical Name	Identifiers	%	LD50/LC50	Classifications According to Regulation/Directive	Comments
Iron	CAS:7439-89-6 EC Number:231-096-4	25% TO 96%	NDA	EU CLP: Acute Tox. 4, H302; Aquatic Chronic 4, H413 OSHA HCS 2012: Acute Tox. 4 (Orl) WHMIS 2015: Acute Tox. 4 (Orl)	NDA
Nickel, massive, ≥ 1 mm	CAS:7440-02-0 EC Number:231-	0% TO 50%	NDA	EU CLP: Annex VI, Table 3.1: Skin Sens. 1, H317; Carc. 2, H351 (Inhl); STOT RE 1, H372 (Lungs / OrI/Dermal/Inhl); Aquatic Chronic 3, H412 OSHA HCS 2012: Flam. Sol. 1; Comb. Dust; Resp. Sens. 1B; Skin Sens. 1A; Carc. 2 (Inhl); STOT RE 2 (Lungs / OrI, Inhl)	NDA

	111-4			WHMIS 2015: Flam. Sol. 1; Comb. Dust; Resp. Sens. 1B; Skin Sens. 1A; Carc. 2 (Inhl); STOT RE 2 (Lungs / OrI, Inhl)	
Chromium, massive	CAS: 7440-47-3 EC Number: 231-157-5	0% TO 32%	NDA	EU CLP: Not Classified OSHA HCS 2012: Not Classified WHMIS 2015: Not Classified	NDA
Molybdenum (powder)	CAS: 7439-98-7 EC Number: 231-107-2	0% TO 30%	NDA	EU CLP: Flam. Sol. 1, H228; Repr. 2, H361 (OrI); Aquatic Chronic 4, H413 OSHA HCS 2012: Flam. Sol. 1; Comb. Dust; Repr. 2 (OrI) WHMIS 2015: Flam. Sol. 1; Comb. Dust; Repr. 2 (OrI)	NDA
Niobium	CAS: 7440-03-1 EC Number: 231-113-5	0% TO 28%	NDA	EU CLP: Not Classified OSHA HCS 2012: Not Classified WHMIS 2015: Not Classified	NDA
Manganese (powder)	CAS: 7439-96-5 EC Number: 231-105-1	0% TO 16%	Ingestion/Oral-Rat LD50 • 9 g/kg	EU CLP: Flam. Sol. 2, H228; Eye Irrit. 2, H319; Repr. 2, H361 (OrI); STOT RE 1, H372 (CNS, Lungs / Inhl) OSHA HCS 2012: Flam. Sol. 2; Comb. Dust; Eye Irrit. 2; Repr. 2 (OrI); STOT RE 1 (CNS, Lungs, Inhl); Hazard Not Otherwise Classified - Health Hazard - Metal fume fever WHMIS 2015: Flam. Sol. 2; Comb. Dust; Eye Irrit. 2; Repr. 2 (OrI); STOT RE 1 (CNS, Lungs/Inhl)	NDA
Vanadium	CAS: 7440-62-2 EC Number: 231-171-1	0% TO 15%	NDA	EU CLP: Not Classified OSHA HCS 2012: Not Classified WHMIS 2015: Not Classified	NDA
Tungsten, powder	CAS: 7440-33-7 EC Number: 231-143-9	0% TO 15%	NDA	EU CLP: Flam. Sol. 1, H228; Self-heat. 2, H252; Repr. 2, H361fd (Oral); EUH029 OSHA HCS 2012: Flam. Sol. 1; Self-heat. 2; Repr. 2 (OrI) WHMIS 2015: Flam. Sol. 1; Self-heat. 2; Repr. 2 (OrI)	NDA
Silicon	CAS: 7440-21-3 EC Number: 231-130-8	0% TO 6%	Ingestion/Oral-Rat LD50 • 3160 mg/kg	EU CLP: Flam. Sol. 2, H228 OSHA HCS 2012: Flam. Sol. 2 WHMIS 2015: Flam. Sol. 2	NDA
Titanium, massive	CAS: 7440-32-6 EC Number: 231-142-3	0% TO 5%	NDA	EU CLP: Not Classified OSHA HCS 2012: Not Classified WHMIS 2015: Not Classified	NDA
Copper	CAS: 7440-50-8 EC Number: 231-159-6	0% TO 5%	NDA	EU CLP: Repr. 1B, H360D (OrI); STOT SE 1, H370 (Kidney, OrI); STOT SE 3: Resp. Irrit., H335; STOT RE 2, H373 (Liver, OrI); Aquatic Acute 1, H400 (M=100); Aquatic Chronic 1, H410 (M=10) OSHA HCS 2012: Comb. Dust; Repr. 1B (OrI); STOT SE 1 (Kidney, OrI); STOT SE 3: Resp. Irrit.; STOT RE 2 (Liver, OrI) WHMIS 2015: Comb. Dust; Repr. 1B (OrI); STOT SE 1 (Kidney, OrI); STOT SE 3: Resp. Irrit.; STOT RE 2 (Liver, OrI)	NDA

Cobalt (powder)	CAS:7440-48-4 EC Number:231-158-0 EU Index:027-001-00-9	0% TO 5%	Ingestion/Oral-Rat LD50 • 6171 mg/kg	EU CLP: Annex VI, Table 3.1: Resp. Sens. 1, H334; Skin Sens. 1, H317; Aquatic Chronic 1, H410 (M=1) OSHA HCS 2012: Eye Irrit. 2; Resp. Sens. 1; Skin Sens. 1; Carc. 2 (Inhl); STOT RE 2 (Lung, Inhl) WHMIS 2015: Eye Irrit. 2; Resp. Sens. 1; Skin Sens. 1; Carc. 2 (Inhl); STOT RE 2 (Lungs, Inhl)	NDA
Carbon (animal or vegetable origin)	CAS:7440-44-0 EC Number:231-153-3	0% TO 5%	NDA	EU CLP: Not Classified OSHA HCS 2012: Not Classified WHMIS 2015: Not Classified	NDA
Boron	CAS:7440-42-8 EINECS:231-151-2	0% TO 5%	Ingestion/Oral-Rat LD50 • 650 mg/kg	EU CLP: Acute Tox. 4, H302; Repr. 2, H361 OSHA HCS 2012: Acute Tox. 4 (Orl); Repr. 2 WHMIS 2015: Acute Tox. 4 (Orl); Repr. 2	NDA
Aluminum powder, stabilized	CAS:7429-90-5 EC Number:231-072-3	0% TO 5%	NDA	EU CLP: Flam. Sol. 1, H228; Water-react. 2, H261 OSHA HCS 2012: Flam. Sol. 1; Water-react. 2; Comb. Dust; STOT RE 1 (Lungs, Inhl) WHMIS 2015: Flam. Sol. 1; Water-react. 2; Comb. Dust; STOT RE 1 (Lungs, Inhl)	NDA
Tantalum	CAS:7440-25-7 EC Number:231-135-5	0% TO 4%	NDA	EU CLP: Flam. Sol. 2, H228; Acute Tox. 4, H302 OSHA HCS 2012: Acute Tox. 4 (Orl) WHMIS 2015: Flam. Sol. 2; Comb. Dust; Acute Tox. 4 (Orl)	NDA
Rhenium	CAS:7440-15-5 EINECS:231-124-5	0% TO 4%	NDA	EU CLP: Not Classified OSHA HCS 2012: Not Classified WHMIS 2015: Not Classified	NDA

See Section 16 for full text of H-statements.

