

Safety Data Sheet

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

1.1 Product identifier

Product Name

- **Ductile Iron Pipe/Castings**

Synonyms

- DI; Ductile Iron; Nodular Iron; SGI; Spheroidal Graphite Iron

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

Relevant identified use(s)

- Transport of water, waste water, air.

1.3 Details of the supplier of the safety data sheet

Manufacturer

- American Cast Iron Pipe Company
P.O. Box 2727
Birmingham, AL 35202
United States
www.american-usa.com

Telephone (General) • 205-325-7701

1.4 Emergency telephone number

Manufacturer

- 205-325-7975

Section 2: Hazards Identification

EU/EEC

According to EU Directive 1272/2008 (CLP)/REACH 1907/2006 [amended by 453/2010]

According to EU Directive 67/548/EEC (DSD) or 1999/45/EC (DPD)

2.1 Classification of the substance or mixture

- | | |
|----------------|--|
| CLP | <ul style="list-style-type: none"> • The material as it is shipped is not expected to be hazardous. Classifications represented are applicable when the material is cut, ground or welded.
Skin Irritation 2 - H315
Eye Irritation 2 - H319
Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation - H335
Specific Target Organ Toxicity Repeated Exposure 2 - H373 |
| DSD/DPD | <ul style="list-style-type: none"> • The material as it is shipped is not expected to be hazardous. Classifications represented are applicable when the material is cut, ground or welded.
Irritant (Xi)
Harmful (Xn)
R36/37/38, R48/20 |

2.2 Label Elements

CLP

WARNING

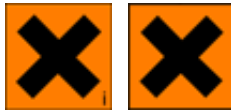


- Hazard statements**
- H315 - Causes skin irritation
 - H319 - Causes serious eye irritation
 - H335 - May cause respiratory irritation
 - H373 - May cause damage to organs (lungs) through prolonged or repeated exposure

Precautionary statements

- **Prevention**
 - P260 - Do not breathe dust/fume.
 - P264 - Wash thoroughly after handling.
 - P271 - Use only outdoors or in a well-ventilated area.
 - P280 - Wear protective gloves/protective clothing/eye protection/face protection.
- **Response**
 - P304+P340 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
 - P312 - Call a POISON CENTER or doctor/physician if you feel unwell.
 - P302+P352 - IF ON SKIN: Wash with plenty of soap and water.
 - P362 - Take off contaminated clothing and wash before reuse.
 - P332+P313 - If skin irritation 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.
 - P321 - Specific treatment, see supplemental first aid information.
- **Storage/Disposal**
 - P403 - Store in a well-ventilated place.
 - P501 - Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

DSD/DPD



- **Risk phrases**
 - R36/37/38 - Irritating to eyes, respiratory system and skin.
 - R48/20 - Harmful: danger of serious damage to health by prolonged exposure through inhalation.
- **Safety phrases**
 - S26 - In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

2.3 Other Hazards

- **CLP**
 - Overexposure to thermal processing fumes may cause metal fume fever which is an influenza like illness. Symptoms include headache, metallic taste in the mouth, cough, thirst, throat irritation, shortness of breath, fever, sweating and pain in the limbs. This illness is not permanent and recovery usually occurs within 24-48 hours after onset.
 - The material as it is shipped is not expected to be hazardous. Classifications represented are applicable when the material is cut, ground or welded.
 - According to Regulation (EC) No. 1272/2008 (CLP) this material is considered hazardous.

- **DSD/DPD**
 - Overexposure to thermal processing fumes may cause metal fume fever which is an influenza like illness. Symptoms include headache, metallic taste in the mouth, cough, thirst, throat irritation, shortness of breath, fever, sweating and pain in the limbs. This illness is not permanent and recovery usually occurs within 24-48 hours after onset.
 - The material as it is shipped is not expected to be hazardous. Classifications represented are applicable when the material is cut, ground or welded.
 - According to European Directive 1999/45/EC this preparation is considered dangerous.

United States (US)

According to OSHA 29 CFR 1910.1200 HCS

2.1 Classification of the substance or mixture

- **OSHA HCS 2012**
 - The material as it is shipped is not expected to be hazardous. Classifications represented are applicable when the material is cut, ground or welded.
 - Skin Irritation 2 - H315

Eye Irritation 2A - H319
 Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation - H335
 Specific Target Organ Toxicity Repeated Exposure 2 - H373
 Hazards Not Otherwise Classified (Health) - Metal Fume Fever

2.2 Label elements

OSHA HCS 2012

WARNING



- Hazard statements**
- Causes skin irritation - H315
 - Causes serious eye irritation - H319
 - May cause respiratory irritation - H335
 - May cause damage to organs (lungs, central nervous system/CNS) through prolonged or repeated exposure - H373

Precautionary statements

- Prevention**
- Do not breathe dust/fume. - P260
 - Wash thoroughly after handling. - P264
 - Use only outdoors or in a well-ventilated area. - P271
 - Wear protective gloves/protective clothing/eye protection/face protection. - P280
- Response**
- IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. - P304+P340
 - Call a POISON CENTER or doctor/physician if you feel unwell. - P312
 - IF ON SKIN: Wash with plenty of soap and water. - P302+P352
 - If skin irritation occurs: Get medical advice/attention. - P332+P313
 - Take off contaminated clothing and wash before reuse. - P362
 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. - P305+P351+P338
 - If eye irritation persists: Get medical advice/attention. - P337+P313
 - Specific treatment, see supplemental first aid information. - P321
- Storage/Disposal**
- Store in a well-ventilated place. - P403
 - Dispose of content and/or container in accordance with local, regional, national, and/or international regulations. - P501

2.3 Other hazards

OSHA HCS 2012

- Overexposure to thermal processing fumes may cause metal fume fever which is an influenza like illness. Symptoms include headache, metallic taste in the mouth, cough, thirst, throat irritation, shortness of breath, fever, sweating and pain in the limbs. This illness is not permanent and recovery usually occurs within 24-48 hours after onset. The material as it is shipped is not expected to be hazardous. Classifications represented are applicable when the material is cut, ground or welded. Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.

Canada

According to WHMIS

2.1 Classification of the substance or mixture

WHMIS

- The material as it is shipped is not expected to be hazardous. Classifications represented are applicable when the material is cut, ground or welded.
- Other Toxic Effects - D2B

2.2 Label elements

WHMIS



- Other Toxic Effects - D2B

2.3 Other hazards

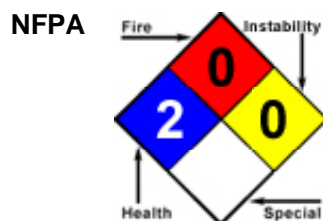
WHMIS

- Overexposure to thermal processing fumes may cause metal fume fever which is an influenza like illness. Symptoms include headache, metallic taste in the mouth, cough, thirst, throat irritation, shortness of breath, fever, sweating and pain in the limbs. This illness is not permanent and recovery usually occurs within 24-48 hours after onset.

The material as it is shipped is not expected to be hazardous. Classifications represented are applicable when the material is cut, ground or welded.

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

2.4 Other information



See Section 12 for Ecological Information.

Section 3 - Composition/Information on Ingredients

3.1 Substances

- Material does not meet the criteria of a substance in accordance with Regulation (EC) No 1272/2008.

3.2 Mixtures

Hazardous Components					
Chemical Name	Identifiers	%(weight)	LD50/LC50	Classifications According to Regulation/Directive	Comments
Iron	CAS:7439-89-6 EC Number:231-096-4	0% TO 94.28%	Ingestion/Oral-Rat LD50 • 30 g/kg	EU DSD/DPD: Self Classified - Xi; R37 Xn; R48/20 EU CLP: Self Classified - STOT SE 3, H335; STOT RE 2 (Lung), H373 OSHA HCS 2012: STOT SE 3: Resp. Irrit.; STOT RE 2 (Lung)	Balance
Carbon	CAS:7440-44-0 EC Number:231-153-3 UN:UN1361	3% TO 4%	NDA	EU DSD/DPD: Not Classified - Classification criteria not met EU CLP: Not Classified - Classification criteria not met OSHA HCS 2012: Not Classified - Classification criteria not met	NDA
Silicon	CAS:7440-21-3 EC Number:231-130-8 UN:UN1346	2% TO 3%	Ingestion/Oral-Rat LD50 • 3160 mg/kg	EU DSD/DPD: Self Classified - Xi; R36/37/38 EU CLP: Self Classified - Eye Irrit. 2, H319; Skin Irrit. 2, H315; STOT SE 3, H335 OSHA HCS 2012: Eye Irrit. 2A; Skin Irrit. 2; STOT SE 3: Resp. Irrit.	NDA

