Material Safety Data Sheet

Reference – MSDS
Date – March 2011

1. PRODUCT IDENTIFICATION & COMPANY INFORMATION

Product name: Various grades of welding and metal spraying consumable carrying the trademarks
DURANICKEL, INCOLOY, INCONEL, INCO-CORED, INCO-WELD, MONEL, Nickel, NILO, NIMONIC, NI-ROD, INCOFLUX
Full list given in tables 2.1-.2.4

Other/generic names: Filler Metal, Flux, Flux Cored, Welding Electrode, Weldstrip, & Thermal Spray (TSW)

Product use: Welding & metal spraying consumables, See applicable product technical data sheets on website for information of typical scope of use and application, not all products are suitable for all processes or applications.

Filler Metal	*Used for joining and overlaying, using GTAW, GMAW, Plasma and SAW (with suitable flux) welding processes*
Flux Cored	*Used for joining and overlaying, using GMAW welding processes*
Welding Electrode	*Used for joining and overlaying, using SMAW welding process*
Weldstrip	*Used for overlaying, (with suitable flux) for submerged arc or electroslag welding process*
INCOFLUX	*Flux used for joining or overlaying with appropriate filler metal or weldstrip for submerged arc or electroslag welding process*
Thermal Spray(TSW)	*Used to apply nickel alloy coating by a variety of thermal spray process*

Manufacturer:

Special Metals Welding Products Company

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2. COMPOSITION/INFORMATION ON INGREDIENTS

Information on ingredients is given in Table 1 and the compositions of individual products in the alloy families or categories listed above are given in the product composition tables 2.1-2.4. Please refer to the appropriate alloy name or designation.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Silver to gray metal wire or strip. (Welding Electrodes are flux coated, Flux Cored has a flux center; flux is granular powder). Not normally considered hazardous as shipped. Ends and edges can be sharp and gloves should be worn when handling.

POTENTIAL HEALTH HAZARDS

Skin: Although not normally hazardous, some individuals can develop allergic skin reactions to nickel and other metallic ingredients. Ends of wire and edges of strips may be sharp and can cause cuts.
During welding and spraying - Fumes generated may be irritating to the skin. UV radiation produced can cause burns (ray burn). Hot metal can cause burns.

Eyes: As shipped, product does not pose a hazard to the eyes however ends of wire and edges of strip are sharp and can cause cuts.
During welding and spraying - Fumes generated can be irritating to the eye. Ends of wire may be sharp and can cause cuts or hot and cause burns. UV radiation produced can cause burns (arc eye).

Inhalation: Fumes generated by welding and spraying processes can be irritating and toxic.

Ingestion: Not a likely route of entry. Metal ingestion can cause toxic effects.

Delayed effects: Inhalation of welding or spraying fumes may cause damage to the lungs and respiratory tract including but not limited to fibrosis of the lung which can reduce lung capacity and produce difficulty breathing. Cobalt and Nickel are animal carcinogens and inhalation of fumes and dusts should be avoided. Prolonged inhalation of Manganese fumes and dusts may cause irreversible damage to the nervous system resulting in Parkinson's Disease-like symptoms (tremors, weakness, paralysis, etc.)

	Nickel	Cobalt
EC Label No	231-111-4	231-158-0
Index No	028-002-00-7	028-001-00-9
Designation:	Xn Harmful	Xn Harmful
Risk Phrases:	R40 Possible risk of irreversible effects R43 May cause sensitization by skin contact	R42/43 May cause sensitization by inhalation and skin contact R53 May cause long-term adverse effects in aquatic environments

4. FIRST AID MEASURES

Skin: Wash skin with soap and water to remove any metallic particles. If a rash or burn develops, seek medical attention.

Eyes: Flush particles from eyes with clean water for at least 15 minutes. If irritation persists or burn develops, seek medical attention.

Inhalation: Remove from exposure. If respiratory irritation persists, seek medical attention.

Ingestion: If metallic particles are swallowed, seek medical assistance.

Advice to physician: Treat symptomatically.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

Flash Point & Method	Solid material – No flash point
Autoignition Temperature:	Not flammable
Flame Propagation Rate (solids):	Not flammable
OSHA Flammability Class:	None – solid material

Extinguishing Media:	Use agent appropriate for surrounding fire.
Unusual Fire And Explosion Hazards:	None
Special Fire Fighting Precautions/Instructions:	Wear self-contained breathing apparatus. Hazardous metallic fumes can be generated in a fire.

Nonflammable except for packaging, however sparks from welding or grinding in user operations could ignite flammable or combustible liquids, vapors and solids.

6. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE: Wear proper protective clothing. Pick up spilled articles and place into container.

7. HANDLING AND STORAGE

Normal Handling: Under normal circumstances the materials do not produce any hazardous products and as such do not require any special precautions. However, see Section 10 "STABILITY AND REACTIVITY". The transient handling of the materials would not be expected to produce any sensitization but it is good practice to use gloves for handling. The normal precautions for handling heavy objects with possible sharp edges should also be observed.

Personal hygiene - Apply good standards, wash hands after use and before eating.

Storage Recommendations: Store in a dry place and protect from contamination with other materials.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide general ventilation and local exhaust ventilation when welding, spraying, cutting or grinding to maintain concentrations of metal dusts and/or fumes below allowable exposure values.
Maintain exposures below the published exposure levels. Use industrial hygiene air monitoring to ensure that your use of this material does not create exposures that exceed the recommended exposure limits. Refer to the following sources for important additional information:

In U.S.A.: 29 CFR 1910, ANSI Z49.1, American Welding Society, OSHA, U.S. Dept of Labor
In Canada: Canadian Standards Association, CAN/CSA - W17.2-M87
In UK: Current exposure limits under Health & Safety Executive EH40 are given in table 2.

PERSONAL PROTECTIVE EQUIPMENT

Skin Protection: Wear gloves, face protection and flame retardant clothing, do not expose skin to the heat, radiation and spatter from welding or spraying operations.

Eye Protection: Eye protection, to the appropriate national standard, is recommended when welding, cutting, spraying or grinding. Do not expose eyes to the heat and radiation from welding operations, use appropriate grade optical filters (welding glass) for welding or spraying process operations.

Respiratory Protection: Respiratory protection is necessary when exposure limits for airborne contaminants are exceeded during welding, grinding or cutting operations. Use air-supplied respirator in confined spaces.

In the USA, use only NIOSH-approved respirators in accordance with 29 CFR 1910.134, or other nationally approved respirators.

In the EU, if required use protection to EN136 (full face respirators), EN140 (half mask respirators), EN149 (filtered half masks (disposable)) or other appropriate EN standard. In the rest of the world use respiratory protection to the appropriate national standard.

Additional Recommendations: Source of running water to wash skin and eyes

Wear ear protection to the appropriate national standards where high levels of noise are experienced.

Exposure Guidelines See Appendix 1

9. PHYSICAL AND CHEMICAL PROPERTIES

	Filler Metal, Weld Strip and Thermal Spray Wire	Welding Electrode	Flux Cored Wire	Flux
Appearance:	Grey to silver or bronze metal	Varies grey, black, brown coating with metallic silver inner	Metallic silver outer with flux core	Varies grey, brown, green particles
Physical State:	Solid	Solid	Solid	Solid (Powder)
Molecular Weight:	Mixture	Mixture	Mixture	Mixture
Chemical Formula:	Mixture	Mixture	Mixture	Mixture
Odor:	Odorless	Odorless	Odorless	Odorless
Specific Gravity (water = 1.0):	8 – 9	4-7	5 - 8	
Bulk Density				0.8 – 1.1
Solubility In Water (wt. %):	Insoluble	Insoluble	Insoluble	Insoluble
Melting Point:	> 2300F (1260 ºC)	> 1800F (>1000^{o}C)	> 1800F (>1000^{o}C)	> 1800F (>1000^{o}C)
Flash Point	None	None	None	None

Other physical and chemical properties, e.g. as described in 91/155/EEC and in the Approved Code of Practice, ref. 11, have no safety implications in relation to these materials.

10. STABILITY AND REACTIVITY

These consumables are stable and no hazardous decomposition products are formed upon exposure to water or the atmosphere. Nickel can react with carbon monoxide in reducing atmospheres to form nickel carbonyl, an extremely toxic gas.

11. TOXICOLOGICAL INFORMATION

Nickel and cobalt are classified as Category 3 carcinogens. The exposure route of concern is inhalation.

As shipped, these complex alloys in massive form have no known toxicological properties other than causing allergic reactions in individuals sensitive to the metal(s) contained in the alloys. However, dust from flux or user-generated dusts and fumes may on contact with the skin or eyes produce mechanical irritation. Chronic exposures coupled with sweat could cause dermatitis (skin) or conjunctivitis (eyes).

Excessive inhalation of dust or user-generated fumes from welding or metal spraying may, depending on the specific features of the process used, pose a long-term health hazard. The International Agency for Research on Cancer (IARC) has concluded that welding fumes are possibly carcinogenic to humans.

The ingredients of fumes and gases generated in welding, metals spraying and grinding will depend on the base metal and the details of the specific process being used. Ingredients may include metals, metal oxides, chromates, fluorides, carbon monoxide, ozone, and oxides of nitrogen. Phosgene can be produced if chlorinated solvent vapors are present in user operations.