Section 4 - First Aid Measures

4.1 Description of first aid measures

Inhalation

- Move victim to fresh air. Give artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult. If signs/symptoms continue, get medical attention.

Skin

- In case of contact with substance, immediately flush skin with running water for at least 20 minutes. If irritation develops and persists, get medical attention.

Eye

- In case of contact with substance, immediately flush eyes with running water for at least 20 minutes. If eye irritation persists: Get medical advice/attention.

Ingestion

- Rinse mouth. Do not give anything by mouth to an unconscious person. Obtain medical attention immediately if ingested.

4.2 Most important symptoms and effects, both acute and delayed

- Refer to Section 11 - Toxicological Information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to Physician

- All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.

Section 5 - Firefighting Measures

5.1 Extinguishing media

Suitable Extinguishing Media • LARGE FIRE: Water spray, fog or regular foam.
SMALL FIRES: Dry chemical, CO₂, water spray or regular foam.

Unsuitable Extinguishing Media • No data available.

5.2 Special hazards arising from the substance or mixture

Unusual Fire and Explosion Hazards • Some may burn, but none ignite readily.

Hazardous Combustion Products • No data available.

5.3 Advice for firefighters

- Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection.

Section 6 - Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal Precautions • Ventilate enclosed areas. Do not walk through spilled material. Wear appropriate personal protective equipment, avoid direct contact. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

Emergency Procedures • Eliminate all ignition sources. As an immediate precautionary measure, isolate spill or leak area for at least 25 meters (75 feet) in all directions. If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. Keep unauthorized personnel away.

6.2 Environmental precautions

- Avoid run off to waterways and sewers.

6.3 Methods and material for containment and cleaning up

Containment/Clean-up Measures • Avoid generating dust.
Carefully shovel or sweep up spilled material and place in suitable container.
Cover powder spill with plastic sheet or tarp to minimize spreading.

6.4 Reference to other sections

- Refer to Section 8 - Exposure Controls/Personal Protection and Section 13 - Disposal Considerations.

Section 7 - Handling and Storage

7.1 Precautions for safe handling

Handling • Minimize dust generation and accumulation. Use only with adequate ventilation. Wear appropriate personal protective equipment, avoid direct contact. Do not breathe dust. Avoid contact with skin, eyes, and clothing. Wash thoroughly with soap and water after handling and before eating, drinking, or using tobacco. Clean up residue from cutting and grinding.

7.2 Conditions for safe storage, including any incompatibilities

Storage • Keep container/package tightly closed in a cool, well-ventilated place.

7.3 Specific end use(s)

- Refer to Section 1.2 - Relevant identified uses.

Section 8 - Exposure Controls/Personal Protection

8.1 Control parameters

Exposure Limits/Guidelines				
	Result	ACGIH	NIOSH	OSHA
Manganese (powder) (7439-96-5)	Ceilings	Not established	Not established	5 mg/m ³ Ceiling (fume)
	TWAs	0.02 mg/m ³ TWA (respirable fraction); 0.1 mg/m ³ TWA (inhalable fraction)	1 mg/m ³ TWA (fume)	Not established
	STELs	Not established	3 mg/m ³ STEL	Not established
Vanadium (7440-62-2)	Ceilings	Not established	0.05 mg/m ³ Ceiling (except Vanadium metal and Vanadium carbide, dust and fume, as V, 15 min) <i>as Vanadium compounds</i>	0.5 mg/m ³ Ceiling (respirable dust, as V ₂ O ₅); 0.1 mg/m ³ Ceiling (fume, as V ₂ O ₅)
	STELs	Not established	3 mg/m ³ STEL (listed under Ferrovandium dust)	Not established
	TWAs	Not established	1 mg/m ³ TWA (listed under Ferrovandium dust)	Not established
Copper (7440-50-8)	TWAs	0.2 mg/m ³ TWA (fume)	1 mg/m ³ TWA (dust and mist); 0.1 mg/m ³ TWA (fume)	0.1 mg/m ³ TWA (fume); 1 mg/m ³ TWA (dust and mist)
Chromium, massive (7440-47-3)	TWAs	0.5 mg/m ³ TWA	0.5 mg/m ³ TWA	1 mg/m ³ TWA
Tantalum (7440-25-7)	TWAs	Not established	5 mg/m ³ TWA (dust)	5 mg/m ³ TWA
	STELs	Not established	10 mg/m ³ STEL (dust)	Not established
Cobalt (powder) (7440-48-4)	TWAs	0.02 mg/m ³ TWA	0.05 mg/m ³ TWA (dust and fume)	0.1 mg/m ³ TWA (dust and fume)
Aluminum powder, stabilized (7429-90-5)	TWAs	1 mg/m ³ TWA (respirable fraction)	10 mg/m ³ TWA (total dust); 5 mg/m ³ TWA (respirable dust)	15 mg/m ³ TWA (total dust); 5 mg/m ³ TWA (respirable fraction)
Nickel, massive, ≥ 1 mm (7440-02-0)	TWAs	1.5 mg/m ³ TWA (inhalable fraction)	0.015 mg/m ³ TWA	1 mg/m ³ TWA
Silicon (7440-21-3)	TWAs	Not established	10 mg/m ³ TWA (total dust); 5 mg/m ³ TWA (respirable dust)	15 mg/m ³ TWA (total dust); 5 mg/m ³ TWA (respirable fraction)
Tungsten, powder (7440-33-7)	STELs	10 mg/m ³ STEL	10 mg/m ³ STEL	Not established
	TWAs	5 mg/m ³ TWA	5 mg/m ³ TWA	Not established
Molybdenum (powder) (7439-98-7)	TWAs	10 mg/m ³ TWA (inhalable fraction); 3 mg/m ³ TWA (respirable fraction)	Not established	Not established

8.2 Exposure controls

Engineering Measures/Controls

- Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Ensure that dust handling systems (such as exhaust ducts, dust collectors, vessels and processing equipment) are designed in a manner to prevent the escape of dust into the work area (i.e., there is not leakage from the equipment).

Personal Protective Equipment

Respiratory

- For limited exposure use an N95 dust mask. For prolonged exposure use an air-purifying respirator with high efficiency particulate air (HEPA) filters. Follow the OSHA respirator regulations found in 29 CFR 1910.134. Use a NIOSH/MSHA approved

- respirator if exposure limits are exceeded or symptoms are experienced.
- **Eye/Face**
 - **Skin/Body**
 - **Environmental Exposure Controls**
- Wear safety goggles.
 - Wear appropriate gloves. Wear long sleeves and/or protective coveralls.
 - Controls should be engineered to prevent release into the environment, including procedures to prevent spills, atmospheric release and release to waterways. Follow best practice for site management and disposal of waste.