Manganese	CAS: 7439-96-5 EC Number: 231-105-1	0.2% TO 1%	Ingestion/Oral-Rat LD50 • 9 g/kg	EU DSD/DPD: Self Classified - N Xi; R36/38 EU CLP: Self Classified - Eye Irrit. 2, H319; Skin Irrit. 2, H315 OSHA HCS 2012: Eye Irrit. 2A; Skin Irrit. 2; STOT RE 2 (CNS)	NDA
Titanium	CAS: 7440-32-6 UN: UN1352 EINECS: 231-142-3	0% TO 0.5%	NDA	EU DSD/DPD: Not Classified - Classification criteria not met EU CLP: Not Classified - Classification criteria not met OSHA HCS 2012: Not Classified - Classification criteria not met	NDA
Magnesium	CAS: 7439-95-4 EC Number: 231-104-6 UN: UN1418	0.02% TO 0.2%	NDA	EU DSD/DPD: Annex I - F; R15 R17 (powder, pyrophoric) EU CLP: Annex VI - Water-react. 1, H260; Pyr. Sol. 1, H250 OSHA HCS 2012: Eye Irrit. 2A; Skin Irrit. 2; STOT SE 3: Resp. Irrit.	NDA
Chrome	CAS: 7440-47-3 EC Number: 231-157-5	0% TO 0.2%	NDA	EU DSD/DPD: Not Classified - Classification criteria not met EU CLP: Not Classified - Classification criteria not met OSHA HCS 2012: Not Classified - Classification criteria not met	NDA
Copper	CAS: 7440-50-8 EC Number: 231-159-6	0% TO 0.2%	NDA	EU DSD/DPD: Not Classified - Classification criteria not met EU CLP: Not Classified - Classification criteria not met OSHA HCS 2012: Not Classified - Classification criteria not met	NDA
Oxygen	CAS: 7782-44-7 EC Number: 231-956-9 UN: UN1072	0% TO 0.2%	NDA	EU DSD/DPD: Annex I - O; R8 EU CLP: Annex VI - Ox. Gas 1, H270; Press. Gas, H280 OSHA HCS 2012: Press. Gas; Ox. Gas 1	NDA
Aluminum	CAS: 7429-90-5 EC Number: 231-072-3 UN: UN1309	0% TO 0.1%	NDA	EU DSD/DPD: Annex I - F; R11 R15 (stabilized) EU CLP: Annex VI - Water-react. 2, H261; Flam. Sol. 1, H228 OSHA HCS 2012: Water-react. 2; Flam. Sol. 1	NDA
Nickel	CAS: 7440-02-0 EC Number: 231-111-4	0% TO 0.1%	NDA	EU DSD/DPD: Annex I - Carc. Cat. 3; R40 R43 T; R48/23 EU CLP: Annex VI - Carc. 2, H351; STOT RE 1, H372; Skin Sens. 1, H317; Aquatic Chronic 3, H412 OSHA HCS 2012: Carc. 2; Skin Sens. 1A	NDA
Phosphorus	CAS: 7723-14-0 EC Number: 231-768-7 UN: UN1381	0% TO 0.1%	NDA	EU DSD/DPD: Annex I - F; R11 R16 R52-53 EU CLP: Annex VI - Flam. Sol. 1, H228; Aquatic Chronic 3, H412 OSHA HCS 2012: Eye Irrit. 2; STOT SE 3: Resp. Irrit.	NDA
Sulfur	CAS: 7704-34-9 EC Number: 231-722-6 UN: UN1350	0% TO 0.1%	NDA	EU DSD/DPD: Annex I - Xi; R38 EU CLP: Annex VI - Skin Irrit. 2, H315 OSHA HCS 2012: Eye Irrit. 2; STOT SE 3: Resp. Irrit.	NDA
Tin	CAS: 7440-31-5 EINECS: 231-141-8	0% TO 0.1%	NDA	EU DSD/DPD: Self Classified - Xi; R36/37 EU CLP: Self Classified - Eye Irrit. 2, H319; STOT SE 3, H335 OSHA HCS 2012: Eye Irrit. 2A; STOT SE 3: Resp. Irrit.	NDA

Vanadium	CAS:7440-62-2 EC Number:231-171-1 UN:UN3285	0% TO 0.1%	NDA	EU DSD/DPD: Self Classified - Xi; R36/37/38 EU CLP: Self Classified - Skin Irrit. 2, H315; Eye Irrit. 2, H319; STOT SE 3, H335 OSHA HCS 2012: Skin Irrit. 2; Eye Irrit. 2A; STOT SE 3: Resp. Irrit.	NDA
Zinc	CAS:7440-66-6 EC Number:231-175-3 UN:UN1435	0% TO 0.1%	NDA	EU DSD/DPD: Annex I - N; R50-53 EU CLP: Annex VI - Water-react. 1, H260; Pyr. Sol. 1, H250; Aquatic Acute 1, H400; Aquatic Chronic 1, H410 OSHA HCS 2012: Skin Irrit. 2	NDA
Molybdenum	CAS:7439-98-7 EC Number:231-107-2	0% TO 0.05%	NDA	EU DSD/DPD: Self Classified - Xi; R36/37/38 EU CLP: Self Classified - Skin Irrit. 2, H315; Eye Irrit. 2, H319; STOT SE 3, H335 OSHA HCS 2012: Skin Irrit. 2; Eye Irrit. 2; STOT SE 3: Resp. Irrit.	NDA
Cerium	CAS:7440-45-1 UN:UN1333 EINECS:231-154-9	0% TO 0.01%	NDA	EU DSD/DPD: Not Classified - Data Lacking EU CLP: Not Classified - Data Lacking OSHA HCS 2012: Not Classified - Data Lacking	NDA
Lead	CAS:7439-92-1 EC Number:231-100-4 UN:UN2291	< 0.1%	NDA	EU DSD/DPD: Annex I - Repr. Cat. 1; R61 Repr. Cat. 3; R62 Xn; R20/22 R33 N; R50-53 EU CLP: Annex VI - Repr. 1A, 360Df; Acute Tox. 4* H332; Acute Tox. 4* H302; STOT RE 2* H373; Aquatic Acute 1, H400; Aquatic Chronic 1, H410 OSHA HCS 2012: Carc. 2; Repr. 1A	NDA
Lithium	CAS:7439-93-2 EC Number:231-102-5 UN:UN1415	< 0.1%	NDA	EU DSD/DPD: Annex I - R14 F; R15 C; R34 EU CLP: Annex VI - Water-react. 1; H260 Skin Corr. 1B; H314 EUH014 OSHA HCS 2012: Skin Corr. 1B; Eye Dam. 1	NDA
Tungsten	CAS:7440-33-7 EC Number:231-143-9	< 0.1%	NDA	EU DSD/DPD: Self Classified - Xi; R36/37 EU CLP: Self Classified - Skin Irrit. 2, H315; Eye Irrit. 2, H319 OSHA HCS 2012: Skin Irrit. 2; Eye Irrit. 2A	NDA

See Section 11 for Toxicological Information.

Section 4 - First Aid Measures

4.1 Description of first aid measures

Inhalation

- IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing. If signs/symptoms continue, get medical attention.

Skin

- For skin contact, flush with large amounts of water. If irritation persists, get medical attention.

Eye

- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Do not rub or scratch your eyes. If eye irritation persists: Get medical advice/attention.

Ingestion

- First aid is not expected to be necessary if material is used under ordinary conditions and as recommended.

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.

See Section 2 for Potential Health Effects.

Section 5 - Firefighting Measures

5.1 Extinguishing media

Suitable Extinguishing Media ● Not combustible. Use extinguishing media suitable for surrounding fire.

Unsuitable Extinguishing Media ● None known.

5.2 Special hazards arising from the substance or mixture

Unusual Fire and Explosion Hazards ● None known.

Hazardous Combustion Products ● Non-combustible, substance itself does not burn but may decompose upon heating to produce toxic fumes.

5.3 Advice for firefighters

- Fire fighters should wear full-face, self contained breathing apparatus and impervious protective clothing.
- Fire fighters should avoid inhaling any combustion products.

Section 6 - Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal Precautions ● Avoid contact with skin and eyes during clean-up. Do not breathe dust.

Emergency Procedures ● Not applicable.

6.2 Environmental precautions

- Prevent entry into waterways and sewers.

6.3 Methods and material for containment and cleaning up

Containment/Clean-up Measures ● Collect dust or particulates using a vacuum cleaner with a HEPA filter. Avoid the generation of dusts during clean-up.

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 ● Do not inhale dusts which may be produced during processing. Do not get into contact with eyes and skin. Use only with adequate ventilation. Keep formation of airborne dusts to a minimum. As with all chemicals, good industrial hygiene practices should be followed when handling this material.