More detailed toxicological information is given in APPENDIX 1

Composition of typical welding fume given in table 3.1 – 3.7,

Contamination or surface preparations etc can affect the composition of the produced fume.

Metals Spraying - Many variations of process are available; refer to table 2.1 in association with guidance from equipment manufacturers for likely constituents of produced fume.

DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS:

Chromium	The International Agency for Research on Cancer (IARC) considers hexavalent chromium to be a carcinogen (lung, nasal) but does not have adequate evidence for chromium metal and trivalent chromium. Fumes have been associated with lung fibrosis.
Iron	Prolonged inhalation of iron oxide fumes can lead to siderosis, which presents as a benign pneumoconiosis.
Molybdenum	Repeated inhalation of fumes has caused kidney damage, respiratory irritation and liver damage in animals.
Nickel	Nickel metal is “reasonably anticipated to be a human carcinogen” (National Toxicology Program’s 10th Report). IARC states that nickel metal is possibly carcinogenic to humans. Epidemiological studies of workers exposed to nickel powders, dusts and fumes in the nickel alloy and stainless steel producing industries do not indicate a significant respiratory cancer hazard. Inhalation of nickel powder produced malignant tumors in rodent studies. Single intratracheal installations of nickel powder at levels close to the LD_{50} have caused malignancies in hamsters. Can cause skin sensitization in susceptible individuals through prolonged contact with skin.
Niobium	No data available.

12. ECOLOGICAL INFORMATION

As a solid metal object, Filler Metal products are not considered toxic to aquatic species.
Flux (being of mineral constituents) from flux coated electrodes, flux cored wire and flux may degrade over time.
Observe national and local standards for fume extraction systems

13. DISPOSAL CONSIDERATIONS

Unused consumable wastes are normally collected to recover metal values.
Dispose of fume, flux, slag, weld grinding residues, over-spray etc, from the work area, or from filters, in accordance with national, federal, state or local regulations. Refer to this MSDS, Table 3.1-3.7, for possible contents of collected fumes and other materials. These may be in the form of dust requiring special health precautions. Nickel is regulated in many countries as hazardous to the environment. Other metals may be regulated in specific jurisdictions. In UK most alloyed material would be regarded as special waste. Observe all National, State, and local environmental regulations.

Packaging - Dispose of by recycling

14. TRANSPORT INFORMATION

No special precautions are necessary for the transport of these materials.

15. REGULATORY INFORMATION

Classification and labelling requirements
Alloys containing less than 1% of nickel or cobalt are not classified as "dangerous for supply". Alloys containing more than 1% of either metal are classified as the metals themselves (see Section 3). However, in recognition of their essentially non-hazardous nature, these alloys in the massive form are not required to be labelled as hazardous.

Product Labeling - UK Manufacture

WARNING: PROTECT YOURSELF AND OTHERS. READ AND UNDERSTAND THIS LABEL. TAKE PRECAUTIONS WHEN WELDING. ASK FOR YOUR EMPLOYER'S SAFETY PRACTICES WHICH SHOULD BE BASED ON MANUFACTURER'S HAZARD DATA
Fumes and gases can be dangerous to your health. Arc rays can injure eyes and burn skin. Electric shock can kill. Read and understand the manufacturer's instructions and your employer's safety practices. Keep your head out of the fumes. Use enough ventilation or exhaust at the arc to keep fumes and gases from your breathing zone, and the general area. Wear correct eye, ear and body protection. Do not touch live electrical parts.

DO NOT REMOVE THIS LABEL

Product Labeling – USA Manufacture

PROTECT YOURSELF AND OTHERS – READ AND UNDERSTAND THIS LABEL – TAKE PRECAUTIONS WHEN WELDING – ASK FOR YOUR EMPLOYER'S SAFETY PRACTICES WHICH SHOULD BE BASED ON MANUFACTURERS HAZARD DATA AVAILABLE TO HIM

Fumes and gas as can be dangerous to your health. Arc rays can injure eyes and burn skin. Electric shock can kill. Read and understand the manufacturer's instructions and your employers' safety practices. Keep your head out of the fume. Use enough ventilation, exhaust at the arc or both, to keep fumes and gases from your breathing zone, and the general area. Wear correct eye ear and body protection. Do not touch live electrical parts. See WMA publication 236 hazards from welding fume available from the manufacturer.

DO NOT REMOVE THIS LABEL

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WARNING POSSIBLE CANCER HAZARD OR LUNG DAMAGE IF INHALED – MAY CAUSE ALLERGIC REACTION – MAY CONTAIN FLUORIDES

PROTECT YOURSELF AND OTHERS – before use, read and understand this label, the manufacturer's instructions, Material Safety Data Sheets [MSDS's], and your employer's safety practices, which should be based on the manufacturer's hazard data available to him. See American National Standard Z49.1, Safety in Welding and Cutting and OSHA Safety and Health Standards 29CFR1910.

FUMES AND GAS can be dangerous to your health. Skin sensitization, irritation of skin, eye and respiratory tract, neurological damage, or death can result from over exposure. Keep your head out of the fumes. Use ventilation, preferably local exhaust ventilation, adequate to keep the concentration of the fumes and gases below the exposure limits. Special attention to ventilation is required in confined, small or crowded spaces. If adequate ventilation is not available, wear appropriate respiratory protection. Wash skin after contact with dust or fumes.

Arc rays can injure eyes and burn skin. Electric shock can kill. Do not touch live electrical parts. Wear correct eye, ear and body protection

DO NOT REMOVE THIS LABEL

SARA SECTION 313 SUPPLIER NOTIFICATION:
Individual consumables covered by this MSDS may contain the following toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 and of 40 CFR 372: Chromium, Copper, Manganese, and Nickel. Refer to "Section 2" of this MSDS for the filler metal name and the percent by weight, and "Table 1" for the CAS Number for each chemical.

16. OTHER INFORMATION

Current Issue Date:	March, 2011
Previous Issue Date:	None
Changes to MSDS From Previous Issue Are Due To:	Change of format which includes additional information

MSDS prepared by Special Metals technical department in compliance with directive 91/115/EEC, 93/112/EEC and HSE (UK) Welding Information Sheet No.1 and is provided in good faith based upon the experience and knowledge of the company. It should not be taken as a guarantee of alloy properties for ordering these materials. Users should make their own assessment of workplace risks as required by other health and safety legislation

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Bibliography:

1. U.S. National Toxicology Program - 10th Report on Carcinogens
2. Health and Safety Executive UK - EH40 - Occupational exposure limits; EH42 - Monitoring Strategies for toxic substances; EH44 - Dust the Workplace - general principles of protection; EH54 - Assessment of Exposure to Fume from Welding and Allied Processes; EH55 - The Control of Exposure to Fume from Welding, Brazing and Similar Processes; EH60 - Nickel and its inorganic compounds.
3. EH Health and Safety Executive's publications (www.hse.gov.uk)
4. HSC. Information approved for the classification, packaging and labeling of dangerous substances for supply and conveyance by road.

5. European Commission Directive 5/3/91 - 91/155/EEC.
6. European Commission Directive 10/12/93 - 93/112/EEC.
7. Twelfth adaptation of Council Directive 67/548/EEC - 91/325/EEC.
8. Sixth amendment of Council Directive 67/548/EEC - 79/831/EEC.
9. The Chemicals (Hazard Information and Packaging for Supply) Regulations 2002 No. 1689.
10. International Agency for Research on Cancer. Monographs on the evaluation of carcinogenic risks to humans. Vol 49 Chromium Nickel and Welding, 1990.
11. Approved Code of Practice. ISBN 0 7176 0859X.
12. European Norm - EN 1811.

Table 2.1
Nominal Composition (Weight %) Of
Filler Metal, Thermal Spray Wires and Weldstrips Covered By This MSDS