Key to abbreviations

ACGIH = American Conference of Governmental Industrial Hygiene

NIOSH = National Institute of Occupational Safety and Health

OSHA = Occupational Safety and Health Administration

STEL = Short Term Exposure Limits are based on 15-minute exposures

TWA = Time-Weighted Averages are based on 8h/day, 40h/week exposures

Section 9 - Physical and Chemical Properties**9.1 Information on Basic Physical and Chemical Properties**

Material Description			
Physical Form	Solid	Appearance/Description	Gray solids with little/no odor.
Color	Gray	Odor	Little/no odor.
Odor Threshold	Data lacking		
General Properties			
Boiling Point	Data lacking	Melting Point/Freezing Point	Data lacking
Decomposition Temperature	Data lacking	pH	Data lacking
Specific Gravity/Relative Density	Data lacking	Water Solubility	Negligible < 0.1 %
Viscosity	Data lacking	Explosive Properties	Data lacking
Oxidizing Properties:	Data lacking		
Volatility			
Vapor Pressure	Data lacking	Vapor Density	Data lacking
Evaporation Rate	Data lacking		
Flammability			
Flash Point	Data lacking	UEL	Data lacking
LEL	Data lacking	Autoignition	Data lacking
Flammability (solid, gas)	Data lacking		
Environmental			
Octanol/Water Partition coefficient	Data lacking		

9.2 Other Information

- No additional physical and chemical parameters noted.

Section 10: Stability and Reactivity**10.1 Reactivity**

- Metal products themselves are not reactive, however, caution must be taken when welding due to fumes and gases.

10.2 Chemical stability

- Stable under normal temperatures and pressures.

10.3 Possibility of hazardous reactions

- Hazardous polymerization not indicated.

10.4 Conditions to avoid

- Avoid generating dust.

10.5 Incompatible materials

- None

10.6 Hazardous decomposition products

- None

Section 11 - Toxicological Information

11.1 Information on toxicological effects

Components		
Aluminum powder, stabilized (0% TO 5%)	7429-90-5	Multi-dose Toxicity: Inhalation-Man TCLo • 4 mg/m ³ 1 Year(s)-Intermittent; <i>Lungs, Thorax, or Respiration:</i> Cough; Lungs, Thorax, or Respiration:Dyspnea; Nutritional and Gross Metabolic: <i>Gross Metabolite Changes:</i> Weight loss or decreased weight gain; Inhalation-Rat TCLo • 206 mg/m ³ 5 Hour(s) 30 Day(s)-Intermittent; <i>Lungs, Thorax, or Respiration:</i> Fibrosis (interstitial); Endocrine: <i>Hypoglycemia; Blood:</i> Changes in serum composition (e.g., TP, bilirubin cholesterol)
Cobalt (powder) (0% TO 5%)	7440-48-4	Acute Toxicity: Ingestion/Oral-Rat LD50 • 6171 mg/kg; <i>Behavioral:</i> Somnolence (general depressed activity); Behavioral:Ataxia; Gastrointestinal:Hypermotility, diarrhea; Multi-dose Toxicity: Inhalation-Rabbit TCLo • 10 mg/m ³ 2 Hour(s) 56 Day(s)-Intermittent; <i>Behavioral:</i> Food intake (animal); Lungs, Thorax, or Respiration:Emphysema; Liver:Fatty liver degeneration; Inhalation-Rat TCLo • 0.09 mg/m ³ 24 Hour(s) 8 Week(s)-Continuous; <i>Lungs, Thorax, or Respiration:Other changes; Kidney, Ureter, and Bladder:Proteinuria; Biochemical:Enzyme inhibition, induction, or change in blood or tissue levels:Dehydrogenases;</i> Inhalation-Rat TCLo • 2 mg/m ³ 4 Day(s)-Intermittent; <i>Lungs, Thorax, or Respiration:</i> Fibrosing alveolitis
Copper (0% TO 5%)	7440-50-8	Acute Toxicity: Ingestion/Oral-Mouse TDLo • 158 mg/kg; <i>Kidney, Ureter, and Bladder:Changes in tubules (including acute renal failure, acute tubular necrosis);</i> Ingestion/Oral-Mouse TDLo • 108 mg/kg; <i>Behavioral:Tremor; Gastrointestinal:Hypermotility, diarrhea; Gastrointestinal:Nausea or vomiting;</i> Ingestion/Oral-Mouse TDLo • 232 mg/kg; <i>Kidney, Ureter, and Bladder:Changes primarily in glomeruli; Blood:Changes in spleen; Blood:Changes in serum composition (e.g., TP, bilirubin cholesterol);</i> Multi-dose Toxicity: Ingestion/Oral-Rabbit TDLo • 3 g/kg 60 Day(s)-Continuous; <i>Cardiac:Other changes; Liver:Hepatitis (hepatocellular necrosis), zonal; Related to Chronic Data:Death in the Other Multiple Dose data type field;</i> Reproductive: Ingestion/Oral-Rat TDLo • 1520 µg/kg (22W pre); <i>Reproductive Effects:Specific Developmental Abnormalities:Musculoskeletal system;</i> Ingestion/Oral-Rat TDLo • 1210 µg/kg (35W pre); <i>Reproductive Effects:Effects on Fertility:Pre-implantation mortality; Reproductive Effects:Effects on Fertility:Post-implantation mortality;</i> Ingestion/Oral-Rat TDLo • 152 mg/kg (22W pre); <i>Reproductive Effects:Effects on Embryo or Fetus:Fetotoxicity (except death, e.g., stunted fetus); Reproductive Effects:Specific Developmental Abnormalities:Central nervous system;</i> Tumorigen / Carcinogen: Ingestion/Oral-Mouse TDLo • 10.08 mg/kg 12 Week(s)-Continuous; <i>Tumorigenic:Carcinogenic by RTECS criteria; Lungs, Thorax, or Respiration:Other changes</i>
Iron (25% TO 96%)	7439-89-6	Acute Toxicity: Ingestion/Oral-Rat LD50 • 750 mg/kg; <i>Blood:Changes in serum composition (e.g., TP, bilirubin cholesterol); Biochemical:Enzyme inhibition, induction, or change in blood or tissue levels:Transaminases;</i> Ingestion/Oral-Child TDLo • 77 mg/kg; <i>Behavioral:Irritability; Gastrointestinal:Nausea or vomiting; Blood:Normocytic anemia;</i> Multi-dose Toxicity: Ingestion/Oral-Rat TDLo • 105 mg/kg 5 Week(s)-Continuous; <i>Liver:Tumors; Tumorigenic:Active as anti-cancer agent; Tumorigenic:Protects against induction of experimental tumors</i>
Manganese (powder) (0% TO 16%)	7439-96-5	Acute Toxicity: Ingestion/Oral-Rat LD50 • 9 g/kg; Inhalation-Man TCLo • 2300 µg/m ³ ; <i>Brain and Coverings:Other degenerative changes; Behavioral:Changes in motor activity (specific assay); Behavioral:Muscle weakness; Irritation: Eye-Rabbit • 500 mg 24 Hour(s) • Mild irritation; Skin-Rabbit • 500 mg 24 Hour(s) • Mild irritation;</i> Multi-dose Toxicity: Inhalation-Human TCLo • 0.5 mg/m ³ 39 Week(s)-Intermittent; <i>Brain and Coverings:Other degenerative changes; Peripheral Nerve and Sensation:Sensory change involving peripheral nerve; Behavioral:Irritability;</i> Inhalation-Mouse TCLo • 0.7 mg/m ³ 24 Hour(s) 22 Week(s)-Continuous; <i>Lungs, Thorax, or Respiration:Fibrosis (interstitial); Immunological Including Allergic:Decrease in cellular immune response;</i> Inhalation-Rat TCLo • 0.3 mg/m ³ 5 Hour(s) 26 Week(s)-Intermittent; <i>Lungs, Thorax, or Respiration:Fibrosis (interstitial); Immunological Including Allergic:Decrease in cellular immune response;</i> Reproductive: Ingestion/Oral-Mouse TDLo • 322.5 mg/kg (43D male); <i>Reproductive Effects:Paternal</i>