7.2 Conditions for safe storage, including any incompatibilities

Storage ● Guard against dust accumulation of this material. Store in a cool/low-temperature, well-ventilated, dry place.

Incompatible Materials or Ignition Sources ● None known.

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	Brazil	Canada Ontario	Canada Quebec	Chile
Copper (7440-50-8)	TWAs	0.2 mg/m3 TWA (fume)	Not established	0.2 mg/m3 TWA (fume); 1 mg/m3 TWA (dust and mist)	0.2 mg/m3 TWAEV (fume); 1 mg/m3 TWAEV (dust and mist)	0.16 mg/m3 TWA LPP (fume); 0.8 mg/m3 TWA LPP (dust and mist, as Cu)
Phosphorus (7723-14-0)	TWAs	Not established	Not established	Not established	0.1 mg/m3 TWAEV (yellow)	Not established
Chrome (7440-47-3)	TWAs	0.5 mg/m3 TWA	Not established	0.5 mg/m3 TWA	0.5 mg/m3 TWAEV	0.4 mg/m3 TWA LPP
Aluminum (7429-90-5)	TWAs	1 mg/m3 TWA (respirable fraction)	Not established	1 mg/m3 TWA (respirable)	10 mg/m3 TWAEV	8 mg/m3 TWA LPP (metallic dust)
Molybdenum (7439-98-7)	TWAs	10 mg/m3 TWA (inhalable fraction); 3 mg/m3 TWA (respirable fraction)	Not established	10 mg/m3 TWA (metal, inhalable); 3 mg/m3 TWA (metal, respirable)	Not established	Not established
Nickel (7440-02-0)	TWAs	1.5 mg/m3 TWA (inhalable fraction)	Not established	1 mg/m3 TWA (inhalable)	1 mg/m3 TWAEV	0.8 mg/m3 TWA LPP
Tin (7440-31-5)	TWAs	2 mg/m3 TWA	Not established	2 mg/m3 TWA	2 mg/m3 TWAEV	1.6 mg/m3 TWA LPP
Vanadium (7440-62-2)	TWAs	Not established	Not established	Not established	Not established	0.04 mg/m3 TWA LPP (respirable dust and fume, as V2O5)
Lead as Lead, inorganic compounds	TWAs	0.05 mg/m3 TWA	0.1 mg/m3 TWA LT	0.05 mg/m3 TWA (designated substance regulation); 0.05 mg/m3 TWA (applies to workplaces to which the designated substance regulation does not apply)	0.05 mg/m3 TWAEV	0.12 mg/m3 TWA LPP (dust)
Tungsten (7440-33-7)	STELs	10 mg/m3 STEL	Not established	10 mg/m3 STEL	Not established	Not established
	TWAs	5 mg/m3 TWA	Not established	5 mg/m3 TWA	Not established	Not established
Manganese (7439-96-5)	TWAs	0.2 mg/m3 TWA	5 mg/m3 TWA LT (dust); 1 mg/m3 TWA LT (fume)	0.2 mg/m3 TWA	5 mg/m3 TWAEV (dust); 1 mg/m3 TWAEV (fume)	0.8 mg/m3 TWA LPP (fume); 4 mg/m3 TWA LPP (dust)
	STELs	Not established	Not established	Not established	3 mg/m3 STEV (fume)	3 mg/m3 STEL LPT (fume)
Silicon (7440-21-3)	TWAs	Not established	Not established	10 mg/m3 TWA (total dust)	10 mg/m3 TWAEV (containing no Asbestos and <1% Crystalline silica, total dust)	Not established

Exposure Limits/Guidelines (Con't.)			
	Result	China	NIOSH
Copper	STELs	2.5 mg/m3 STEL (dust); 0.6 mg/m3 STEL (fume)	Not established
			OSHA
			Not established

(7440-50-8)	TWAs	1 mg/m3 TWA (dust); 0.2 mg/m3 TWA (fume)	1 mg/m3 TWA (dust and mist); 0.1 mg/m3 TWA (fume)	0.1 mg/m3 TWA (fume); 1 mg/m3 TWA (dust and mist)
Phosphorus (7723-14-0)	STELs	0.1 mg/m3 STEL	Not established	Not established
	TWAs	0.05 mg/m3 TWA	Not established	0.1 mg/m3 TWA
Chrome (7440-47-3)	STELs	0.15 mg/m3 STEL	Not established	Not established
	TWAs	0.05 mg/m3 TWA	0.5 mg/m3 TWA	1 mg/m3 TWA
Aluminum (7429-90-5)	STELs	6 mg/m3 STEL (total dust)	Not established	Not established
	TWAs	3 mg/m3 TWA (total dust)	10 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable dust)	15 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)
Molybdenum (7439-98-7)	STELs	15 mg/m3 STEL	Not established	Not established
	TWAs	6 mg/m3 TWA	Not established	Not established
Nickel (7440-02-0)	STELs	2.5 mg/m3 STEL	Not established	Not established
	TWAs	1 mg/m3 TWA	0.015 mg/m3 TWA	1 mg/m3 TWA
Tin (7440-31-5)	TWAs	Not established	2 mg/m3 TWA	Not established
Vanadium (7440-62-2)	Ceilings	Not established	0.05 mg/m3 Ceiling (except Vanadium metal and Vanadium carbide, as V, dust and fume, 15 min) <i>as Vanadium compounds</i>	0.5 mg/m3 Ceiling (as V2O5, respirable dust); 0.1 mg/m3 Ceiling (as V2O5, fume)
	STELs	Not established	3 mg/m3 STEL (listed under Ferrovandium dust)	Not established
	TWAs	Not established	1 mg/m3 TWA (listed under Ferrovandium dust)	Not established
Lead as Lead, inorganic compounds	STELs	0.15 mg/m3 STEL (dust); 0.09 mg/m3 STEL (fume)	Not established	Not established
	TWAs	0.05 mg/m3 TWA (dust); 0.03 mg/m3 TWA (fume)	0.050 mg/m3 TWA	50 µg/m3 TWA
Tungsten (7440-33-7)	STELs	10 mg/m3 STEL	10 mg/m3 STEL	Not established
	TWAs	5 mg/m3 TWA	5 mg/m3 TWA	Not established
Manganese as Manganese compounds	STELs	0.45 mg/m3 STEL	3 mg/m3 STEL	Not established
	TWAs	0.15 mg/m3 TWA	1 mg/m3 TWA (fume)	Not established
	Ceilings	Not established	Not established	5 mg/m3 Ceiling (fume)
Silicon (7440-21-3)	TWAs	Not established	10 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable dust)	15 mg/m3 TWA (total dust); 5 mg/m3 TWA (respirable fraction)

Exposure Control Notations

Egypt

- Chrome (7440-47-3): **Carcinogens:** (Present)
- Lead (7439-92-1): **Carcinogens:** (Animal Carcinogen)

•Lead as Lead, inorganic compounds: **Carcinogens:** (Animal Carcinogen)

•Nickel (7440-02-0): **Carcinogens:** (Present)

Canada Ontario

•Lead (7439-92-1): **Designated Substances:** (0.05 mg/m3 TWA)

•Lead as Lead, inorganic compounds: **Designated Substances:** (0.05 mg/m3 TWA (except Tetraethyl lead, as Pb))

Canada Quebec

•Lead (7439-92-1): **Carcinogens:** (C3 carcinogen - effect detected in animals)

•Lead as Lead, inorganic compounds: **Carcinogens:** (C3 carcinogen - effect detected in animals)

Chile

•Chrome (7440-47-3): **Carcinogens:** (A4 - Not Classifiable as a Human Carcinogen)

•Lead as Lead, inorganic compounds: **Carcinogens:** (A3 - Animal Carcinogen (dust and fume))

•Nickel (7440-02-0): **Carcinogens:** (A1 - Confirmed Human Carcinogen)

ACGIH

•Chrome (7440-47-3): **Carcinogens:** (A4 - Not Classifiable as a Human Carcinogen)

•Lead (7439-92-1): **Carcinogens:** (A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans)

•Lead as Lead, inorganic compounds: **Carcinogens:** (A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans)

•Aluminum (7429-90-5): **Carcinogens:** (A4 - Not Classifiable as a Human Carcinogen)

•Aluminum as Aluminum insoluble compounds: **Carcinogens:** (A4 - Not Classifiable as a Human Carcinogen)

•Nickel (7440-02-0): **Carcinogens:** (A5 - Not Suspected as a Human Carcinogen)

Exposure Limits Supplemental

Chile

•Chrome (7440-47-3): **BEIs:** (30 µg/g Creatinine Medium: urine Time: end of shift and at end of workweek Parameter: Chromium)

•Lead (7439-92-1): **BEIs:** (40 µg/100mL Medium: blood Time: discretionary Parameter: Lead)