Trade Name	Al	Cr	Co	Cu	Fe	Mn	Mo	Ni	Nb	Si	Ti	W
DURANICKEL® 301 & 301TSW™	4	-	-	-	-	-	-	94	-	1	1	-
INCOLOY® 65	-	21	-	2	30	1	3	42	-	-	1	-
INCONEL® 52	<1	29	-	-	9	1	-	59	-	-	-	-
INCONEL® 52M™	1	30			9	1		57	1		1	
INCONEL® 53MD™	3	29	-	-	3	1	-	64	-	-	-	-
INCONEL® 601	1	23	-	1	14	1	-	61	-	-	-	-
INCONEL® 617	1	22	12		2	1	9	52		1		
INCONEL® 62 & 62T	-	16	-	-	8	1	-	74	3	-	-	-
INCONEL® 622	-	20	-	-	5	-	14	58	-	-	-	3
INCONEL® 625, 625T & 625TSW™	-	22	-	-	1	-	9	61	4	-	-	-
INCONEL® 718 & 718TSW™	-	19	-	-	19	-	3	53	5	-	1	-
INCONEL® 72 & 72TSW™	-	44	-	-		-	-	55	-	-	1	-
INCONEL® 8020 TSW	-	20	-	-	-	-	-	78	-	1	-	-
INCONEL® 8020M TSW	-	20	-	-	-	-	-	78	-	2	-	-
INCONEL® 82 & 82T	-	20	-	-	1	3	-	72	3	-	-	-
INCONEL® 92	-	16	-	-	7	2	-	71	1	-	3	-
INCO-WELD® 686CPT®	-	21	-	-	1	-	16	58	-	-	-	4
INCO-WELD® 725NDUR®	-	21	-	-	9	-	9	57	3	-	1	-
INCO-WELD® C-276 & C276TSW™	-	16	2	-	6	-	16	57	-	-	-	3
INCO-WELD® HX	-	22	2	-	19	-	9	47	-	-	-	1
MONEL® 400 TSW	-	-	-	32	1	1	-	67	-	-	-	-
MONEL® 60, 60N & 60TSW™	-	-	-	27	-	4	-	65	1	1	2	-
MONEL® 67 & 67N	-	-	-	68	1	1	-	31	-	1	-	-
NC 80/20	-	20	-	-	-	1	-	79	-	-	-	-
Nickel 200 TSW	-	-	-	-	-	-	-	99	-	-	-	-
Nickel 61 & 61N	-	-	-	-	-	-	-	96	-	-	3	-
NILO® 365					52			43	3		1	
NILO® CF36™	-	-	-	-	61	-	-	36	2	-	-	-
NILO® CF42™	-	-	-	-	56	-	-	42	2	-	-	-
NIMONIC® 263	1	20	20	-	-	-	6	51	-	-	2	-
NIMONIC® 86	-	25	-	-	-	-	10	65	-	-	-	-
NIMONIC® 90	2	20	17		-	-	-	60	-	-	3	-
NIMONIC® PE11	1	18	-	-	34	-	5	39	-	-	2	-
NIMONIC® PE16	1	17	-	-	34	-	3	44	-	-	1	-
NIMONIC® PK33	2	18	14	-	1	-	7	56	-	-	2	-
NI-ROD® 44	-	-	-	-	48	10	-	42	-	-	-	-
NI-ROD® 44HT™	-	7	-	-	37	11	-	43	1	-	-	-
NI-ROD® 55	-	-	-	-	44	-	-	55	-	-	-	-
NI-ROD® 99	-	-	-	-	-	-	-	99	-	-	-	-
UDIMET® L605		20	55					10				15
WASPALOY	1	19	13		2	1	4	59			3	

Table 2.2
Composition (Weight %)
Of Flux Coated Electrodes Covered By This MSDS

PRODUCT NAME	Al	Al_2O_3	$BaCO_3$	BaF_2	C	$CaCO_3$	CaF_2	Cr	Co	Cu	Fe	Fe_2O_3	K_2O	K_2SiO_3	Li_2Co_3	Mn	MnO	Mo	Nb	Ni	SiO_2	$NaAlF_6$	Na_2SiO_3	$SrCO_3$	Ti	TiO_2	W
INCOLOY® 135						5-10		15-40		1-5	15-40					1-5		1-5		30-60	0.1-1	5-10	1-5		1-5	1-5	
INCONEL® 112 & 112T						5-10		15-40			1-5							5-10	1-5	40-70	1-5	5-10	1-5			1-5	
INCONEL® 112AC						5-10		15-40			1-5		1-3	1-5				5-10	1-5	40-70	1-5	5-10	1-5			1-5	
INCONEL® 117						5-10		15-40	5-10		1-5					0.5-2		5-10		40-70	0-5-2	5-10	1-5			1-5	
INCONEL® 122						5-10	1-5	15-40			1-5							10-30		40-70	0.1-1	5-10	1-5			1-5	1-5
INCONEL® 152						1-5		10-30			5-10					1-5			1-5	40-70	0.1-1	5-10	1-5	1-5		1-5	
INCONEL® 182 & 182T						5-10		10-30			5-10					1-5	1-5		1-5	40-70	0.1-1	1-10	1-5		1-5	1-5	
INCO-WELD® 686CPT®		1-5				3-7		10-30										10-30		30-60			1-5			3-7	1-5
INCO-WELD® A						5-10		10-30			6-12					1-5		1-5	1-5	30-60	0.1-2	5-10	1-5			3-7	
INCO-WELD® B						5-10	3-7	10-30			7-13					1-5		1-5	1-5	30-60	0.1-2		1-5				
INCO-WELD® C		1-5				1-5		10-30			30-60		1-5			1-5				5-10	1-5	1-5	1-5			5-10	
INCO-WELD® C-276						1-5		10-30	1-5		3-7					1-5		10-30		30-60	0.1-1	5-10	1-5			5-10	1-5
INCO-WELD® G3								15-25	1-3		15-21							4-8		45-55	3-6	1-10	1-5				0-2
MONEL® 187 & 187N						5-10	1-5			40-70					0.7-0.9	1-5				15.40	1.5	5-10	1-5		1-5	1-5	
MONEL® 190 & 190N			1-5			1-5	1-5			15-40						1-5				40-70	1-5	5-10	1-5		1-5	1-5	
Nickel 141 & 141N		1-5				5-10														40-70	0.5-2	5-10	1-5		1-5		
NI-ROD®	1-5		0-1		1-5	1-5	1-5				1-5	1-5								60-100			1-5	7-13			
NI-ROD® 44			1-5	1-5	1-5	1-5				1-5	30-60					7-13				30-60				7-13			
NI-ROD® 55					1-5	1-5	1-5				30-60	1-5								30-60				7-13			
NI-ROD® 55X			1-5	1-5	1-5	1-5				1-5	30-60					1-5				30-60				5-10			
NI-ROD® 60			1-5	1-5	1-5	1-5					30-60									30-60				7-13			
NI-ROD® 99X			1-5	1-5	1-5	1-5				1-5	1-5					1-5				60-100							

Table 2.3
Composition Of Flux-Cored Welding Wires Covered By This MSDS

Weight %	Ca0	CaF_2	C	Cr	Fe	Mn	MnO	Mo	$NaAlF_6$	Na_2O	Nb	Ni	SiO_2	TiO_2	K_2ZrF_6	ZrO_2
INCO-CORED© 625 AP	1-5			15-20			1-5	5-10		1-5	1-5	50-60	0.1-0.5	5-10		
INCO-CORED© 625 DH	1-5			15-20			1-5	5-10		1-5	1-5	50-60	0.1-0.5	5-10		
INCO-CORED© 82 AP				15-20	1-5	1-5					1-5	57-63	0.1-0.5	5-10		
INCO-CORED© 82 DH				15-20	1-5	1-5	1-5			1-5	1-5	57-63	0.1-0.5	5-10	1-5	1-5
NI-ROD© FC55		7-13	1-5		30-60	1-5			1-5			30-60				

Table 2.4
Composition of Flux Covered By This MSDS

Product Name	Al_2O_3	CaF_2	CaO	Cr_2O_3	MgO	Mn	MnO	Nb	Ni	K_2SiO_3	K_2O	SiO_2	$NaAlF_6$	TiO_2	ZrO_2	K_2ZrF_6	NaF	Others	
INCOFLUX® 4		60-100			1-5			1-5	1-5	1-5			3-7		1-5				
INCOFLUX® 5		60-100					10-30			1-5		1-5	3-7						
INCOFLUX® 6	15-40	40-70			3-7				1-5	1-5			3-7	3-7					
INCOFLUX® 7	15-40	40-70				1-5				1-5			3-7		5-20			Fe_3O_4	1-5
INCOFLUX® 8		60-100					10-30			1-5		1-5	3-7					Fe_3O_4	1-5
INCOFLUX® 9	1-5	15-20	28-33		2-6							28-33			4-8				
INCOFLUX® 10			85-95															$CaTiO_3$	1-5
																		NiMg	1-5
INCOFLUX® ESS1	10-15	65-80	10-15	3-8	3-7	1-5		1-5	1-5		1-3	1-5				3-7		Cr	1-5
INCOFLUX® ESS2	5-10	65-80		3-8	3-7	2-7		1-5	1-5	1-5	1-5	2-7	2-7			1-6	1-6	Cr	1-5
INCOFLUX® ESS3	20-40	45-70										5-15							
INCOFLUX® ESS4	5-10	65-80		5-10	3-7	2-7		1-5	1-5		1-5	2-7					1-6	Cr	1-5
INCOFLUX® NT100	15-40	40-70			3-7				1-5	1-5			3-7	3-7					
INCOFLUX® NT110	30-70	10-40					0-20			5-20		0-10		0-10				Cu	0-5
																		Na_20	0-5
																		$Na_2Si_4O_9$	5-20
INCOFLUX® NT120	26-33	30-35				0-5	2-4	1-5	1-5			2-4		4-7	8-13		1-6	$CaSiO_3$	1-5
																		Cr	0-5
																		Fe	1-6
																		Mo	1-6
																		Na_2O	2-4
																		$Na_2Si_4O_9$	1-6
INCOFLUX® SAS1	30-70	10-40	0-10			0-5	0-5			5-20		0-10		0-10				$CaCO_3$	0-10
																		Na_2O	0-5
																		$Na_2Si_4O_9$	5-20
INCOFLUX® SAS2	35-45	35-45		2-8		5-10				1-5								$CaSiO_3$	5-15
																		Cr	2-6
																		$CaTiO_3$	5-15

Table 2.5 - Nominal Composition (Weight %) Of Stainless Steel Filler Metal Covered By This MSDS

Trade Name	Fe	Cr	Ni	Mo	Mn	Si
INCO-WELD© 308, 308H, 308L, 308LSi	61-68	19-22	9-11	<0.5	1-2.5	<1
INCO-WELD© 309, 309H, 309L, 309LSi	54-61	23-25	12-14	<0.8	1-2.5	<1
INCO-WELD© 309LMo	52-59	23-25	12-14	2-3	1-2.5	0.6-1
INCO-WELD© 310	43-51	25-28	20-23	<.8	1-2.5	.3-.7
INCO-WELD© 312	51-59	29-32	8-10.5	<0.8	1-2.5	.3-.7
INCO-WELD© 316, 316L	57-65	18-20	11-14	2-3	1-2.5	.3-.7
INCO-WELD© 316LSi	57-65	18-20	11-14	2-3	1-2.5	.6-1
INCO-WELD© 347	61-68	19-21.5	9-11	<.8	1-2.5	.3-.7

Table 2.6 - Nominal Composition (Weight %) Of Aluminum Filler Metal Covered By This MSDS

Trade Name	Al	Si	Mn	Mg
INCO-WELD© 1050	>99.8			
INCO-WELD© 1080	>99.5			
INCO-WELD© 4043	Bal	4.5-6		
INCO-WELD© 4047	Bal	11-13		
INCO-WELD© 5154	Bal			3-4
INCO-WELD© 5183	Bal			4.3-5.2
INCO-WELD© 5356	Bal			4.5-5.5
INCO-WELD© 5556	Bal			4.7-5.5

Trace impurities and minor addition material names not listed above may also appear.