		Effects: Spermatogenesis ; Ingestion/Oral-Rat TDLo • 50 mg/kg (20D post); Reproductive Effects: Specific Developmental Abnormalities:Central nervous system ; Reproductive Effects:Effects on Newborn:Biochemical and metabolic ; Reproductive Effects:Effects on Newborn:Behavioral
Molybdenum (powder) (0% TO 30%)	7439-98-7	Mutagen: Cytogenetic analysis • Inhalation-Rat • 19500 µg/m ³ ; Reproductive: Ingestion/Oral-Mouse TDLo • 448 mg/kg (multigenerations); Reproductive Effects:Effects on Embryo or Fetus:Fetotoxicity (except death, e.g., stunted fetus) ; Reproductive Effects:Effects on Embryo or Fetus:Fetal death ; Ingestion/Oral-Rat TDLo • 5800 µg/kg (30W pre/1-20D preg); Reproductive Effects:Specific Developmental Abnormalities:Musculoskeletal system ; Ingestion/Oral-Rat TDLo • 6050 µg/kg (35W pre); Reproductive Effects:Effects on Fertility:Pre-implantation mortality ; Reproductive Effects:Effects on Fertility:Post-implantation mortality ; Reproductive Effects:Specific Developmental Abnormalities:Musculoskeletal system
Nickel, massive, ≥ 1 mm (0% TO 50%)	7440-02-0	Acute Toxicity: Ingestion/Oral-Rat TDLo • 200 mg/kg; Nutritional and Gross Metabolic:Gross Metabolite Changes:Weight loss or decreased weight gain ; Behavioral:Somnolence (general depressed activity) ; Multi-dose Toxicity: Ingestion/Oral-Mouse TDLo • 500 mg/kg 5 Day(s)-Intermittent; Lungs, Thorax, or Respiration:Fibrosis, focal (pneumoconiosis) ; Related to Chronic Data:Death in the Other Multiple Dose data type field ; Inhalation-Rabbit TClO • 1 mg/m ³ 6 Hour(s) 13 Week(s)-Intermittent; Lungs, Thorax, or Respiration:Other changes ; Lungs, Thorax, or Respiration:Changes in lung weight ; Blood:Hemorrhage ; Inhalation-Rat TClO • 0.4 mg/m ³ 40 Week(s)-Intermittent; Vascular:Thrombosis distant from injection site ; Lungs, Thorax, or Respiration:Other changes ; Related to Chronic Data:Death in the Other Multiple Dose data type field ; Reproductive: Ingestion/Oral-Rat TDLo • 158 mg/kg (multigenerations); Reproductive Effects:Effects on Embryo or Fetus:Fetotoxicity (except death, e.g., stunted fetus) ; Reproductive Effects:Effects on Embryo or Fetus:Fetal death ; Tumorigen / Carcinogen: Inhalation-Guinea Pig TClO • 15 mg/m ³ 91 Week(s)-Intermittent; Tumorigenic:Equivocal tumorigenic agent by RTECS criteria ; Lungs, Thorax, or Respiration:Tumors ; Lungs, Thorax, or Respiration:Bronchiogenic carcinoma
Silicon (0% TO 6%)	7440-21-3	Acute Toxicity: Ingestion/Oral-Rat LD50 • 3160 mg/kg; Irritation: Eye-Rabbit • 3 mg • Mild irritation
Tantalum (0% TO 4%)	7440-25-7	Acute Toxicity: Ingestion/Oral-Mouse LD50 • 595 mg/kg
Titanium, massive (0% TO 5%)	7440-32-6	Reproductive: Ingestion/Oral-Rat TDLo • 158 mg/kg (multigeneration); Reproductive Effects:Effects on Embryo or Fetus:Fetotoxicity (except death, e.g., stunted fetus) ; Reproductive Effects:Effects on Embryo or Fetus:Fetal death
Tungsten, powder (0% TO 15%)	7440-33-7	Irritation: Eye-Rabbit • 500 mg 24 Hour(s) • Mild irritation; Skin-Rabbit • 500 mg 24 Hour(s) • Mild irritation; Reproductive: Ingestion/Oral-Rat TDLo • 1160 µg/kg (30W pre/1-20D preg); Reproductive Effects:Specific Developmental Abnormalities:Musculoskeletal system ; Ingestion/Oral-Rat TDLo • 1210 µg/kg (35W pre); Reproductive Effects:Effects on Fertility:Post-implantation mortality ; Reproductive Effects:Specific Developmental Abnormalities:Musculoskeletal system
Boron (0% TO 5%)	7440-42-8	Acute Toxicity: Ingestion/Oral-Rat LD50 • 650 mg/kg; Multi-dose Toxicity: Ingestion/Oral-Rat TDLo • 32 g/kg 30 Day(s)-Intermittent; Brain and Coverings:Other degenerative changes ; Cardiac:Other changes ; Liver:Liver function tests impaired ; Reproductive: Ingestion/Oral-Rat TDLo • 4.95 mg/kg (1-22D preg); Reproductive Effects:Effects on Embryo or Fetus:Fetotoxicity (except death, e.g., stunted fetus) ; Reproductive Effects:Effects on Embryo or Fetus:Fetal death
Vanadium (0% TO 15%)	7440-62-2	Acute Toxicity: Subcutaneous-Rabbit LD50 • 59 mg/kg; Multi-dose Toxicity: Ingestion/Oral-Rat TDLo • 225 mg/kg 15 Day(s)-Continuous; Nutritional and Gross Metabolic:Gross Metabolite Changes:Weight loss or decreased weight gain

GHS Properties	Classification
Acute toxicity	EU/CLP • Data lacking OSHA HCS 2012 • Data lacking WHMIS 2015 • Data lacking
Skin corrosion/Irritation	EU/CLP • Data lacking OSHA HCS 2012 • Data lacking