•Manganese (7439-96-5): **BEIs:** (40 µg/L Medium: urine Time: discretionary Parameter: Manganese)

ACGIH

•Copper (7440-50-8): **TLV Basis - Critical Effects:** (metal fume fever (fume))

•Copper as Copper Compounds: **TLV Basis - Critical Effects:** (gastrointestinal (dust and mist); irritation (dust and mist))

•Chrome (7440-47-3): **TLV Basis - Critical Effects:** (skin and upper respiratory tract irritation)

•Lead (7439-92-1): **BEIs:** (30 µg/100 ml Medium: blood Time: not critical Parameter: Lead (Note: Women of child bearing potential, whose blood Pb exceeds 10 µg/dL, are at risk of delivering a child with a blood Pb over the current Centers for Disease Control guideline of 10 µg/dL. If the blood Pb of such children remains elevated, they may be at increased risk of cognitive deficits. The blood Pb of these children should be closely monitored and appropriate steps should be taken to minimize the child's exposure to environmental lead.)) | **TLV Basis - Critical Effects:** (CNS and PNS impairment; hematologic effects)

•Lead as Lead, inorganic compounds: **BEIs:** (30 µg/100 ml Medium: blood Time: not critical Parameter: Lead (Note: Women of child bearing potential, whose blood Pb exceeds 10 µg/dL, are at risk of delivering a child with a blood Pb over the current Centers for Disease Control guideline of 10 µg/dL. If the blood Pb of such children remains elevated, they may be at increased risk of cognitive deficits. The blood Pb of these children should be closely monitored and appropriate steps should be taken to minimize the child's exposure to environmental lead.)) | **TLV Basis - Critical Effects:** (CNS and PNS impairment; hematologic effects)

•Manganese (7439-96-5): **TLV Basis - Critical Effects:** (CNS impairment) | **Notice of Intended Changes (TLVs):** (0.1 mg/m3 TWA (inhalable fraction); 0.02 mg/m3 TWA (respirable fraction); A4 - not classifiable as a human carcinogen; TLV basis: CNS impairment)

•Aluminum (7429-90-5): **TLV Basis - Critical Effects:** (pneumoconiosis; lower respiratory tract irritation; neurotoxicity)

•Aluminum as Aluminum insoluble compounds: **TLV Basis - Critical Effects:** (pneumoconiosis; lower respiratory tract irritation; neurotoxicity)

•Nickel (7440-02-0): **TLV Basis - Critical Effects:** (dermatitis; pneumoconiosis)

•Tungsten (7440-33-7): **TLV Basis - Critical Effects:** (lower respiratory tract irritation)

8.2 Exposure controls

Engineering Measures/Controls

- Adequate ventilation systems as needed to control concentrations of airborne contaminants below applicable threshold limit values.

Personal Protective Equipment

Pictograms



Respiratory

- If ventilation is not sufficient to effectively prevent buildup of dust, appropriate NIOSH/MSHA respiratory protection must be provided.

Eye/Face

- Wear safety glasses.

Hands

- Wear appropriate gloves.

Skin/Body

- Work clothing sufficient to prevent all skin contact should be worn, such as coveralls, long sleeves and cap.

Environmental Exposure Controls

- Follow best practice for site management and disposal of waste.

Key to abbreviations

ACGIH = American Conference of Governmental Industrial Hygiene

VME = Valeur Moyenne d'Exposition is the maximum permissible concentration for a work day

NIOSH = National Institute of Occupational Safety and Health

TWAEV = Time-Weighted Average Exposure Value

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 Physical and Chemical Properties

Material Description			
Physical Form	Solid	Appearance/Description	Dark gray solid with no odor.
Color	Dark gray.	Odor	Odorless
Particulate Type	Dust/Fume	Odor Threshold	Not relevant
General Properties			
Boiling Point	5000 F(2760 C)	Melting Point	2100 to 2280 F(1148.8889 to 1248.8889 C)
Decomposition Temperature	Not relevant	pH	Not relevant
Specific Gravity/Relative Density	7.4 Water=1	Water Solubility	Negligible < 0.1 %
Solvent Solubility	Data lacking	Viscosity	Not relevant
Explosive Properties	Not relevant.	Oxidizing Properties:	Not relevant.
Volatility			
Vapor Pressure	Not relevant	Vapor Density	Not relevant
Evaporation Rate	Not relevant		
Flammability			
Flash Point	Not relevant	UEL	Not relevant
LEL	Not relevant	Autoignition	Not relevant
Flammability (solid, gas)	Not flammable.		
Environmental			
Octanol/Water Partition coefficient	Not relevant		

9.2 Other Information

- No additional physical and chemical parameters noted.

Section 10: Stability and Reactivity

10.1 Reactivity

- No dangerous reaction known under conditions of normal use.

10.2 Chemical stability

- Stable under normal conditions.

10.3 Possibility of hazardous reactions

- Hazardous polymerization will not occur.

10.4 Conditions to avoid

- Avoid creating dusts.

10.5 Incompatible materials

- None known or anticipated.

10.6 Hazardous decomposition products

- No data available.

Section 11 - Toxicological Information

11.1 Information on toxicological effects

Other Material Information

- Toxicological information is not available for the material as a whole, but is provided for applicable components.

Component Name	CAS	Data
Silicon (2% TO 3%)	7440-21-3	Acute Toxicity: orl-rat LD50:3160 mg/kg; Irritation: eye-rbt 3 mg MLD
Manganese (0.2% TO 1%)	7439-96-5	Acute Toxicity: orl-rat LD50:9 gm/kg; Irritation: eye-rbt 500 mg/24H MLD; skn-rbt 500 mg/24H MLD; Reproductive: orl-rat TDLo:90 mg/kg (18D post)
Titanium (0% TO 0.5%)	7440-32-6	Reproductive: orl-rat TDLo:158 mg/kg (multigeneration)
Copper (0% TO 0.2%)	7440-50-8	Reproductive: orl-rat TDLo:1210 ug/kg (35W pre)
Oxygen (0% TO 0.2%)	7782-44-7	Reproductive: ihl-rat TCLo:10 pph/9H (22D preg)
Nickel (0% TO 0.1%)	7440-02-0	Reproductive: orl-rat TDLo:158 mg/kg (multigenerations)
Molybdenum (0% TO 0.05%)	7439-98-7	Reproductive: orl-rat TDLo:5800 ug/kg (30W pre/1-20D preg)
Lead (< 0.1%)	7439-92-1	Reproductive: ihl-rat TCLo:10 mg/m3/24H (1-21D preg)
Tungsten (< 0.1%)	7440-33-7	Irritation: eye-rbt 500 mg/24H MLD; skn-rbt 500 mg/24H MLD; Reproductive: orl-rat TDLo:1160 ug/kg (30W pre/1-20D preg)

GHS Properties	Classification
Acute toxicity	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
Aspiration Hazard	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
Carcinogenicity	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
Germ Cell Mutagenicity	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
Skin corrosion/Irritation	EU/CLP • Skin Irritation 2 OSHA HCS 2012 • Skin Irritation 2
Skin sensitization	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
STOT-RE	EU/CLP • Specific Target Organ Toxicity Repeated Exposure 2 OSHA HCS 2012 • Specific Target Organ Toxicity Repeated Exposure 2

STOT-SE	EU/CLP • Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation OSHA HCS 2012 • Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation
Toxicity for Reproduction	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
Respiratory sensitization	EU/CLP • Classification criteria not met OSHA HCS 2012 • Classification criteria not met
Serious eye damage/Irritation	EU/CLP • Eye Irritation 2 OSHA HCS 2012 • Eye Irritation 2A

Potential Health Effects

Inhalation

Acute (Immediate)

- Exposure to dust may cause 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)

- Repeated and prolonged exposure to dust may cause lung injury and/or disease.

Skin

Acute (Immediate)

- Dust from this product may cause mechanical irritation.

Chronic (Delayed)

- No data available.

Eye

Acute (Immediate)

- Dust generated from this product may cause irritation to the eyes. 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)

- Ingestion of this product unlikely. No significant effects expected.

Chronic (Delayed)

- No applicable information found.

Carcinogenic Effects

- Welding or flame cutting may convert a fraction of the chromium to the water insoluble hexavalent (carcinogenic) form, but the chromium content of the casting is so low that overexposure is not likely.

11.2 Other information

- Overexposure to thermal processing fumes may cause metal fume fever which is an influenza like illness. Symptoms include headache, metallic taste in the mouth, cough, thirst, throat irritation, shortness of breath, fever, sweating and pain in the limbs. This illness is not permanent and recovery usually occurs within 24-48 hours after onset.