Table 2.7 - Nominal Composition (Weight %) Of Copper Filler Metal Covered By This MSDS

Trade Name	Cu	Sn	Mn	Fe	Si	Ni	Al
INCO-WELD© AlBZ8							
INCO-WELD© CuSN-A	Bal	4-6					
INCO-WELD© C11	Bal	5.5-8					
INCO-WELD© Cu	>98	<1	<0.5		<0.5		
INCO-WELD© CuSi-A	Bal	<1	<1.5	<.5	2.8-4		
INCO-WELD© CuAl-A2	Bal			<1.5			8.5-11
INCO-WELD© CuAL8-NI2							

Table 3.1
Composition of Welding Fume for Filler Metal Wires Covered By This MSDS (Weight %)

	Si	Ti	Al	Fe	Mn	Ni	Cr	Mo	Nb	Cu	Co
INCOLOY® 65	0.2	0.6	0.2	23	0.4	39	19	2	<0.1	2.8	-
INCONEL® 617	0.2	.0.3	0.7	1	0.6	40	16	8	<0.1	0.4	8
INCONEL® 625, 625T & 625TSW™	0.1	0.2	0.2	0.3	0.2	49	17	9	2	<0.1	-
INCONEL® 718 & 718TSW™	<0.1	0.9	0.6	15	0.4	44	15	3	3	0.4	-
INCONEL® 82 & 82T	0.3	0.3	0.2	1	6	56	15	<0.1	1	<0.1	-
INCO-WELD® C-276 & C276TSW™	0.1	<0.1	1	14	3	28	10	11	<0.1	0.8	-
MONEL® 60, 60N & 60TSW™	0.3	2	<0.1	2	5	47	<0.1	<0.1	<0.14	24	-
MONEL® 67 & 67N	0.4	1	0.6	2	2	10	<0.1	<0.1	<0.1	64	-
NC 80/20	0.4	0.1	0.1	0.4	2	57	16	<0.1	<0.1	0.6	-
Nickel 61 & 61N	<0.1	2	0.1	0.2	0.7	69	<0.1	<0.1	<0.1	1.3	-
NIMONIC® 263	0.2	2	0.4	0.7	0.7	43	17	5	<0.1	<0.1	14
NIMONIC® 90	1	1	2	3	0.4	35	15	<0.1	<0.1	0.4	9
NIMONIC® PE11	0.7	1	1	24	1	30	15	2	<0.1	0.4	-
NI-ROD® 44	<0.1	0.3	0.2	32	16	30	<0.1	<0.1	<0.1	<0.1	-
NI-ROD® 55	0.8	<0.1	0.1	33	4	31	<0.1	<0.1	<0.1	<0.1	-

Table 3.2
Composition of Welding Fume for Flux Coated Welding Electrodes Covered By This MSDS (Weight %)

	Ni	Cr Total	Cr 6	Fe	Mn	Cu	Co	Ti	Ba	F
INCOLOY® 135	0.88	3.13	0.91	2.15	2.99	0.60	0.02	3.51	<0.1	21.3
INCONEL® 112 & 112T	1.95	2.80	0.79	0.76	0.16	0.06	0.03	2.58	<0.1	26.7
INCONEL® 117	2.32	3.14	0.93	0.54	0.84	0.03	0.91	1.05	<0.1	28.4
INCONEL® 182 & 182T	1.59	2.14	0.55	0.94	10.5	0.06	0.03	3.29	<0.1	23.2
INCO-WELD® A	2.10	2.33	0.61	1.00	1.62	0.03	0.03	0.23	0.90	29.3
INCO-WELD® B	4.18	3.70	1.1	2.62	3.80	0.15	0.03	0.22	<0.1	20.9
INCO-WELD® C	0.77	4.38	1.49	9.62	3.19	0.09	0.20	2.91	<0.1	11.6
INCO-WELD® C-276	5.0	4.0	2.7	2.0	2.0	0.2	-	3.0	<0.1	-
MONEL® 187 & 187N	0.76	0.02	<0.01	0.42	2.33	10.7	0.03	3.36	2.90	30.4
MONEL® 190 & 190N	1.79	0.04	<0.01	0.26	2.43	8.7	0.04	1.23	1.83	24.9
Nickel 141 & 141N	3.15	0.02	<0.01	.56	.60	0.02	0.03	1.91	<0.01	30.2
NI-ROD©	13.9	0.01	0.01	3.77	0.27	0.02	0.05	0.64	<0.1	8.4
NI-ROD® 44	2.41	0.03	0.01	9.73	11.8	1.40	0.02	0.13	7.25	3.4
NI-ROD® 55	2.1	0.03	0.01	1.45	0.37	0.02	0.02	0.23	0.49	3.1
NI-ROD® 55X	1.23	0.02	<0.01	5.30	1.14	1.40	0.03	0.10	9.88	3.0
NI-ROD® 99X	3.23	0.03	<0.01	3.21	3.69	1.29	0.04	0.03	8.30	5

Table 3.3
Composition of Welding Fume for Flux-Cored Welding Wires Covered By This MSDS (Weight %)

	Si	Ti	Al	Fe	Mn	Ni	Cr	Mo	Nb	Cu
NI-ROD© FC55	1	0.3	3	13	7	13	<0.1	<0.1	<0.1	0.2

Table 3.4
Composition of Welding Fume for Stainless Steel Welding Wires Covered By This MSDS (Weight %)

	Fe	Mn	Ni	Cr	Cu	Mo
INCO-WELD© 308, 308H, 308L, 308LSi	40.30	4.10	6.30	11.10	0.16	0.06
INCO-WELD© 309, 309H, 309L, 309LSi	33.50	7.00	7.00	16.30	0.16	0.33
INCO-WELD© 310	34.50	4.20	10.00	16.50	0.16	0.06
INCO-WELD© 312	34.00	7.10	6.20	18.50	0.10	0.06
INCO-WELD© 316, 316L, 316LSi	31.00	7.10	6.50	8.50	0.70	1.80
INCO-WELD© 347	34.5	5.70	6.20	10.20	0.17	0.14
318	31.00	7	6.5	9	0.16	1.8
410	35	3		5.5		
18/8/Mn	40.3	8.20	6.20	11.20	0.15	1.06

Table 3.5
Composition of Welding Fume For Low Alloy Steel Welding Wires Covered By This MSDS (Weight %)

	Fe	Mn	Ni	Cr	Cu	Pb
A15 / A18	55	6.5			1.1	
A31	62	16			1.5	
A32	55	9	0.2	1.5	2	03
A33	53	6	0.3	2	2.2	0.5

Table 3.6
Composition of Welding Fume for Aluminum Alloy Welding Wires Covered By This MSDS

	Fe	Mn	Ni	Cr	Cu	Al_2O_3
INCO-WELD© 1050	1	0.1			0.2	90
INCO-WELD© 4043	2	0.1			0.40	80
INCO-WELD© 4047	2	0.1			0.4	80
INCO-WELD© 5356	1	0.1			0.50	83
INCO-WELD© 5556	1	0.1			0.40	80

Table 3.7
Composition of Welding Fume for Copper Alloy Welding Wires Covered By This MSDS

	Fe	Mn	Ni	Cr	Cu
INCO-WELD© Cu	0.30	0.60	0.10	0.10	75
INCO-WELD© CuSi-A	0.20	1.00	0.20	0.10	73
INCO-WELD© C12	0.30	0.10	0.10	0.10	75
INCO-WELD© C13	2.00	0.10	0.20	0.10	80
INCO-WELD© C26	5.0	1.00	0.50	0.10	75

Appendix 1

INGREDIENTS, TOXICOLOGICAL AND EXPOSURE LIMIT INFORMATION

The following information is primarily directed to the ingredients of the complex alloys listed in table 2.1, 2.2, 2.3, 2.5, 2.6, and 2.7. Although it is the user's responsibility to assess end products, intermediates, or fugitive emissions arising out of the use of these alloys, information is also provided for common fume ingredients. *UK EH40 limits for the ingredients are shown in italics at the end of each section.*