	WHMIS 2015 • Data lacking
Serious eye damage/Irritation	EU/CLP • Eye Irritation 2 OSHA HCS 2012 • Eye Irritation 2 WHMIS 2015 • Eye Irritation 2
Skin sensitization	EU/CLP • Skin Sensitizer 1 OSHA HCS 2012 • Skin Sensitizer 1 WHMIS 2015 • Skin Sensitizer 1
Respiratory sensitization	EU/CLP • Respiratory Sensitizer 1 OSHA HCS 2012 • Respiratory Sensitizer 1 WHMIS 2015 • Respiratory Sensitizer 1
Aspiration Hazard	EU/CLP • Data lacking OSHA HCS 2012 • Data lacking WHMIS 2015 • Data lacking
Carcinogenicity	EU/CLP • Data lacking OSHA HCS 2012 • Carcinogenicity 2 WHMIS 2015 • Carcinogenicity 2
Germ Cell Mutagenicity	EU/CLP • Data lacking OSHA HCS 2012 • Data lacking WHMIS 2015 • Data lacking
Toxicity for Reproduction	EU/CLP • Toxic to Reproduction 1B OSHA HCS 2012 • Toxic to Reproduction 1B WHMIS 2015 • Toxic to Reproduction 1B
STOT-SE	EU/CLP • Specific Target Organ Toxicity Single Exposure 2 OSHA HCS 2012 • Specific Target Organ Toxicity Single Exposure 1 WHMIS 2015 • Specific Target Organ Toxicity Single Exposure 1
STOT-RE	EU/CLP • Specific Target Organ Toxicity Repeated Exposure 1 OSHA HCS 2012 • Specific Target Organ Toxicity Repeated Exposure 1; Specific Target Organ Toxicity Repeated Exposure 2 WHMIS 2015 • Specific Target Organ Toxicity Repeated Exposure 1; Specific Target Organ Toxicity Repeated Exposure 2

Potential Health Effects

Inhalation

Acute (Immediate)

- May cause respiratory irritation. Processes such as cutting, grinding, crushing, or impact may result in generation of excessive amounts of airborne dusts in the workplace. Nuisance dust may affect the lungs but reactions are typically reversible.

Chronic (Delayed)

- May cause allergy or asthma symptoms or breathing difficulties if inhaled. Chronic inhalation exposure to nickel in humans also results in respiratory effects, including a type of asthma specific to nickel, decreased lung function, and bronchitis.

Skin

Acute (Immediate)

- Exposure to dust may cause mechanical irritation. May cause skin sensitization. Symptoms include redness, and skin rash.

Chronic (Delayed)

- No data available.

Eye

Acute (Immediate)

- Causes serious eye irritation. Excessive concentrations of nuisance dust in the workplace may reduce visibility and may cause unpleasant deposits in eyes.

Chronic (Delayed)

- No data available.

Ingestion

Acute (Immediate)

- Excessive concentrations of nuisance dust in the workplace may cause mechanical irritation to mucous membranes. Ingestion of large amounts of copper may cause

damage to the kidneys.

Chronic (Delayed)

- Repeated and prolonged exposure to copper may affect the liver.

Other

Chronic (Delayed)

- Exposure to Manganese dust and fumes can cause Manganism (Parkinson like disease)

Carcinogenic Effects

- Repeated and prolonged exposure may cause cancer.

Carcinogenic Effects			
	CAS	IARC	NTP
Cobalt (powder)	7440-48-4	Group 2B-Possible Carcinogen	Not Listed
Nickel, massive, ≥ 1 mm	7440-02-0	Group 2B-Possible Carcinogen	Reasonably Anticipated to be Human Carcinogen

Reproductive Effects

- Repeated and prolonged exposure may cause reproductive effects.

11.2 Other information

- Heating above the melting point releases metallic oxides which may cause metal fume fever by inhalation. The symptoms are shivering, fever, malaise and muscular pain.

Key to abbreviations

LC = Lethal Concentration

LD = Lethal Dose

TC = Toxic Concentration

TD = Toxic Dose

Section 12 - Ecological Information

12.1 Toxicity

Components		
Cobalt (powder) (0% TO 5%)	7440-48-4	<p>Aquatic Toxicity-Fish: 96 Hour(s) LC50 <i>Pimephales promelas (Fathead Minnow) Fish; Standard Test Species</i> 3.4 mg/L Comments: Results of Toxicity Tests</p> <p>Aquatic Toxicity-Crustacea: 48 Hour(s) LC50 Water Flea 4.4 mg/L Comments: Chronic Screening Toxicity Test with <i>Daphnia magna</i></p> <p>28 Day(s) NOEC Water Flea 0.0028 mg/L Comments: Chronic Screening Toxicity Test with <i>Daphnia magna</i></p>
Copper (0% TO 5%)	7440-50-8	<p>Aquatic Toxicity-Fish: 96 Hour(s) LC50 <i>Osteichthyes (Bony Fishes)</i> 0.0051 mg/L</p> <p>7 Day(s) NOEC <i>Salmo trutta (Brown Trout)</i> 0.0075 mg/L</p> <p>Aquatic Toxicity-Crustacea: 21 Day(s) NOEC Water Flea 0.002 mg/L</p> <p>48 Hour(s) EC50 Water Flea 0.001 mg/L</p> <p>Aquatic Toxicity-Algae and Other Aquatic Plant(s): 48 Hour(s) EC50 <i>Chlorella sp. (Green Algae)</i> 0.0011 mg/L</p> <p>7 Day(s) NOEC <i>Laminaria saccharina (Tangleweed, Brown Algae)</i> 0.01 mg/L</p>
Iron (25% TO 96%)	7439-89-6	<p>Aquatic Toxicity-Fish: 96 Hour(s) LC50 <i>Mudskipper(Periophthalmus waltoni)</i> 0.00648 mg/L</p> <p>7 Day(s) NOEC <i>Brown Trout (Salmo trutta)</i> 0.305 mg/L</p> <p>Aquatic Toxicity-Crustacea: 7 Day(s) NOEC <i>Aquatic Sowbug, Isopod (Idotea balthica)</i> 0.5 mg/L</p>
Molybdenum (powder) (0% TO 30%)	7439-98-7	<p>Aquatic Toxicity-Fish: 96 Hour(s) LC50 <i>Rainbow Trout (Oncorhynchus mykiss)</i> 800 mg/L Comments: Water Pollution Studies</p> <p>Aquatic Toxicity-Crustacea: 48 Hour(s) LC50 Water Flea >200 mg/L Comments: Chronic Screening Toxicity Test with <i>Daphnia magna</i></p> <p>28 Day(s) NOEC Water Flea 0.67 mg/L Comments: Chronic Screening Toxicity Test with <i>Daphnia magna</i></p>
Nickel, massive, ≥ 1 mm (0% TO 50%)	7440-02-0	<p>Aquatic Toxicity-Fish: 96 Hour(s) LC50 <i>Oncorhynchus mykiss (Rainbow Trout)</i> 0.06 mg/L Comments: The Reproductive Toxicology of Aquatic Contaminants</p> <p>28 Day(s) NOEC <i>Cyprinus carpio (Common Carp)</i> 0.0035 µg/L Comments: Bioaccumulation of Micropollutants and Biomarker Responses in Caged Carp (<i>Cyprinus carpio</i>)</p> <p>Aquatic Toxicity-Crustacea: 7 Day(s) NOEC <i>Americamysis bahia (Opossum Shrimp)</i> 0.213 mg/L Comments: Results of Provision E5F Spiked Metals Toxicity Testing 2 to 9 April 1991</p> <p>Aquatic Toxicity-Algae and Other Aquatic Plant(s): 96 Hour(s) EC50 <i>Pseudokirchneriella subcapitata</i></p>

(Green Algae) 0.233 mg/L Comments: Comparison of the Relative Toxicity Relationships Based on Batch and Continuous Algal Toxicity Tests.

- Very toxic to aquatic life. Very toxic to aquatic life with long lasting effects.

12.2 Persistence and degradability

- Material data lacking.

12.3 Bioaccumulative potential

- Material data lacking.