Key to abbreviations

TD = Toxic Dose

LD = Lethal Dose

TC = Toxic Concentration

Section 12 - Ecological Information

12.1 Toxicity

Component	CAS	Data	Comments
Iron (0% TO 94.28%)	7439-89-6	Fish: 96 Hour(s) LC50 Fish 560 µg/L	

Copper (0% TO 0.2%)	7440-50-8	Crustacea: 48 Hour(s) EC50 Water Flea 1.6 µg/L	
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- No information available for the product.

12.2 Persistence and degradability

- No information available for the product.

12.3 Bioaccumulative potential

- No information available for the product.

12.4 Mobility in Soil

- No information available for the product.

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	NDA	Not Regulated	NDA	NDA	NDA
TDG	NDA	Not Regulated	NDA	NDA	NDA
IMO/IMDG	NDA	Not Regulated	NDA	NDA	NDA
IATA/ICAO	NDA	Not Regulated	NDA	NDA	NDA

14.6 Special precautions for user

- The material, as it is shipped, is not expected to be hazardous.

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

- Not relevant.

Section 15 - Regulatory Information

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

SARA Hazard Classifications

- Acute, Chronic

State Right To Know				
Component	CAS	MA	NJ	PA
Iron	7439-89-6	No	No	Yes
Carbon	7440-44-0	No	No	No
Silicon	7440-21-3	Yes	Yes	Yes
Manganese	7439-96-5	Yes	Yes	Yes
Titanium	7440-32-6	No	Yes	No
Magnesium	7439-95-4	Yes	Yes	Yes
Chrome	7440-47-3	Yes	Yes	Yes
Copper	7440-50-8	Yes	Yes	Yes
Oxygen	7782-44-7	Yes	Yes	Yes
Aluminum	7429-90-5	Yes	Yes	Yes
Nickel	7440-02-0	Yes	Yes	Yes
Phosphorus	7723-14-0	No	Yes	Yes
Sulfur	7704-34-9	Yes	Yes	Yes
Tin	7440-31-5	Yes	Yes	Yes
Vanadium	7440-62-2	Yes	Yes	Yes
Zinc	7440-66-6	Yes	Yes	Yes
Molybdenum	7439-98-7	Yes	Yes	Yes
Cerium	7440-45-1	No	Yes	No
Lead	7439-92-1	Yes	Yes	Yes
Lithium	7439-93-2	Yes	Yes	Yes
Tungsten	7440-33-7	Yes	Yes	Yes

Inventory						
Component	CAS	Canada DSL	EU EINECS	EU ELNICS	Japan ENCS	Korea KECL
Iron	7439-89-6	Yes	Yes	No	No	Yes
Carbon	7440-44-0	Yes	Yes	No	No	Yes
Silicon	7440-21-3	Yes	Yes	No	No	Yes
Manganese	7439-96-5	Yes	Yes	No	No	Yes
Titanium	7440-32-6	Yes	Yes	No	No	Yes
Magnesium	7439-95-4	Yes	Yes	No	No	Yes
Chrome	7440-47-3	Yes	Yes	No	No	Yes

Copper	7440-50-8	Yes	Yes	No	No	Yes
Oxygen	7782-44-7	Yes	Yes	No	No	Yes
Aluminum	7429-90-5	Yes	Yes	No	No	Yes
Nickel	7440-02-0	Yes	Yes	No	No	Yes
Phosphorus	7723-14-0	Yes	Yes	No	No	Yes
Sulfur	7704-34-9	Yes	Yes	No	No	Yes
Tin	7440-31-5	Yes	Yes	No	No	Yes
Vanadium	7440-62-2	Yes	Yes	No	No	Yes
Zinc	7440-66-6	Yes	Yes	No	No	Yes
Molybdenum	7439-98-7	Yes	Yes	No	No	Yes
Cerium	7440-45-1	Yes	Yes	No	No	Yes
Lead	7439-92-1	Yes	Yes	No	Yes	Yes
Lithium	7439-93-2	Yes	Yes	No	No	Yes
Tungsten	7440-33-7	Yes	Yes	No	No	Yes

Inventory (Con't.)

Component	CAS	TSCA
Iron	7439-89-6	Yes
Carbon	7440-44-0	Yes
Silicon	7440-21-3	Yes
Manganese	7439-96-5	Yes
Titanium	7440-32-6	Yes
Magnesium	7439-95-4	Yes
Chrome	7440-47-3	Yes
Copper	7440-50-8	Yes
Oxygen	7782-44-7	Yes
Aluminum	7429-90-5	Yes
Nickel	7440-02-0	Yes
Phosphorus	7723-14-0	Yes
Sulfur	7704-34-9	Yes
Tin	7440-31-5	Yes
Vanadium	7440-62-2	Yes
Zinc	7440-66-6	Yes
Molybdenum	7439-98-7	Yes
Cerium	7440-45-1	Yes
Lead	7439-92-1	Yes
Lithium	7439-93-2	Yes
Tungsten	7440-33-7	Yes

Bahrain

Environment
Bahrain - Banned Chemicals

• Lithium	7439-93-2	< 0.1%	Not Listed
• Carbon	7440-44-0	3% TO 4%	Not Listed
• Copper	7440-50-8	0% TO 0.2%	Not Listed
• Copper as Copper compounds		0% TO 0.2%	Not Listed
• Cerium	7440-45-1	0% TO 0.01%	Not Listed
• Oxygen	7782-44-7	0% TO 0.2%	Not Listed
• Phosphorus	7723-14-0	0% TO 0.1%	Not Listed
• Chrome	7440-47-3	0% TO 0.2%	Not Listed
• Chromium as Chromium compounds		0% TO 0.2%	Not Listed
• Lead	7439-92-1	< 0.1%	Not Listed
• Lead as Lead compounds		< 0.1%	Not Listed
• Lead as Lead, inorganic compounds		< 0.1%	Not Listed
• Manganese	7439-96-5	0.2% TO 1%	Not Listed
• Manganese as Manganese compounds		0.2% TO 1%	Not Listed
• Tin	7440-31-5	0% TO 0.1%	Not Listed
• Tin as Tin compounds		0% TO 0.1%	Not Listed
• Aluminum	7429-90-5	0% TO 0.1%	Not Listed
• Aluminum as Aluminum insoluble compounds		0% TO 0.1%	Not Listed
• Molybdenum	7439-98-7	0% TO 0.05%	Not Listed
• Nickel	7440-02-0	0% TO 0.1%	Not Listed
• Nickel as Nickel compounds		0% TO 0.1%	Not Listed
• Silicon	7440-21-3	2% TO 3%	Not Listed
• Tungsten	7440-33-7	< 0.1%	Not Listed
• Vanadium	7440-62-2	0% TO 0.1%	Not Listed
• Vanadium as Vanadium compounds		0% TO 0.1%	Not Listed
• Zinc	7440-66-6	0% TO 0.1%	Not Listed
• Zinc as Zinc compounds		0% TO 0.1%	Not Listed
• Iron	7439-89-6	0% TO 94.28%	Not Listed
• Iron as Iron Salts		0% TO 94.28%	Not Listed
• Magnesium	7439-95-4	0.02% TO 0.2%	Not Listed
• Titanium	7440-32-6	0% TO 0.5%	Not Listed
• Sulfur	7704-34-9	0% TO 0.1%	Not Listed

Bahrain - Restricted Chemicals

• Lithium	7439-93-2	< 0.1%	Not Listed
• Carbon	7440-44-0	3% TO 4%	Not Listed
• Copper	7440-50-8	0% TO 0.2%	Not Listed
• Copper as Copper compounds		0% TO 0.2%	Not Listed
• Cerium	7440-45-1	0% TO 0.01%	Not Listed
• Oxygen	7782-44-7	0% TO 0.2%	Not Listed
• Phosphorus	7723-14-0	0% TO 0.1%	Not Listed
• Chrome	7440-47-3	0% TO 0.2%	Not Listed
• Chromium as Chromium compounds		0% TO 0.2%	Not Listed
• Lead	7439-92-1	< 0.1%	Not Listed
• Lead as Lead compounds		< 0.1%	Not Listed
• Lead as Lead, inorganic compounds		< 0.1%	Not Listed
• Manganese	7439-96-5	0.2% TO 1%	Not Listed
• Manganese as Manganese compounds		0.2% TO 1%	Not Listed
• Tin	7440-31-5	0% TO 0.1%	Not Listed
• Tin as Tin compounds		0% TO 0.1%	Not Listed