Ingredient		EINECS Number	CAS Number	Exposure Limits[(1)]:	Comments
Symbol	**Name**				
Al	Aluminum		7429-90-5	TLV: 10 mg/m³ (Metal dust); 5 mg/m³ (Welding fumes) PEL: 15 mg/m³ (Total metal dust); 5 mg/m³ (Metal dust – respirable fraction) LD_{50}: Not Available *EH40 - Aluminum metal: Total inhalable dust OES 10 mg/m³ (8 hours TWA),Total respirable dust OES 4 mg/m³ (8 hours TWA)*	Aluminum is not readily absorbed through the skin or the GI tract and only poorly through the lungs. Foreign literature between 1958 and 1962 reported cases of severe and sometimes fatal pulmonary fibrosis in workers exposed to aluminum dust. In one of the fatal cases, the worker developed fibrosis and encephalopathy after 13.5 years of exposure to aluminum dust. In rodent studies and currently in US industry, no fibrosis or encephalopathy have been reported from the inhalation of aluminum powder. Acute exposure to alumina fume may cause bronchial irritation; however reports of pulmonary fibrosis and emphysema in alumina abrasive workers are no longer seen, owing to improved environmental control.
Al_2O_3	Aluminum Oxide (Alumina)		1344-28-1	TLV: 10 mg/m³ PEL: 15 mg/m³ (Total dust); 5 mg/m³ (respirable) LD50: Not Available *EH40 Total inhalable dust OES 10 mg/m³ (8 hours TWA),Total respirable dust OES 4 mg/m³ (8 hours TWA)*	Acute exposure to this material may cause bronchial irritation; however reports of pulmonary fibrosis and emphysema of alumina abrasive workers are no longer seen, owing to improved environmental control.
$BaCO_3$	Barium Carbonate		513-77-9	TLV: 0.5 mg/m³ (Soluble compounds, as Ba) PEL: 0.5 mg/m³ (Soluble compounds, as Ba) LD50: 418 mg/kg, rat, oral *EH40 OES 0.5 mg/m³ (soluble compounds, as Ba)*	Excessive inhalation can produce a benign pneumoconiosis called Baritosis. Ingestion can cause excessive salivation, vomiting, colic, violent diarrhea, convulsive tremors progressing to muscular paralysis, increased blood pressure, internal hemorrhages in the kidneys and G.I tract, and possible hypokalemia.
BaF_2	Barium Flouride		7787-32-8	TLV: 0.5 mg/m³ (Soluble compounds, as Ba) PEL: 0.5 mg/m³ (Soluble compounds, as Ba) LD50: 250 mg/kg, rat, oral *EH40 OES 0.5 mg/m³ (soluble compounds, as Ba)*	Inhalation may cause irritation of the respiratory tract. Ingestion can cause severe gastrointestinal distress with vomiting, diarrhea, and abdominal pain. Barium and fluoride absorption can result in muscle (including cardiac) and nerve irregularities with potassium and calcium deficiencies. Chronic exposures may cause Fluorosis (Chronic fluoride intoxication) with symptoms of digestive disturbances such as vomiting, loss of appetite, diarrhea, or constipation.
C	Carbon		7440-44-0	TLV: 3.5 mg/m³ (As carbon black) PEL: 3.5 mg/m³ (As carbon black) LD50: 440 mg/kg, mouse, intravenous	Inhalation that is prolonged and repeated at excessive levels may lead to benign pneumoconiosis. No effects have been found for ingestion.
$CaCO_3$	Calcium Carbonate		1317-65-3	TLV: 10 mg/m³ PEL: 15 mg/m³ (Total dust); 5 mg/ m³ (Respirable fraction) LD50: 6,450 mg/kg, rat, oral *EH40: Total inhalable dust OES 10 mg/m³ (8 hours TWA),Total respirable dust OES 4 mg/m³ (8 hours TWA)*	This compound is considered non-toxic. Inhalation of particulates could cause mild irritation of the respiratory tract. Though used as an antacid, ingestion of large amounts could lead to intestinal blockage.

CaF_2	Calcium Fluoride (Fluorspar)		7789-75-5	TLV: 2.5 mg/m³ (as F) PEL: 2.5mg/m³ (as F) LD_{50}: 4,250mg/kg, rat, oral	Inhalation of welding fumes containing calcium fluoride can cause irritation of the respiratory tract. Ingestion of soluble fluorides can produce symptoms of vomiting, abdominal pain, diarrhea, convulsions, muscular weakness and other signs of neurological problems. Chronic exposures may cause Fluorosis (Chronic fluoride intoxication) with symptoms of digestive disturbances such as vomiting, loss of appetite, diarrhea, or constipation.
CaO	Calcium Oxide		1305-78-8	TLV: 2 mg/m³, as Calcium Oxide PEL: 5 mg/m³, as Calcium Oxide LD50: Not Known *EH40: Total inhalable dust OES 2 mg/m³ (8 hours TWA*	May cause skin, eye and mucous membrane irritation. Inhalation of dust or fume may cause respiratory irritation. Repeated exposure can cause damage to the nasal septum, pneumonia and dermatitis.
$CaSiO_3$	Calcium Metasilicate		1344-95-2	TLV: 10 mg/m³ (Dust) PEL: 15 mg/m³ (Total dust) 5 mg/m³ (Respirable) LD_{50}: Not Available *EH40: Total inhalable dust OES 10 mg/m³ (8 hours TWA),Total respirable dust OES 4 mg/m³ (8 hours TWA)*	Long Term cumulative inhalation of calcium metasilicate may cause restriction of the large airways. May cause minor skin and eye irritation. The International Agency for Research on Cancer (IARC) has concluded that calcium metasilicate is a questionable carcinogen with experimental tumorigenic data in animals. Not classifiable as a human carcinogen according to IARC.
Co	Cobalt	231-158-0	7440-48-4	TLV: 0.02 mg/m³ (Dust & fume as Co) PEL: 0.1 mg/m³ (As Co metal) LD_{50}: 6,170 mg/kg, rat, oral *EH40 OES 0.1 mg/m³ (8 hours TWA)*	Asthmatic symptoms and pulmonary fibrosis occurring in the tungsten carbide industry may be related to the inhalation of metallic cobalt dust. Evidence of polycythemia (an increase in the total red cell mass of the blood in the body) and altered thyroid, kidney and liver function have also been found. Excessive inhalation of metallic cobalt has produced cardiac changes in miniature swine. Eye contact may cause conjunctivitis. Symptoms of excessive ingestion may be a sensation of hotness with vomiting, diarrhea and nausea along with the potential for causing damage to blood, heart, thyroid and pancreas. Repeated skin contact can cause sensitivity and allergic skin rashes. Cobalt powders have caused tumors at the site of injection in rodents. However, studies of cobalt-containing prostheses do not suggest a significant risk for humans.
Cr	Chromium	231-157-5	7440-47-3	TLV: 0.5 mg/m³ PEL: 1.0 mg/m³ (Metal as Cr) LD_{50}: Not Available *EH40:* *Chromium VI compounds (as Cr)* *OES 0.05 mg/m³ (8 hours TWA)* *Chromium II compounds (as Cr)* *OES 0.5 mg/m³ (8 hours TWA)* *Chromium III compounds (as Cr)* *OES 0.5 mg/m³ (8 hours TWA)* *Chromium* *OES 0.5 mg/m³ (8 hours TWA)*	Chromium metal is relatively nontoxic. Chromium metal and insoluble salts are said to be involved in fibrosis of the lungs. When the metal is heated to a high temperature, fumes produced may be damaging to the lungs if inhaled. The International Agency for Research on Cancer has concluded that the evidence for carcinogenicity in humans and animals is inadequate for chromium metal and trivalent chromium compounds, but sufficient for hexavalent chromium compounds. Fumes from welding chromium-containing stainless steel or certain chromium-containing rods can trigger eczematous eruptions on the palms of the hands of chromium-sensitized individuals.
Cr_2O_3	Chromic Oxide		1308-38-9	TLV: 0.5 mg/m³, as Cr PEL: 0.5 mg/m³ (Metal as Cr) LD50: Not Available	Trivalent chromium compounds (such as Cr2O3) are considered to exhibit a low degree of toxicity. Excessive concentrations of airborne dust may irritate the nose, throat, and respiratory tract. Prolonged overexposure may result in pulmonary changes. Skin and eye contact may cause irritation. The U.S. National Toxicology Program (NTP) has concluded that there is sufficient evidence that certain chromium compounds were carcinogenic to humans. However, the International Agency for Research on Cancer (IARC) has stated that there is inadequate evidence for carcinogenicity to humans or animals for trivalent chromium compounds.