12.4 Mobility in Soil

- Material data lacking.

12.5 Results of PBT and vPvB assessment

- No PBT and vPvB assessment has been conducted.

12.6 Other adverse effects

- No studies have been found.

Section 13 - Disposal Considerations

13.1 Waste treatment methods

Product waste

- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Packaging waste

- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Section 14 - Transport Information

	14.1 UN number	14.2 UN proper shipping name	14.3 Transport hazard class(es)	14.4 Packing group	14.5 Environmental hazards
DOT	Not Applicable	Not Regulated	Not Applicable	Not Applicable	NDA
TDG	Not Applicable	Not Regulated	Not Applicable	Not Applicable	NDA
IMO/IMDG	Not Applicable	Not Regulated	Not Applicable	Not Applicable	NDA
ADN	Not Applicable	Not Regulated	Not Applicable	Not Applicable	NDA
ADR/RID	Not Applicable	Not Regulated	Not Applicable	Not Applicable	NDA
IATA/ICAO	Not Applicable	Not Regulated	Not Applicable	Not Applicable	NDA

14.6 Special precautions for user

- None specified.

14.7 Transport in bulk according to Annex II of Marpol and the IBC Code

- Data lacking.

Section 15 - Regulatory Information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

SARA Hazard Classifications • Acute, Chronic

Inventory						
Component	CAS	Canada DSL	Canada NDSL	EU EINECS	EU ELNICS	TSCA
Aluminum powder, stabilized	7429-90-5	Yes	No	Yes	No	Yes
Boron	7440-42-8	Yes	No	Yes	No	Yes
Carbon (animal or vegetable origin)	7440-44-0	Yes	No	Yes	No	Yes
Chromium, massive	7440-47-3	Yes	No	Yes	No	Yes
Cobalt (powder)	7440-48-4	Yes	No	Yes	No	Yes
Copper	7440-50-8	Yes	No	Yes	No	Yes
Iron	7439-89-6	Yes	No	Yes	No	Yes
Manganese (powder)	7439-96-5	Yes	No	Yes	No	Yes
Molybdenum (powder)	7439-98-7	Yes	No	Yes	No	Yes
Nickel, massive, ≥ 1 mm	7440-02-0	Yes	No	Yes	No	Yes
Niobium	7440-03-1	Yes	No	Yes	No	Yes
Rhenium	7440-15-5	Yes	No	Yes	No	Yes
Silicon	7440-21-3	Yes	No	Yes	No	Yes
Tantalum	7440-25-7	Yes	No	Yes	No	Yes
Titanium, massive	7440-32-6	Yes	No	Yes	No	Yes
Tungsten, powder	7440-33-7	Yes	No	Yes	No	Yes
Vanadium	7440-62-2	Yes	No	Yes	No	Yes

Canada

Labor

Canada - WHMIS 1988 - Classifications of Substances

• Rhenium	7440-15-5	Not Listed
• Carbon (animal or vegetable origin)	7440-44-0	Uncontrolled product according to WHMIS classification criteria
• Copper	7440-50-8	Uncontrolled product according to WHMIS classification criteria
• Chromium, massive	7440-47-3	Uncontrolled product according to WHMIS classification criteria
• Manganese (powder)	7439-96-5	D2A; B4, D2A (powder)
• Tantalum	7440-25-7	Uncontrolled product according to WHMIS classification criteria
• Cobalt (powder)	7440-48-4	D2A, D2B
• Aluminum powder, stabilized	7429-90-5	B6 (powder); Uncontrolled product according to WHMIS classification criteria
• Molybdenum (powder)	7439-98-7	Uncontrolled product according to WHMIS classification criteria
• Nickel, massive, ≥ 1 mm	7440-02-0	D2A, D2B; B6, D2A (Raney)
• Silicon	7440-21-3	B4

• Tungsten, powder	7440-33-7	Uncontrolled product according to WHMIS classification criteria
• Vanadium	7440-62-2	Not Listed
• Iron	7439-89-6	Uncontrolled product according to WHMIS classification criteria
• Titanium, massive	7440-32-6	Not Listed
• Niobium	7440-03-1	Not Listed
• Boron	7440-42-8	Not Listed

Canada - WHMIS 1988 - Ingredient Disclosure List

• Rhenium	7440-15-5	Not Listed
• Carbon (animal or vegetable origin)	7440-44-0	Not Listed
• Copper	7440-50-8	1 %
• Chromium, massive	7440-47-3	0.1 %
• Manganese (powder)	7439-96-5	1 %
• Tantalum	7440-25-7	1 %
• Cobalt (powder)	7440-48-4	0.1 %
• Aluminum powder, stabilized	7429-90-5	1 %
• Molybdenum (powder)	7439-98-7	1 %
• Nickel, massive, ≥ 1 mm	7440-02-0	0.1 %
• Silicon	7440-21-3	Not Listed
• Tungsten, powder	7440-33-7	1 %
• Vanadium	7440-62-2	1 %
• Iron	7439-89-6	Not Listed
• Titanium, massive	7440-32-6	Not Listed
• Niobium	7440-03-1	Not Listed
• Boron	7440-42-8	Not Listed

Environment**Canada - CEPA - Priority Substances List**

• Rhenium	7440-15-5	Not Listed
• Carbon (animal or vegetable origin)	7440-44-0	Not Listed
• Copper	7440-50-8	Not Listed
• Chromium, massive	7440-47-3	Not Listed
• Manganese (powder)	7439-96-5	Not Listed
• Tantalum	7440-25-7	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum powder, stabilized	7429-90-5	Not Listed
• Molybdenum (powder)	7439-98-7	Not Listed
• Nickel, massive, ≥ 1 mm	7440-02-0	Not Listed
• Silicon	7440-21-3	Not Listed
• Tungsten, powder	7440-33-7	Not Listed
• Vanadium	7440-62-2	Not Listed
• Iron	7439-89-6	Not Listed
• Titanium, massive	7440-32-6	Not Listed
• Niobium	7440-03-1	Not Listed
• Boron	7440-42-8	Not Listed

United States**Labor****U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals**

• Rhenium	7440-15-5	Not Listed
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• Carbon (animal or vegetable origin)	7440-44-0	Not Listed
• Copper	7440-50-8	Not Listed
• Chromium, massive	7440-47-3	Not Listed
• Manganese (powder)	7439-96-5	Not Listed
• Tantalum	7440-25-7	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum powder, stabilized	7429-90-5	Not Listed
• Molybdenum (powder)	7439-98-7	Not Listed
• Nickel, massive, ≥ 1 mm	7440-02-0	Not Listed
• Silicon	7440-21-3	Not Listed
• Tungsten, powder	7440-33-7	Not Listed
• Vanadium	7440-62-2	Not Listed
• Iron	7439-89-6	Not Listed
• Titanium, massive	7440-32-6	Not Listed
• Niobium	7440-03-1	Not Listed
• Boron	7440-42-8	Not Listed