• Aluminum	7429-90-5	0% TO 0.1%	Not Listed
• Aluminum as Aluminum insoluble compounds		0% TO 0.1%	Not Listed
• Molybdenum	7439-98-7	0% TO 0.05%	Not Listed
• Nickel	7440-02-0	0% TO 0.1%	Not Listed
• Nickel as Nickel compounds		0% TO 0.1%	Not Listed
• Silicon	7440-21-3	2% TO 3%	Not Listed
• Tungsten	7440-33-7	< 0.1%	Not Listed
• Vanadium	7440-62-2	0% TO 0.1%	Not Listed
• Vanadium as Vanadium compounds		0% TO 0.1%	Not Listed
• Zinc	7440-66-6	0% TO 0.1%	Not Listed
• Zinc as Zinc compounds		0% TO 0.1%	Not Listed
• Iron	7439-89-6	0% TO 94.28%	Not Listed
• Iron as Iron Salts		0% TO 94.28%	Not Listed
• Magnesium	7439-95-4	0.02% TO 0.2%	Not Listed
• Titanium	7440-32-6	0% TO 0.5%	Not Listed
• Sulfur	7704-34-9	0% TO 0.1%	Not Listed

Canada

Labor

Canada - WHMIS - Classifications of Substances

• Lithium	7439-93-2	< 0.1%	B6, E
• Carbon	7440-44-0	3% TO 4%	Uncontrolled product according to WHMIS classification criteria
• Copper	7440-50-8	0% TO 0.2%	Uncontrolled product according to WHMIS classification criteria
• Copper as Copper compounds		0% TO 0.2%	Not Listed
• Cerium	7440-45-1	0% TO 0.01%	Not Listed
• Oxygen	7782-44-7	0% TO 0.2%	A, C
• Phosphorus	7723-14-0	0% TO 0.1%	B4, D1A, E
• Chrome	7440-47-3	0% TO 0.2%	Uncontrolled product according to WHMIS classification criteria
• Chromium as Chromium compounds		0% TO 0.2%	Not Listed
• Lead	7439-92-1	< 0.1%	D2A
• Lead as Lead compounds		< 0.1%	Not Listed
• Lead as Lead, inorganic compounds		< 0.1%	Not Listed
• Manganese	7439-96-5	0.2% TO 1%	D2A (including powder)
• Manganese as Manganese compounds		0.2% TO 1%	Not Listed
• Tin	7440-31-5	0% TO 0.1%	Uncontrolled product according to WHMIS classification criteria
• Tin as Tin compounds		0% TO 0.1%	Not Listed
• Aluminum	7429-90-5	0% TO 0.1%	B6 (powder); Uncontrolled product according to WHMIS classification criteria
• Aluminum as Aluminum insoluble compounds		0% TO 0.1%	Not Listed
• Molybdenum	7439-98-7	0% TO 0.05%	Uncontrolled product according to WHMIS classification criteria
• Nickel	7440-02-0	0% TO 0.1%	D2A, D2B; B6, D2A (Raney)
• Nickel as Nickel compounds		0% TO 0.1%	Not Listed
• Silicon	7440-21-3	2% TO 3%	B4
• Tungsten	7440-33-7	< 0.1%	Uncontrolled product according to WHMIS classification criteria
• Vanadium	7440-62-2	0% TO 0.1%	Not Listed
• Vanadium as Vanadium compounds		0% TO 0.1%	Not Listed
• Zinc	7440-66-6	0% TO 0.1%	Not Listed
• Zinc as Zinc compounds		0% TO 0.1%	Not Listed
• Iron	7439-89-6	0% TO 94.28%	Uncontrolled product according to WHMIS classification criteria

• Iron as Iron Salts		0% TO 94.28%	Not Listed
• Magnesium	7439-95-4	0.02% TO 0.2%	B4, B6
• Titanium	7440-32-6	0% TO 0.5%	Not Listed
• Sulfur	7704-34-9	0% TO 0.1%	B4

Canada - WHMIS - Ingredient Disclosure List

• Lithium	7439-93-2	< 0.1%	Not Listed
• Carbon	7440-44-0	3% TO 4%	Not Listed
• Copper	7440-50-8	0% TO 0.2%	1 %
• Copper as Copper compounds		0% TO 0.2%	1 %
• Cerium	7440-45-1	0% TO 0.01%	Not Listed
• Oxygen	7782-44-7	0% TO 0.2%	Not Listed
• Phosphorus	7723-14-0	0% TO 0.1%	1 %
• Chrome	7440-47-3	0% TO 0.2%	0.1 %
• Chromium as Chromium compounds		0% TO 0.2%	Not Listed
• Lead	7439-92-1	< 0.1%	0.1 %
• Lead as Lead compounds		< 0.1%	Not Listed
• Lead as Lead, inorganic compounds		< 0.1%	1 %
• Manganese	7439-96-5	0.2% TO 1%	1 %
• Manganese as Manganese compounds		0.2% TO 1%	1 %
• Tin	7440-31-5	0% TO 0.1%	1 %
• Tin as Tin compounds		0% TO 0.1%	1 %
• Aluminum	7429-90-5	0% TO 0.1%	1 %
• Aluminum as Aluminum insoluble compounds		0% TO 0.1%	Not Listed
• Molybdenum	7439-98-7	0% TO 0.05%	1 %
• Nickel	7440-02-0	0% TO 0.1%	0.1 %
• Nickel as Nickel compounds		0% TO 0.1%	Not Listed
• Silicon	7440-21-3	2% TO 3%	Not Listed
• Tungsten	7440-33-7	< 0.1%	1 %
• Vanadium	7440-62-2	0% TO 0.1%	1 %
• Vanadium as Vanadium compounds		0% TO 0.1%	Not Listed
• Zinc	7440-66-6	0% TO 0.1%	Not Listed
• Zinc as Zinc compounds		0% TO 0.1%	Not Listed
• Iron	7439-89-6	0% TO 94.28%	Not Listed
• Iron as Iron Salts		0% TO 94.28%	Not Listed
• Magnesium	7439-95-4	0.02% TO 0.2%	Not Listed
• Titanium	7440-32-6	0% TO 0.5%	Not Listed
• Sulfur	7704-34-9	0% TO 0.1%	Not Listed

Egypt

Environment

Egypt - Air Pollutants - Maximum Limits

• Lithium	7439-93-2	< 0.1%	Not Listed
• Carbon	7440-44-0	3% TO 4%	Not Listed
• Copper	7440-50-8	0% TO 0.2%	Not Listed
• Copper as Copper compounds		0% TO 0.2%	Not Listed
• Cerium	7440-45-1	0% TO 0.01%	Not Listed

• Oxygen	7782-44-7	0% TO 0.2%	Not Listed
• Phosphorus	7723-14-0	0% TO 0.1%	Not Listed
• Chrome	7440-47-3	0% TO 0.2%	Not Listed
• Chromium as Chromium compounds		0% TO 0.2%	Not Listed
• Lead	7439-92-1	< 0.1%	0.5 µg/m3 ML (24 hours average over 1 year, populated areas); 1.5 µg/m3 ML (24 hours average over 6 months, industrial areas)
• Lead as Lead compounds		< 0.1%	Not Listed
• Lead as Lead, inorganic compounds		< 0.1%	Not Listed
• Manganese	7439-96-5	0.2% TO 1%	Not Listed
• Manganese as Manganese compounds		0.2% TO 1%	Not Listed
• Tin	7440-31-5	0% TO 0.1%	Not Listed
• Tin as Tin compounds		0% TO 0.1%	Not Listed
• Aluminum	7429-90-5	0% TO 0.1%	Not Listed
• Aluminum as Aluminum insoluble compounds		0% TO 0.1%	Not Listed
• Molybdenum	7439-98-7	0% TO 0.05%	Not Listed
• Nickel	7440-02-0	0% TO 0.1%	Not Listed
• Nickel as Nickel compounds		0% TO 0.1%	Not Listed
• Silicon	7440-21-3	2% TO 3%	Not Listed
• Tungsten	7440-33-7	< 0.1%	Not Listed
• Vanadium	7440-62-2	0% TO 0.1%	Not Listed
• Vanadium as Vanadium compounds		0% TO 0.1%	Not Listed
• Zinc	7440-66-6	0% TO 0.1%	Not Listed
• Zinc as Zinc compounds		0% TO 0.1%	Not Listed
• Iron	7439-89-6	0% TO 94.28%	Not Listed
• Iron as Iron Salts		0% TO 94.28%	Not Listed
• Magnesium	7439-95-4	0.02% TO 0.2%	Not Listed
• Titanium	7440-32-6	0% TO 0.5%	Not Listed
• Sulfur	7704-34-9	0% TO 0.1%	Not Listed

United States

Environment

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

• Lithium	7439-93-2	< 0.1%	Not Listed
• Carbon	7440-44-0	3% TO 4%	Not Listed
• Copper	7440-50-8	0% TO 0.2%	Not Listed
• Copper as Copper compounds		0% TO 0.2%	Not Listed
• Cerium	7440-45-1	0% TO 0.01%	Not Listed
• Oxygen	7782-44-7	0% TO 0.2%	Not Listed
• Phosphorus	7723-14-0	0% TO 0.1%	
• Chrome	7440-47-3	0% TO 0.2%	Not Listed
• Chromium as Chromium compounds		0% TO 0.2%	(including any unique chemical substance that contains Chromium as part of its infrastructure)
• Lead	7439-92-1	< 0.1%	Not Listed
• Lead as Lead compounds		< 0.1%	(including any unique chemical substance that contains Lead as part of its infrastructure)