Cu	Copper	231-159-6	7440-50-8	TLV: 1 mg/m³ (Dusts & mists, as Cu), 0.2 mg/m³ (Fume) PEL: 1 mg/m³ (Dusts & mists, as Cu), 0.1 mg/m³ (Fume as Cu) LD_{50}: 35 mg/kg, mouse, intraperitoneal *EH40: Fume OES 0.2 mg/m³ (8 hours TWA)* *Dusts & mists (as Cu) OES 1.0 mg/m³ (8 hours TWA), 2.0 mg/m³ (15 minute reference period)*	Copper metal dust and fume may be irritating to the respiratory tract. In user operations where copper fume is generated, inhalation of the fume can result in symptoms of "Metal Fume Fever" such as chills, fever and sweating. A few instances of allergic skin rashes have been reported in workers with skin exposure to metallic copper. In the eyes, copper metal as a foreign body can provoke an inflammatory reaction resulting in pus formation in the conjunctiva, cornea or sclera. Ingestion of copper metal may cause gastrointestinal upset. Wilson's disease can occur in certain individuals with a rare, inherited metabolic disorder characterized by retention of excessive amounts of copper in the liver, brain, kidneys and corneas. These deposits eventually lead to tissue necrosis and fibrosis, causing a variety of clinical effects, especially liver disease and neurological changes. Wilson's disease is progressive and, if untreated, leads to fatal liver failure.
Fe/ Fe_2O_3	Iron	231-096-4	7439-89-6	TLV: No limit set (For Fe_2O_3 fume the TLV is 5 mg/m³ as Fe) PEL: No limit set (For Fe_2O_3 dust & fume the PEL is 10 mg/m³ as Fe) LD_{50}: Not Available *EH40 Iron Oxide, fume (as Fe) OES 5.0 mg/m³ (8 hours TWA), 10 mg/m³ (15 minute reference period)*	Inhalation of the excessive oxide fumes or dusts can lead to irritation of the respiratory tract. Prolonged inhalation of iron oxide for periods of 6 to 10 years is known to cause siderosis which appears to be a benign pneumoconiosis. Prolonged eye contact with the metal dust could cause rust brown colored spots forming around the particles and if left for several years, permanent damage could result.
Fe_3O_4	Ferrosoferric Oxide		1317-61-9	TLV: No limit set (For Fe_2O_3 fume, 5 mg/m_3 as Fe) PEL: No limit set (For Fe_2O_3 dust and fume, 5 mg/m³ as Fe) LD50: Not Available	Inhalation of excessive amounts can lead to irritation of the respiratory tract. Chronic inhalation of iron oxide for periods of 6 - 10 years is known to cause siderosis which seems to be a benign pneumoconiosis. No data found on ingestion.
K_2O	Potassium Oxide		12136-45-7	TLV: 2 mg/m³ Ceiling value as KOH PEL: 2 mg/m³ Ceiling value as KOH LD50: Not Available	No toxicity data was found on potassium oxide, but it is expected to have effects similar to sodium peroxide which is highly irritating to the skin, eyes and the mucous membranes of the respiratory tract.
K_2SiO_3	Potasium Silicate		1312-76-1	TLV: Not Established PEL: Not Established LD50: >1000 mg/kg, oral, rat	Silicates are generally considered to have low systemic toxicity, however due to their alkaline nature they may cause corrosive effects on mucous membranes. Eye exposure can cause irritation, redness, tearing and blurred vision. Prolonged eye exposure may lead to chronic conjunctivitis. Skin exposure may cause local slight irritation. Repeated contact may lead to dermatitis. Inhalation of mist or fume can cause irritation of the nasal and respiratory passages. Ingestion can produce gastrointestinal irritation, nausea, vomiting, diarrhea, accompanied by potentially severe tissue damage. No known chronic effects have been noted.
K_2ZrF_6	Potassium Fluozirconate		16923-95-8	TLV: 2.5 mg/m³ (Fluorides, as F) PEL: 2.5 mg/m³ (Fluorides, as F) LD50: 98 mg/kg, mouse, oral	Inhalation of welding fumes containing fluorides can cause irritation of the respiratory tract. Ingestion of soluble fluorides can produce symptoms of vomiting, abdominal pain, diarrhea, convulsions, muscular weakness and other signs of neurological problems. Nose bleeds, skin irritation, tissue damage and slow healing scars can result if exposure is excessive. Chronic exposures may cause Fluorosis (Chronic fluoride intoxication) with symptoms of digestive disturbances such as vomiting, loss of appetite, diarrhea, or constipation.

$LiCO_3$ Li_2CO_3	Lithium Carbonate		554-13-2	TLV: No limit set PEL: No limit set LD50: Oral 525 mg/kg, rat Dermal LD 50, > 2000 mg/kg, rat	Contact with skin or eyes may cause irritation. Ingestion may cause acute local tissue damage. Some studies of pregnant mice and rats indicated an association between lithium ingestion and birth defects but only at dose levels large enough to produce signs of severe maternal toxicity. Although data for the 1970's and early 1980's suggested an increase in cardiovascular defects in babies born to women on lithium carbonate therapy, more recent studies have not found any association between lithium exposure and birth defects. Exposure to lithium in industrial settings is not considered to pose a risk to human health. NIOSH studied 25 workers exposed to lithium-containing dust at air concentrations exceeding 10 Mg/M3 (nuisance dust limit) and found that typical industrial exposure to lithium will not result in blood levels sufficiently high to produce toxicity in either adults or their offspring.
MgO	Magnesium Oxide		1309-48-4	TLV: 10 mg/m³ (As fume) PEL: 15 mg/m³ (Total dust or fume) LD50: Not Available *EH40 Total inhalable dust OES 10 mg/m³ (8 hours TWA),Total fume and respirable dust OES 4 mg/m³ (8 hours TWA)*	Inhalation of fumes can irritate the nose and throat. Excessive inhalation can cause metal fume fever with flue-like symptoms such as fever, body aches, vomiting, etc. Fumes of magnesium may irritate the eyes and skin. On ingestion the oxide will act as an antacid and laxative.
Mn	Manganese	231-105-1	7439-96-5	TLV: 0.2 mg/m³ elemental and inorganic compounds, as Mn PEL: 5 mg/m³ (Ceiling, as Mn compounds); 5 mg/m³ (Fume, as Mn) LD_{50}: 9,000 mg/kg, rat, oral *EH40 Manganese and its inorganic compounds (as Mn) OES 0.5 mg/m³ (8 hours TWA)*	Excessive inhalation or ingestion of manganese can produce manganese poisoning. Chronic exposures can lead to neurological problems such as apathy, drowsiness, weakness, spastic gait, paralysis, and other neurological problems resembling Parkinsonism. These symptoms can become progressive and permanent if not treated. Excessive inhalation of fumes may cause "Metal Fume Fever" with its flu-like symptoms, such as chills, fever, body aches, vomiting, sweating, etc.
MnO	Manganous Oxide		1344-43-0	TLV: 0.2 mg/m³ (as Mn) PEL: 1mg/m³ (fume) 5mg/m³(Stel, Ceiling) LD_{50}: >50mg/kg, intratracheal rat.	Excessive inhalation or ingestion of manganese and manganese compounds can produce manganese poisoning. Chronic exposures can lead to neurological problems such as apathy, drowsiness, weakness, spastic gait, paralysis, and other neurological problems resembling Parkinsonism. These symptoms can become progressive and permanent if not treated. Inhalation of fumes may bring about "metal fume fever" with symptoms such as chills and fever, upset stomach, vomiting, dryness of throat, cough, weakness, and aching of the head and body.
Mo	Molybdenum	231-107-2	7439-96-7	TLV: 10 mg/m³ (Insoluble and metal compounds, as Mo) PEL: 15 mg/m³ (Insoluble compounds, total dust as Mo) LD_{50}: Not Available *EH40 - Molybdenum compounds (as Mo):* *Soluble - OES 5.0 mg/m³ (8 hours TWA), 10 mg/m³ (15 minute reference period)* *Insoluble - OES 10 mg/m³ (8 hours TWA), 20 mg/m³ (15 minute reference period)*	Molybdenum and its insoluble compounds are reported to have a low toxicity. High dietary intake may produce a gout-like disease and high blood uric acid. Inhalation of fumes has caused kidney damage, respiratory irritation and liver damage in animals. Skin and eye contact may cause irritation.

Na_20	Sodium Oxide		1313-59-3	TLV: 2 mg/m³ (ceiling level as NaOH) PEL: 2mg/m³ (as NaOH) LD_{50}: Not Available	Sodium oxide, in powder form, is highly corrosive to moist skin, eyes, and the mucous membranes of the digestive and respiratory tracts due to its reaction with water to form sodium hydroxide. Inhalation of dusts may cause symptoms that vary from mild irritation to destructive burns depending on exposure. Ingestion can cause immediate burning of the mouth, esophagus, and stomach; swelling of surround tissues, vomiting; and rapid, faint pulse with cold, clammy skin. Death can result. Skin contact causes slippery, soapy feeling that may not be immediately painful even though skin damage begins at contact. This contact can lead to chemical burns, tissue corrosion, ulceration, loss of nails and hair, and permanent scarring if not immediately washed off. The cornea of the eye will begin corroding on contact and can lead to temporary or permanent corneal opacification producing blindness. Chronic low level skin exposures to sodium hydroxide may result in dermatitis. Sodium hydroxide is reported to have caused carcinoma of the esophagus 12 to 42 years after ingestion.
$Na_2Si_4O_9$/ Na_2Si0_3	Sodium Silicate		1344-09-8	TLV: Not Established PEL: Not Established LD50: 1153 mg/kg, oral, rat	Silicates are generally considered to have low systemic toxicity, however due to their alkaline nature they may cause corrosive effects on mucous membranes. Eye exposure can cause severe irritation, redness, tearing and blurred vision. Skin exposure may cause slight irritation. Inhalation of mist or fume can cause irritation of the nasal and respiratory passages. Ingestion may produce gastrointestinal irritation, nausea, vomiting, diarrhea and abnormal kidney function. No known chronic effects have been noted.
Na_2AlF_6	Sodium Aluminum Fluoride (Sodium Fluoaluminate)		15096-52-3	TLV: No limit set PEL: No limit set LD50: 200 mg/kg, rat, oral	Excessive inhalation of dust may cause irritation of the nose, throat and respiratory tract. Ingestion causes severe gastrointestinal distress with salivation, nausea, vomiting, diarrhea, and pain. Also may cause muscular weakness, tremors, convulsions, loss of consciousness, and death. Prolonged exposure to fluorides can cause skeletal abnormalities and digestive tract disturbances. Prolonged or repeated skin contact can produce dermatitis.
NaF	Sodium Flouride		7681-49-4	TLV: 2.5 mg/m³ (as F) PEL: 2.5 mg/m³ (as F) LD_{50}: 0.18g/kg, rat, oral	Sodium fluoride is very poisonous. Ingestion of less than 1 gram can cause nausea and vomiting, salivation, diarrhea, weakness, spasms of limbs, and stupor. Ingestion of 5 to 10 grams has proven fatal. Symptoms of possible lethal exposure include muscular weakness, tremors, convulsions, collapse, and difficulty breathing to respiratory and cardiac failure. This chemical is irritating to the eyes, nose and respiratory system. Long-term exposure can cause skeletal abnormalities (Fluorosis) to develop. This can include bone densification and calcification of certain ligaments along with stiffness of the spinal column. Mottling of tooth enamel is also possible.
Nb	Niobium	231-113-5	7440-03-1	TLV: No limit set PEL: No limit set LD_{50}: Not Available	Also known as Columbium (Cb), there is almost no information on the toxicity of this metal or its fumes. Russian medical literature has described early chest x-ray changes in welders and chemical workers handling niobium and tantalum, but no specific data has been found. It is expected that the metal dust and fumes could cause irritation to the skin, eyes and respiratory tract upon acute exposure.