U.S. - OSHA - Specifically Regulated Chemicals

• Rhenium	7440-15-5	Not Listed
• Carbon (animal or vegetable origin)	7440-44-0	Not Listed
• Copper	7440-50-8	Not Listed
• Chromium, massive	7440-47-3	Not Listed
• Manganese (powder)	7439-96-5	Not Listed
• Tantalum	7440-25-7	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum powder, stabilized	7429-90-5	Not Listed
• Molybdenum (powder)	7439-98-7	Not Listed
• Nickel, massive, ≥ 1 mm	7440-02-0	Not Listed
• Silicon	7440-21-3	Not Listed
• Tungsten, powder	7440-33-7	Not Listed
• Vanadium	7440-62-2	Not Listed
• Iron	7439-89-6	Not Listed
• Titanium, massive	7440-32-6	Not Listed
• Niobium	7440-03-1	Not Listed
• Boron	7440-42-8	Not Listed

Environment**U.S. - CAA (Clean Air Act) - 1990 Hazardous Air Pollutants**

• Rhenium	7440-15-5	Not Listed
• Carbon (animal or vegetable origin)	7440-44-0	Not Listed
• Copper	7440-50-8	Not Listed
• Chromium, massive	7440-47-3	Not Listed
• Manganese (powder)	7439-96-5	Not Listed
• Tantalum	7440-25-7	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum powder, stabilized	7429-90-5	Not Listed
• Molybdenum (powder)	7439-98-7	Not Listed
• Nickel, massive, ≥ 1 mm	7440-02-0	Not Listed
• Silicon	7440-21-3	Not Listed
• Tungsten, powder	7440-33-7	Not Listed
• Vanadium	7440-62-2	Not Listed
• Iron	7439-89-6	Not Listed
• Titanium, massive	7440-32-6	Not Listed

• Niobium	7440-03-1	Not Listed
• Boron	7440-42-8	Not Listed
U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities		
• Rhenium	7440-15-5	Not Listed
• Carbon (animal or vegetable origin)	7440-44-0	Not Listed
		5000 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm); 2270 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm)
• Copper	7440-50-8	5000 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm); 2270 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm)
		5000 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm); 2270 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm)
• Chromium, massive	7440-47-3	5000 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm); 2270 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm)
• Manganese (powder)	7439-96-5	Not Listed
• Tantalum	7440-25-7	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum powder, stabilized	7429-90-5	Not Listed
• Molybdenum (powder)	7439-98-7	Not Listed
		100 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm); 45.4 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm)
• Nickel, massive, ≥ 1 mm	7440-02-0	100 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm); 45.4 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm)
• Silicon	7440-21-3	Not Listed
• Tungsten, powder	7440-33-7	Not Listed
• Vanadium	7440-62-2	Not Listed
• Iron	7439-89-6	Not Listed
• Titanium, massive	7440-32-6	Not Listed
• Niobium	7440-03-1	Not Listed
• Boron	7440-42-8	Not Listed
U.S. - CERCLA/SARA - Radionuclides and Their Reportable Quantities		
• Rhenium	7440-15-5	Not Listed
• Carbon (animal or vegetable origin)	7440-44-0	Not Listed
• Copper	7440-50-8	Not Listed
• Chromium, massive	7440-47-3	Not Listed
• Manganese (powder)	7439-96-5	Not Listed

• Tantalum	7440-25-7	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum powder, stabilized	7429-90-5	Not Listed
• Molybdenum (powder)	7439-98-7	Not Listed
• Nickel, massive, ≥ 1 mm	7440-02-0	Not Listed
• Silicon	7440-21-3	Not Listed
• Tungsten, powder	7440-33-7	Not Listed
• Vanadium	7440-62-2	Not Listed
• Iron	7439-89-6	Not Listed
• Titanium, massive	7440-32-6	Not Listed
• Niobium	7440-03-1	Not Listed
• Boron	7440-42-8	Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs

• Rhenium	7440-15-5	Not Listed
• Carbon (animal or vegetable origin)	7440-44-0	Not Listed
• Copper	7440-50-8	Not Listed
• Chromium, massive	7440-47-3	Not Listed
• Manganese (powder)	7439-96-5	Not Listed
• Tantalum	7440-25-7	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum powder, stabilized	7429-90-5	Not Listed
• Molybdenum (powder)	7439-98-7	Not Listed
• Nickel, massive, ≥ 1 mm	7440-02-0	Not Listed
• Silicon	7440-21-3	Not Listed
• Tungsten, powder	7440-33-7	Not Listed
• Vanadium	7440-62-2	Not Listed
• Iron	7439-89-6	Not Listed
• Titanium, massive	7440-32-6	Not Listed
• Niobium	7440-03-1	Not Listed
• Boron	7440-42-8	Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances TPQs

• Rhenium	7440-15-5	Not Listed
• Carbon (animal or vegetable origin)	7440-44-0	Not Listed
• Copper	7440-50-8	Not Listed
• Chromium, massive	7440-47-3	Not Listed
• Manganese (powder)	7439-96-5	Not Listed
• Tantalum	7440-25-7	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum powder, stabilized	7429-90-5	Not Listed
• Molybdenum (powder)	7439-98-7	Not Listed
• Nickel, massive, ≥ 1 mm	7440-02-0	Not Listed
• Silicon	7440-21-3	Not Listed
• Tungsten, powder	7440-33-7	Not Listed
• Vanadium	7440-62-2	Not Listed
• Iron	7439-89-6	Not Listed
• Titanium, massive	7440-32-6	Not Listed
• Niobium	7440-03-1	Not Listed
• Boron	7440-42-8	Not Listed

U.S. - CERCLA/SARA - Section 313 - Emission Reporting

• Rhenium	7440-15-5	Not Listed
• Carbon (animal or vegetable origin)	7440-44-0	Not Listed

• Copper	7440-50-8	1.0 % de minimis concentration
• Chromium, massive	7440-47-3	1.0 % de minimis concentration
• Manganese (powder)	7439-96-5	1.0 % de minimis concentration
• Tantalum	7440-25-7	Not Listed
• Cobalt (powder)	7440-48-4	0.1 % de minimis concentration
• Aluminum powder, stabilized	7429-90-5	1.0 % de minimis concentration (dust or fume only)
• Molybdenum (powder)	7439-98-7	Not Listed
• Nickel, massive, ≥ 1 mm	7440-02-0	0.1 % de minimis concentration
• Silicon	7440-21-3	Not Listed
• Tungsten, powder	7440-33-7	Not Listed
• Vanadium	7440-62-2	1.0 % de minimis concentration (except when contained in an alloy)
• Iron	7439-89-6	Not Listed
• Titanium, massive	7440-32-6	Not Listed
• Niobium	7440-03-1	Not Listed
• Boron	7440-42-8	Not Listed

U.S. - CERCLA/SARA - Section 313 - PBT Chemical Listing

• Rhenium	7440-15-5	Not Listed
• Carbon (animal or vegetable origin)	7440-44-0	Not Listed
• Copper	7440-50-8	Not Listed
• Chromium, massive	7440-47-3	Not Listed
• Manganese (powder)	7439-96-5	Not Listed
• Tantalum	7440-25-7	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum powder, stabilized	7429-90-5	Not Listed
• Molybdenum (powder)	7439-98-7	Not Listed
• Nickel, massive, ≥ 1 mm	7440-02-0	Not Listed
• Silicon	7440-21-3	Not Listed
• Tungsten, powder	7440-33-7	Not Listed
• Vanadium	7440-62-2	Not Listed
• Iron	7439-89-6	Not Listed
• Titanium, massive	7440-32-6	Not Listed
• Niobium	7440-03-1	Not Listed
• Boron	7440-42-8	Not Listed