• Lead as Lead, inorganic compounds		< 0.1%	Not Listed
• Manganese	7439-96-5	0.2% TO 1%	Not Listed
• Manganese as Manganese compounds		0.2% TO 1%	(including any unique chemical substance that contains Manganese as part of its infrastructure)
• Tin	7440-31-5	0% TO 0.1%	Not Listed
• Tin as Tin compounds		0% TO 0.1%	Not Listed
• Aluminum	7429-90-5	0% TO 0.1%	Not Listed
• Aluminum as Aluminum insoluble compounds		0% TO 0.1%	Not Listed
• Molybdenum	7439-98-7	0% TO 0.05%	Not Listed
• Nickel	7440-02-0	0% TO 0.1%	Not Listed
• Nickel as Nickel compounds		0% TO 0.1%	(including any unique chemical substance that contains Nickel as part of its infrastructure)
• Silicon	7440-21-3	2% TO 3%	Not Listed
• Tungsten	7440-33-7	< 0.1%	Not Listed
• Vanadium	7440-62-2	0% TO 0.1%	Not Listed
• Vanadium as Vanadium compounds		0% TO 0.1%	Not Listed
• Zinc	7440-66-6	0% TO 0.1%	Not Listed
• Zinc as Zinc compounds		0% TO 0.1%	Not Listed
• Iron	7439-89-6	0% TO 94.28%	Not Listed
• Iron as Iron Salts		0% TO 94.28%	Not Listed
• Magnesium	7439-95-4	0.02% TO 0.2%	Not Listed
• Titanium	7440-32-6	0% TO 0.5%	Not Listed
• Sulfur	7704-34-9	0% TO 0.1%	Not Listed

U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities

• Lithium	7439-93-2	< 0.1%	Not Listed
• Carbon	7440-44-0	3% TO 4%	Not Listed
• Copper	7440-50-8	0% TO 0.2%	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 as Copper compounds		0% TO 0.2%	Not Listed
• Cerium	7440-45-1	0% TO 0.01%	Not Listed
• Oxygen	7782-44-7	0% TO 0.2%	Not Listed
• Phosphorus	7723-14-0	0% TO 0.1%	1 lb final RQ; 0.454 kg final RQ
• Chrome	7440-47-3	0% TO 0.2%	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 as Chromium compounds		0% TO 0.2%	Not Listed
• Lead	7439-92-1	< 0.1%	10 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); 4.54 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)
• Lead as Lead compounds		< 0.1%	Not Listed
• Lead as Lead, inorganic compounds		< 0.1%	Not Listed
• Manganese	7439-96-5	0.2% TO 1%	Not Listed

• Manganese as Manganese compounds		0.2% TO 1%	Not Listed
• Tin	7440-31-5	0% TO 0.1%	Not Listed
• Tin as Tin compounds		0% TO 0.1%	Not Listed
• Aluminum	7429-90-5	0% TO 0.1%	Not Listed
• Aluminum as Aluminum insoluble compounds		0% TO 0.1%	Not Listed
• Molybdenum	7439-98-7	0% TO 0.05%	Not Listed
• Nickel	7440-02-0	0% TO 0.1%	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 as Nickel compounds		0% TO 0.1%	Not Listed
• Silicon	7440-21-3	2% TO 3%	Not Listed
• Tungsten	7440-33-7	< 0.1%	Not Listed
• Vanadium	7440-62-2	0% TO 0.1%	Not Listed
• Vanadium as Vanadium compounds		0% TO 0.1%	Not Listed
• Zinc	7440-66-6	0% TO 0.1%	454 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); 1000 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)
• Zinc as Zinc compounds		0% TO 0.1%	Not Listed
• Iron	7439-89-6	0% TO 94.28%	Not Listed
• Iron as Iron Salts		0% TO 94.28%	Not Listed
• Magnesium	7439-95-4	0.02% TO 0.2%	Not Listed
• Titanium	7440-32-6	0% TO 0.5%	Not Listed
• Sulfur	7704-34-9	0% TO 0.1%	Not Listed

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

• Lithium	7439-93-2	< 0.1%	Not Listed
• Carbon	7440-44-0	3% TO 4%	Not Listed
• Copper	7440-50-8	0% TO 0.2%	Not Listed
• Copper as Copper compounds		0% TO 0.2%	Not Listed
• Cerium	7440-45-1	0% TO 0.01%	Not Listed
• Oxygen	7782-44-7	0% TO 0.2%	Not Listed
• Phosphorus	7723-14-0	0% TO 0.1%	100 lb TPQ (This material is a reactive solid. The TPQ does not default to 10000 pounds for non-powder, non-molten, non-solution form)
• Chrome	7440-47-3	0% TO 0.2%	Not Listed
• Chromium as Chromium compounds		0% TO 0.2%	Not Listed
• Lead	7439-92-1	< 0.1%	Not Listed
• Lead as Lead compounds		< 0.1%	Not Listed
• Lead as Lead, inorganic compounds		< 0.1%	Not Listed
• Manganese	7439-96-5	0.2% TO 1%	Not Listed

• Manganese as Manganese compounds		0.2% TO 1%	Not Listed
• Tin	7440-31-5	0% TO 0.1%	Not Listed
• Tin as Tin compounds		0% TO 0.1%	Not Listed
• Aluminum	7429-90-5	0% TO 0.1%	Not Listed
• Aluminum as Aluminum insoluble compounds		0% TO 0.1%	Not Listed
• Molybdenum	7439-98-7	0% TO 0.05%	Not Listed
• Nickel	7440-02-0	0% TO 0.1%	Not Listed
• Nickel as Nickel compounds		0% TO 0.1%	Not Listed
• Silicon	7440-21-3	2% TO 3%	Not Listed
• Tungsten	7440-33-7	< 0.1%	Not Listed
• Vanadium	7440-62-2	0% TO 0.1%	Not Listed
• Vanadium as Vanadium compounds		0% TO 0.1%	Not Listed
• Zinc	7440-66-6	0% TO 0.1%	Not Listed
• Zinc as Zinc compounds		0% TO 0.1%	Not Listed
• Iron	7439-89-6	0% TO 94.28%	Not Listed
• Iron as Iron Salts		0% TO 94.28%	Not Listed
• Magnesium	7439-95-4	0.02% TO 0.2%	Not Listed
• Titanium	7440-32-6	0% TO 0.5%	Not Listed
• Sulfur	7704-34-9	0% TO 0.1%	Not Listed

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

• Lithium	7439-93-2	< 0.1%	Not Listed
• Carbon	7440-44-0	3% TO 4%	Not Listed
• Copper	7440-50-8	0% TO 0.2%	1.0 % de minimis concentration
• Copper as Copper compounds		0% TO 0.2%	1.0 % de minimis concentration (This category does not include CAS numbers 147-14-8, 1328-53-6, or 14302-13-7, or copper phthalocyanine compounds that are substituted with only hydrogen and/or chlorine and/or bromine.)
• Cerium	7440-45-1	0% TO 0.01%	Not Listed
• Oxygen	7782-44-7	0% TO 0.2%	Not Listed
• Phosphorus	7723-14-0	0% TO 0.1%	1.0 % de minimis concentration (yellow or white)
• Chrome	7440-47-3	0% TO 0.2%	1.0 % de minimis concentration
• Chromium as Chromium compounds		0% TO 0.2%	Not Listed
• Lead	7439-92-1	< 0.1%	0.1 % Supplier notification limit; 0.1 % de minimis concentration (when contained in stainless steel, brass, or bronze)
• Lead as Lead compounds		< 0.1%	Not Listed
• Lead as Lead, inorganic compounds		< 0.1%	0.1 % Supplier notification limit (Chemical Category N420)
• Manganese	7439-96-5	0.2% TO 1%	1.0 % de minimis concentration
• Manganese as Manganese compounds		0.2% TO 1%	1.0 % de minimis concentration (Chemical Category N450)
• Tin	7440-31-5	0% TO 0.1%	Not Listed
• Tin as Tin compounds		0% TO 0.1%	Not Listed
• Aluminum	7429-90-5	0% TO 0.1%	1.0 % de minimis concentration (dust or fume only)
• Aluminum as Aluminum insoluble compounds		0% TO 0.1%	Not Listed
• Molybdenum	7439-98-7	0% TO 0.05%	Not Listed
• Nickel	7440-02-0	0% TO 0.1%	0.1 % de minimis concentration