Ni	Nickel R43	231-111-4	7440-02-0	TLV: 1.5 mg/m³ as metal (Inhalable Fraction) PEL: 1 mg/m³ for metal and insoluble compounds as Ni LD_{50}: >9,000 mg/kg, rat, oral *EH40 - Nickel and its inorganic compounds (except nickel carbonyl): Water soluble nickel compounds (as nickel) OES 0.1 mg/m³ (8hours TWA). Nickel & water in-soluble nickel compounds (as Ni) OES 0.5 mg/m³(8-hour TWA)*	The U.S. National Toxicology Program (NTP) 10th Report on Carcinogens has listed "metallic nickel" as "reasonably anticipated to be a human carcinogen" and "nickel compounds" as "known human carcinogens". "Nickel Alloys" were reviewed but not listed. The International Agency for Research on Cancer (IARC) concluded that nickel compounds were carcinogenic to humans and that metallic nickel is possibly carcinogenic to humans. Epidemiological studies of workers exposed to nickel powder and to dust and fume generated in the production of nickel alloys and of stainless steel have not indicated the presence of a significant respiratory cancer hazard. The inhalation of nickel powder has not resulted in an increased incidence of malignant tumors in rodents. Repeated intratracheal instillation of nickel powder produced an increased incidence of malignant lung tumors in rats, but did not produce an increased incidence in hamsters when administered at the maximum tolerated dose. However, single intratracheal instillations of nickel powder in hamsters at doses near the LD_{50} have produced an increased incidence of fibrosarcomas, mesotheliomas and rhabdomyosarcomas. Inhalation of nickel powder at concentrations 15 times the PEL irritated the respiratory tract in rodents. Nickel is a known sensitizer and may produce allergic reactions.
Si	Silicon	231-130-8	7440-21-3	TLV: 10 mg/m³ PEL: 10 mg/m³ Total dust; 5 mg/m³ Respirable fraction LD50: 3,160 mg/kg, rat, oral in amorphous form *EH40 Total inhalable dust OES 10 mg/m³ (8 hours TWA). Total respirable dust OES 4 mg/m³ (8 hours TWA).*	Silicon in dust form is considered a nuisance dust with no toxic effects when exposures are kept under control. However, like all dusts, high concentrations of silicon dust will cause some irritation to the nose and throat. Inhalation of crystalline silica (SiO2) over a long period of time can cause silicosis. In 1997, the International Agency for Research on Cancer (IARC) concluded that crystalline silica is a class I carcinogen. IARC states that a number of studies have shown that persons diagnosed as having silicosis have an increased risk of dying from lung cancer.
SiO_2	Silicon Dioxide Silica		60676-86-0	TLV: 10 mg/m³ (Metal dust); 5 mg/m³ (Welding fumes) PEL: 15 mg/m³ (Total metal dust); 5 mg/m³ (Metal dust - respirable fraction) LD_{50}: Not Available *EH40: Silica, fused respirable dust, OES 0.08 mg/m³ (8-hour TWA)*	No information was found on the hazards of ingestion of crystalline silica as the material seems to be relatively inert. Acute exposures to this material will irritate the respiratory tract. Chronic inhalation (after 10 - 20 years) can produce silicosis pneumoconiosis of the lungs) with symptoms of dyspnea, cough, wheezing and repeated, non-specific chest illnesses. Impairment of pulmonary function may be progressive. In 1997, the International Agency for Research on Cancer (IARC) concluded that crystalline silica is a class 1 carcinogen. IARC states that a number of studies have shown that persons diagnosed as having silicosis have an increased risk of dying from lung cancer.
$SrCO_3$	Strontium Carbonate		1633-05-2	TLV: No limit set PEL: No limit set LD50: Not Available	There is very little toxicity and health data on this material. Excessive overexposure to the dust may ulcerate mucous membranes in the nose and may cause sneezing and coughing. No data found on ingestion problems.
Ti	Titanium	231-142-3	7440-32-6	TLV: No limit set PEL: No limit set LD_{50}: Not Available *EH40 - As Titanium dioxide: Total inhalable dust OES 10 mg/m³ (8 hours TWA), Total respirable dust OES 4 mg/m³ (8 hours TWA)*	Inhalation of titanium could cause mild irritation to the respiratory tract. Inhalation of titanium dioxide dust or fume could produce lung fibrosis and chronic bronchitis.

Ta	Tantalum		7440-25-7	TLV: 5 mg/m³ (Metal & oxide dusts) PEL: 5 mg/m³ (Metal & oxide dusts) LD_{50}: Not Available *EH40 OES 5.0 mg/m³ (8 hours TWA), 10 mg/m³ (15 minute reference period)*	There are no reports of adverse health effects in industrially exposed workers. Massive doses of tantalum given by the intratracheal route to rats have produced respiratory tract lesions. In contact with tissue, metallic tantalum is inert. Tantalum pentoxide has an LD_{50} of >8 g/kg, orally in rats.
TiO_2	Titanium Dioxide		13463-67-7	TLV: 10 mg/m³ (Dust); PEL: 5 mg/m³ (Respirable) LD_{50}: Not Available *EH40: Total inhalable dust OES 10.0 mg/m³(8-hour TWA), total respirable OES 4 mg/m³*	Is considered a nuisance dust that is inert, practically non-toxic and chemically non-irritating. Skin contact has shown no problems other than possible drying and mechanical abrasion. Eye contact can produce particulate irritation. Does not seem to be absorbed by the body through ingestion. Excessive inhalation can produce mild pulmonary irritation and possible non-disabling slight fibrosis of the lungs.
W	Tungsten	231-143-9	7440-33-7	TLV: 5 mg/m³ insoluble compounds, as W STEL: 10 mg/m³ for soluble compounds, as W PEL: No limit set LD_{50}: 2,000mg/kg, rat, unreported route *EH40: Soluble compounds, OES 1.0 mg/m³ (8-hour TWA) and 3 mg/m³ (15 minute reference period).* *In-soluble compounds, OES 5 mg/m³(8-hour TWA) and 10.0 mg/m3 (15 minutes reference period)*	Inhalation of tungsten dust may cause irritation of the respiratory tract. Skin or eye contact could cause abrasion or irritation of the respective surfaces. No hazards have been identified for tungsten fume except that it may aggravate an existing chronic respiratory disease.
$Zr0_2$	Zirconium Dioxide		1314-23-4	TLV: 5 mg/m³ (as Zr) 10 mg/m³ (STEL) PEL: 5 mg/m³ (as Zr) 10 mg/m³ (STEL) LD_{50}: Not Available *EH40 Zirconium compounds (as Zr), OES 5mg/m³ (8-hour TWA), 10 mg/m³ (15-minute reference period*	Though this material has a low order of toxicity on inhalation some lung granulomas have been reported. Excessive inhalation may cause irritation of the nose and respiratory tract. Eye contact may cause irritation. Skin contact may cause irritation and sensitization dermatitis characterized by dusty red-brown papules. No information found on effects of ingestion.

Notes: (1) TLV = Threshold Limit Values - American Conference of Governmental Industrial Hygienists
PEL = Permissible Exposure Limit - OSHA 29 CFR 1910.1000
C = Ceiling value
STEL = Short Term Exposure Limit - a time-weighted 15-minute exposure limit, not to be exceeded at any time during a workday.

(2) CAS No. = Chemical Abstracts Services Number

Trace impurities and additional material names not listed above may also appear in Appendix 1 toward the end of the MSDS. These materials may be listed for local “Right-To-Know” compliance and for other reasons.