United States - California**Environment****U.S. - California - Proposition 65 - Carcinogens List**

• Rhenium	7440-15-5	Not Listed
• Carbon (animal or vegetable origin)	7440-44-0	Not Listed
• Copper	7440-50-8	Not Listed
• Chromium, massive	7440-47-3	Not Listed
• Manganese (powder)	7439-96-5	Not Listed
• Tantalum	7440-25-7	Not Listed
• Cobalt (powder)	7440-48-4	carcinogen, 7/1/1992 (powder)

• Aluminum powder, stabilized	7429-90-5	Not Listed
• Molybdenum (powder)	7439-98-7	Not Listed
• Nickel, massive, ≥ 1 mm	7440-02-0	carcinogen, 10/1/1989 (metallic)
• Silicon	7440-21-3	Not Listed
• Tungsten, powder	7440-33-7	Not Listed
• Vanadium	7440-62-2	Not Listed
• Iron	7439-89-6	Not Listed
• Titanium, massive	7440-32-6	Not Listed
• Niobium	7440-03-1	Not Listed
• Boron	7440-42-8	Not Listed

U.S. - California - Proposition 65 - Developmental Toxicity

• Rhenium	7440-15-5	Not Listed
• Carbon (animal or vegetable origin)	7440-44-0	Not Listed
• Copper	7440-50-8	Not Listed
• Chromium, massive	7440-47-3	Not Listed
• Manganese (powder)	7439-96-5	Not Listed
• Tantalum	7440-25-7	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum powder, stabilized	7429-90-5	Not Listed
• Molybdenum (powder)	7439-98-7	Not Listed
• Nickel, massive, ≥ 1 mm	7440-02-0	Not Listed
• Silicon	7440-21-3	Not Listed
• Tungsten, powder	7440-33-7	Not Listed
• Vanadium	7440-62-2	Not Listed
• Iron	7439-89-6	Not Listed
• Titanium, massive	7440-32-6	Not Listed
• Niobium	7440-03-1	Not Listed
• Boron	7440-42-8	Not Listed

U.S. - California - Proposition 65 - Maximum Allowable Dose Levels (MADL)

• Rhenium	7440-15-5	Not Listed
• Carbon (animal or vegetable origin)	7440-44-0	Not Listed
• Copper	7440-50-8	Not Listed
• Chromium, massive	7440-47-3	Not Listed
• Manganese (powder)	7439-96-5	Not Listed
• Tantalum	7440-25-7	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum powder, stabilized	7429-90-5	Not Listed
• Molybdenum (powder)	7439-98-7	Not Listed
• Nickel, massive, ≥ 1 mm	7440-02-0	Not Listed
• Silicon	7440-21-3	Not Listed
• Tungsten, powder	7440-33-7	Not Listed
• Vanadium	7440-62-2	Not Listed
• Iron	7439-89-6	Not Listed
• Titanium, massive	7440-32-6	Not Listed
• Niobium	7440-03-1	Not Listed
• Boron	7440-42-8	Not Listed

U.S. - California - Proposition 65 - No Significant Risk Levels (NSRL)

• Rhenium	7440-15-5	Not Listed
• Carbon (animal or vegetable origin)	7440-44-0	Not Listed
• Copper	7440-50-8	Not Listed

• Chromium, massive	7440-47-3	Not Listed
• Manganese (powder)	7439-96-5	Not Listed
• Tantalum	7440-25-7	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum powder, stabilized	7429-90-5	Not Listed
• Molybdenum (powder)	7439-98-7	Not Listed
• Nickel, massive, ≥ 1 mm	7440-02-0	Not Listed
• Silicon	7440-21-3	Not Listed
• Tungsten, powder	7440-33-7	Not Listed
• Vanadium	7440-62-2	Not Listed
• Iron	7439-89-6	Not Listed
• Titanium, massive	7440-32-6	Not Listed
• Niobium	7440-03-1	Not Listed
• Boron	7440-42-8	Not Listed

U.S. - California - Proposition 65 - Reproductive Toxicity - Female

• Rhenium	7440-15-5	Not Listed
• Carbon (animal or vegetable origin)	7440-44-0	Not Listed
• Copper	7440-50-8	Not Listed
• Chromium, massive	7440-47-3	Not Listed
• Manganese (powder)	7439-96-5	Not Listed
• Tantalum	7440-25-7	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum powder, stabilized	7429-90-5	Not Listed
• Molybdenum (powder)	7439-98-7	Not Listed
• Nickel, massive, ≥ 1 mm	7440-02-0	Not Listed
• Silicon	7440-21-3	Not Listed
• Tungsten, powder	7440-33-7	Not Listed
• Vanadium	7440-62-2	Not Listed
• Iron	7439-89-6	Not Listed
• Titanium, massive	7440-32-6	Not Listed
• Niobium	7440-03-1	Not Listed
• Boron	7440-42-8	Not Listed

U.S. - California - Proposition 65 - Reproductive Toxicity - Male

• Rhenium	7440-15-5	Not Listed
• Carbon (animal or vegetable origin)	7440-44-0	Not Listed
• Copper	7440-50-8	Not Listed
• Chromium, massive	7440-47-3	Not Listed
• Manganese (powder)	7439-96-5	Not Listed
• Tantalum	7440-25-7	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum powder, stabilized	7429-90-5	Not Listed
• Molybdenum (powder)	7439-98-7	Not Listed
• Nickel, massive, ≥ 1 mm	7440-02-0	Not Listed
• Silicon	7440-21-3	Not Listed
• Tungsten, powder	7440-33-7	Not Listed
• Vanadium	7440-62-2	Not Listed
• Iron	7439-89-6	Not Listed
• Titanium, massive	7440-32-6	Not Listed
• Niobium	7440-03-1	Not Listed
• Boron	7440-42-8	Not Listed

15.2 Chemical Safety Assessment

- No Chemical Safety Assessment has been carried out.

15.3 Other Information

- WARNING: This product contains a chemical known to the State of California to cause cancer.

Section 16 - Other Information

Relevant Phrases (code & full text)

- H228 - Flammable solid
- H252 - Self-heating in large quantities; may catch fire
- H261 - In contact with water releases flammable gas
- H302 - Harmful if swallowed
- H335 - May cause respiratory irritation
- H351 - Suspected of causing cancer.
- H361 - Suspected of damaging fertility or the unborn child.
- H361fd - Suspected of damaging fertility. Suspected of damaging the unborn child.
- H370 - Causes damage to organs.
- H373 - May cause damage to organs through prolonged or repeated exposure.
- H412 - Harmful to aquatic life with long lasting effects
- H413 - May cause long lasting harmful effects to aquatic life
- EUH029 - Contact with water liberates toxic gas.

Revision Date

- 20/October/2016

Preparation Date

- 30/September/2016

Disclaimer/Statement of Liability

- All statements, technical information and recommendations are based on data which this company believes to be currently reliable, but no warranty of any kind is made with respect thereto. Since the company shall have no control of the use of the product described, the company assumes no liability for loss or damage incurred by proper or improper use of such product.

Key to abbreviations

NDA = No Data Available