• Nickel as Nickel compounds		0% TO 0.1%	0.1 % de minimis concentration (Chemical Category N495)
• Silicon	7440-21-3	2% TO 3%	Not Listed
• Tungsten	7440-33-7	< 0.1%	Not Listed
• Vanadium	7440-62-2	0% TO 0.1%	1.0 % de minimis concentration (except when contained in an alloy)
• Vanadium as Vanadium compounds		0% TO 0.1%	1.0 % de minimis concentration (Chemical Category N770)
• Zinc	7440-66-6	0% TO 0.1%	1.0 % de minimis concentration (dust or fume only)
• Zinc as Zinc compounds		0% TO 0.1%	1.0 % de minimis concentration (Chemical Category N982)
• Iron	7439-89-6	0% TO 94.28%	Not Listed
• Iron as Iron Salts		0% TO 94.28%	Not Listed
• Magnesium	7439-95-4	0.02% TO 0.2%	Not Listed
• Titanium	7440-32-6	0% TO 0.5%	Not Listed
• Sulfur	7704-34-9	0% TO 0.1%	Not Listed

United States - Pennsylvania

Labor

U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List

• Lithium	7439-93-2	< 0.1%	Not Listed
• Carbon	7440-44-0	3% TO 4%	Not Listed
• Copper	7440-50-8	0% TO 0.2%	(dust and fume)
• Copper as Copper compounds		0% TO 0.2%	
• Cerium	7440-45-1	0% TO 0.01%	Not Listed
• Oxygen	7782-44-7	0% TO 0.2%	Not Listed
• Phosphorus	7723-14-0	0% TO 0.1%	
• Chrome	7440-47-3	0% TO 0.2%	
• Chromium as Chromium compounds		0% TO 0.2%	
• Lead	7439-92-1	< 0.1%	
• Lead as Lead compounds		< 0.1%	
• Lead as Lead, inorganic compounds		< 0.1%	Not Listed
• Manganese	7439-96-5	0.2% TO 1%	
• Manganese as Manganese compounds		0.2% TO 1%	
• Tin	7440-31-5	0% TO 0.1%	Not Listed
• Tin as Tin compounds		0% TO 0.1%	Not Listed
• Aluminum	7429-90-5	0% TO 0.1%	
• Aluminum as Aluminum insoluble compounds		0% TO 0.1%	Not Listed
• Molybdenum	7439-98-7	0% TO 0.05%	Not Listed
• Nickel	7440-02-0	0% TO 0.1%	
• Nickel as Nickel compounds		0% TO 0.1%	
• Silicon	7440-21-3	2% TO 3%	Not Listed
• Tungsten	7440-33-7	< 0.1%	Not Listed
• Vanadium	7440-62-2	0% TO 0.1%	(dust or fume)
• Vanadium as Vanadium compounds		0% TO 0.1%	Not Listed
• Zinc	7440-66-6	0% TO 0.1%	
• Zinc as Zinc compounds		0% TO 0.1%	
• Iron	7439-89-6	0% TO 94.28%	Not Listed
• Iron as Iron Salts		0% TO 94.28%	
• Magnesium	7439-95-4	0.02% TO 0.2%	Not Listed
• Titanium	7440-32-6	0% TO 0.5%	Not Listed

• Sulfur 7704-34-9 0% TO 0.1% Not Listed

U.S. - Pennsylvania - RTK (Right to Know) - Special Hazardous Substances

• Lithium	7439-93-2	< 0.1%	Not Listed
• Carbon	7440-44-0	3% TO 4%	Not Listed
• Copper	7440-50-8	0% TO 0.2%	Not Listed
• Copper as Copper compounds		0% TO 0.2%	Not Listed
• Cerium	7440-45-1	0% TO 0.01%	Not Listed
• Oxygen	7782-44-7	0% TO 0.2%	Not Listed
• Phosphorus	7723-14-0	0% TO 0.1%	Not Listed
• Chrome	7440-47-3	0% TO 0.2%	
• Chromium as Chromium compounds		0% TO 0.2%	Not Listed
• Lead	7439-92-1	< 0.1%	Not Listed
• Lead as Lead compounds		< 0.1%	Not Listed
• Lead as Lead, inorganic compounds		< 0.1%	Not Listed
• Manganese	7439-96-5	0.2% TO 1%	Not Listed
• Manganese as Manganese compounds		0.2% TO 1%	Not Listed
• Tin	7440-31-5	0% TO 0.1%	Not Listed
• Tin as Tin compounds		0% TO 0.1%	Not Listed
• Aluminum	7429-90-5	0% TO 0.1%	Not Listed
• Aluminum as Aluminum insoluble compounds		0% TO 0.1%	Not Listed
• Molybdenum	7439-98-7	0% TO 0.05%	Not Listed
• Nickel	7440-02-0	0% TO 0.1%	
• Nickel as Nickel compounds		0% TO 0.1%	Not Listed
• Silicon	7440-21-3	2% TO 3%	Not Listed
• Tungsten	7440-33-7	< 0.1%	Not Listed
• Vanadium	7440-62-2	0% TO 0.1%	Not Listed
• Vanadium as Vanadium compounds		0% TO 0.1%	Not Listed
• Zinc	7440-66-6	0% TO 0.1%	Not Listed
• Zinc as Zinc compounds		0% TO 0.1%	Not Listed
• Iron	7439-89-6	0% TO 94.28%	Not Listed
• Iron as Iron Salts		0% TO 94.28%	Not Listed
• Magnesium	7439-95-4	0.02% TO 0.2%	Not Listed
• Titanium	7440-32-6	0% TO 0.5%	Not Listed
• Sulfur	7704-34-9	0% TO 0.1%	Not Listed

United States - Rhode Island

Labor

U.S. - Rhode Island - Hazardous Substance List

• Lithium	7439-93-2	< 0.1%	Flammable
• Carbon	7440-44-0	3% TO 4%	Toxic
• Copper	7440-50-8	0% TO 0.2%	Toxic (dust, fume, and mist)
• Copper as Copper compounds		0% TO 0.2%	Not Listed
• Cerium	7440-45-1	0% TO 0.01%	Not Listed
• Oxygen	7782-44-7	0% TO 0.2%	Flammable
• Phosphorus	7723-14-0	0% TO 0.1%	Toxic; Flammable
• Chrome	7440-47-3	0% TO 0.2%	Toxic; Carcinogen

• Chromium as Chromium compounds		0% TO 0.2%	Not Listed
• Lead	7439-92-1	< 0.1%	Toxic (dust and fume)
• Lead as Lead compounds		< 0.1%	Not Listed
• Lead as Lead, inorganic compounds		< 0.1%	Not Listed
• Manganese	7439-96-5	0.2% TO 1%	Toxic
• Manganese as Manganese compounds		0.2% TO 1%	Not Listed
• Tin	7440-31-5	0% TO 0.1%	Toxic
• Tin as Tin compounds		0% TO 0.1%	Not Listed
• Aluminum	7429-90-5	0% TO 0.1%	Toxic (dust, powder, welding fumes); Flammable (dust, powder, welding fumes)
• Aluminum as Aluminum insoluble compounds		0% TO 0.1%	Not Listed
• Molybdenum	7439-98-7	0% TO 0.05%	Toxic
• Nickel	7440-02-0	0% TO 0.1%	Toxic; Carcinogen
• Nickel as Nickel compounds		0% TO 0.1%	Carcinogen
• Silicon	7440-21-3	2% TO 3%	Toxic
• Tungsten	7440-33-7	< 0.1%	Toxic
• Vanadium	7440-62-2	0% TO 0.1%	Not Listed
• Vanadium as Vanadium compounds		0% TO 0.1%	Not Listed
• Zinc	7440-66-6	0% TO 0.1%	Flammable
• Zinc as Zinc compounds		0% TO 0.1%	Not Listed
• Iron	7439-89-6	0% TO 94.28%	Not Listed
• Iron as Iron Salts		0% TO 94.28%	Not Listed
• Magnesium	7439-95-4	0.02% TO 0.2%	Flammable
• Titanium	7440-32-6	0% TO 0.5%	Not Listed
• Sulfur	7704-34-9	0% TO 0.1%	Flammable

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 birth defects or other reproductive harm.

Section 16 - Other Information

Last Revision Date	• 14/December/2012
Preparation Date	• 14/December/2012
Disclaimer/Statement of Liability	• American Cast Iron Pipe Company believes that the information contained on this Material Safety Data Sheet is accurate. The suggested procedures are based on experience as of the date of publication. They are not necessarily all-inclusive nor fully adequate in every circumstance. Also, the suggestions should not be confused with nor followed in violation of applicable laws, regulations, rules or insurance requirements.

Key to abbreviations

NDA = No data available