Weight percentages for each grade of product are listed in Table 2.x

Safety Data Sheet

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

1.1 Product identifier

Product Name • **Monel Based Alloys**

Synonyms • (X) Monel; CuNi; Monel (X)

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

Relevant identified use(s) • Cast ingots at varying weights and dimensions. Ingots are sold and distributed to downstream processors who remelt the superalloys into products used within various downstream applications.

1.3 Details of the supplier of the safety data sheet

Manufacturer • Doncasters US Holdings, Inc.

3245 Cherry Avenue
Long Beach, CA 90807
United States

Telephone (General) • 860-677-1376

Telephone (Technical) • 562-595-6625

1.4 Emergency telephone number

Manufacturer • 800-262-8200 - CHEMTREC

Manufacturer • +1-703-741-5500 - CHEMTREC

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
Respiratory Sensitization 1 - H334
Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation - H335
Carcinogenicity 2 - H351
Reproductive Toxicity 1B - H360D
Specific Target Organ Toxicity Single Exposure 1 - H370
Specific Target Organ Toxicity Repeated Exposure 1 - H372
Specific Target Organ Toxicity Repeated Exposure 2 - H373

2.2 Label Elements

CLP

DANGER

Hazard statements

- H317 - May cause an allergic skin reaction
  H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled
  H335 - May cause respiratory irritation
  H351 - Suspected of causing cancer.
  H360D - May damage the unborn child.
  H370 - Causes damage to organs.
  H372 - Causes damage to organs through prolonged or repeated exposure.
  H373 - May cause damage to organs through prolonged or repeated exposure.

Precautionary statements

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 or fume.
  P264 - Wash thoroughly after handling.
  P270 - Do not eat, drink or smoke when using this product.
  P271 - Use only outdoors or in a well-ventilated area.
  P272 - Contaminated work clothing should not be allowed out of the workplace.
  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.
  P312 - Call a POISON CENTER/doctor if you feel unwell.
  P302+P352 - IF ON SKIN: Wash with plenty of water.
  P321 - Specific treatment, see supplemental first aid information.
  P362+P364 - Take off contaminated clothing and wash it before reuse.
  P333+P313 - If skin irritation or rash occurs: 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.

Storage/Disposal

- P403+P233 - Store in a well-ventilated place. Keep container tightly closed.
  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

- May form combustible dust concentrations in air.
  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.

UN GHS Revision 3

According to: UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS): Third Revised Edition

2.1 Classification of the substance or mixture

UN GHS

- Skin Sensitization 1
  Respiratory Sensitization 1
  Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation
  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

2.2 Label elements

UN GHS

DANGER

Hazard statements •
May cause an allergic skin reaction
May cause allergy or asthma symptoms or breathing difficulties if inhaled
May cause respiratory irritation
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 or fume.
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
Use only outdoors or in a well-ventilated area.
Contaminated work clothing should not be allowed out of the workplace.
Wear protective gloves/protective clothing/eye protection/face protection.
Use personal protective equipment as required.
In case of inadequate ventilation wear respiratory protection.

Response •
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
Call a POISON CENTER or doctor/physician.
IF ON SKIN: Wash with plenty of soap and water.
Specific treatment, see supplemental first aid information.
Wash contaminated clothing before reuse.
If skin irritation or rash occurs: 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 in a well-ventilated place. Keep container tightly closed.
Store locked up.
Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

2.3 Other hazards

UN GHS •
May form combustible dust concentrations in air.
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 the Globally Harmonized System for Classification and Labeling (GHS) this product 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
Respiratory Sensitization 1
Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation
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
Combustible Dust

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
  May cause allergy or asthma symptoms or breathing difficulties if inhaled
  May cause respiratory irritation
  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.
  May form combustible dust concentrations in air.

Precautionary statements

Prevention

- Obtain special instructions before use.
  Do not handle until all safety precautions have been read and understood.
  Do not breathe dust or fume.
  Wash thoroughly after handling.
  Do not eat, drink or smoke when using this product.
  Use only outdoors or in a well-ventilated area.
  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.
  Call a POISON CENTER/doctor.
  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 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 in a well-ventilated place. Keep container tightly closed.
  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
  Respiratory Sensitization 1
  Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation
  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
Combustible Dusts 1
Health Hazards Not Otherwise Classified 1

2.2 Label elements

WHMIS 2015

DANGER

Hazard statements

- May cause an allergic skin reaction
May cause allergy or asthma symptoms or breathing difficulties if inhaled
May cause respiratory irritation
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.
May form combustible dust concentrations in air.
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 or fume.
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
Use only outdoors or in a well-ventilated area.
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.
Call a POISON CENTER/doctor if you feel unwell.
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 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 in a well-ventilated place. Keep container tightly closed.
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**
Nickel	**CAS:**7440-02-0 **EC Number:**231-111-4	25% TO 70%	NDA	**EU CLP:** Annex VI, Table 3.1: Skin Sens. 1, H317; Carc. 2, H351 (Inhl); STOT RE 1, H372 (Lungs / Orl/Dermal/Inhl); Aquatic Chronic 3, H412 **UN GHS Revision 3:** Flam. Sol. 1; Resp. Sens. 1B; Skin Sens. 1A; Carc. 2 (Inhl); STOT RE 2 (Lungs / Orl, Inhl); Aquatic Acute 3; Aquatic Chronic 3 **OSHA HCS 2012:** Flam. Sol. 1; Comb. Dust; Resp. Sens. 1B; Skin Sens. 1A; Carc. 2 (Inhl); STOT RE 2 (Lungs / Orl, Inhl) **WHMIS 2015:** Flam. Sol. 1; Comb. Dust; Resp. Sens. 1B; Skin Sens. 1A; Carc. 2 (Inhl); STOT RE 2 (Lungs / Orl, Inhl)	NDA
Copper	**CAS:**7440-50-8 **EC Number:**231-159-6	20% TO 70%	NDA	**EU CLP:** Repr. 1B, H360D (Orl); STOT SE 1, H370 (Kidney, Orl); STOT SE 3: Resp. Irrit., H335; STOT RE 2, H373 (Liver, Orl); Aquatic Acute 1, H400 (M=100); Aquatic Chronic 1, H410 (M=10) **UN GHS Revision 3:** Repr. 1B (Orl); STOT SE 1 (Kidney, Orl); STOT SE 3: Resp. Irrit.; STOT RE 2 (Liver, Orl); Aquatic Acute 1 (M=100); Aquatic Chronic 1 (M=10) **OSHA HCS 2012:** Comb. Dust; Repr. 1B (Orl); STOT SE 1 (Kidney, Orl); STOT SE 3: Resp. Irrit.; STOT RE 2 (Liver, Orl); Hazard Not Otherwise Classified - Health Hazard - Metal Fume Fever **WHMIS 2015:** Comb. Dust; Repr. 1B (Orl); STOT SE 1 (Kidney, Orl); STOT SE 3: Resp. Irrit.; STOT RE 2 (Liver, Orl); Hazard Not Otherwise Classified - Health Hazard - Metal Fume Fever	NDA
Silicon	**CAS:**7440-21-3 **EC Number:**231-130-8	0% TO 8%	Ingestion/Oral-Rat LD50 • 3160 mg/kg	**EU CLP:** Flam. Sol. 2, H228 **UN GHS Revision 3:** Flam. Sol. 2; Acute Tox. 5 (Orl) **OSHA HCS 2012:** Flam. Sol. 2 **WHMIS 2015:** Flam. Sol. 2	NDA
Iron	**CAS:**7439-89-6 **EC Number:**231-096-4	0% TO 5%	NDA	**EU CLP:** Acute Tox. 4, H302; Aquatic Chronic 4, H413 **UN GHS Revision 3:** Acute Tox. 4 (Orl); Aquatic Chronic 4 **OSHA HCS 2012:** Acute Tox. 4 (Orl) **WHMIS 2015:** Acute Tox. 4 (Orl)	NDA
Aluminum	**CAS:**7429-90-5 **EC Number:**231-072-3	0% TO 5%	NDA	**EU CLP:** Annex VI, Table 3.1: Flam. Sol. 1, H228; Water-react. 2, H261 **UN GHS Revision 3:** Flam. Sol. 1; Water-react. 2; STOT RE 1 (Lungs / Inhl) **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
Manganese	**CAS:**7439-96-5 **EC Number:**231-105-1	0% TO 2%	Ingestion/Oral-Rat LD50 • 9 g/kg	**EU CLP:** Flam. Sol. 2, H228; Eye Irrit. 2, H319; Repr. 2, H361 (Orl); STOT RE 1 (CNS, Lungs / Inhl) **UN GHS Revision 3:** Flam. Sol. 2; Skin Irrit. 3; Eye Irrit. 2; Repr. 2 (Orl); STOT RE 1 (CNS, Lungs/ Inhl) **OSHA HCS 2012:** Flam. Sol. 2; Comb. Dust; Eye Irrit. 2; Repr. 2 (Orl); 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 (Orl); STOT RE 1 (CNS, Lungs / Inhl); Hazard Not Otherwise Classified - Health Hazard - Metal fume fever	NDA
				EU CLP: Annex VI, Table 3.1: Resp. Sens. 1, H334; Skin	

Cobalt (powder)	**CAS:**7440-48-4 **EC Number:**231-158-0 **EU Index:**027-001-00-9	0% TO 2%	Ingestion/Oral-Rat LD50 • 6171 mg/kg	Sens. 1, H317; Aquatic Chronic 1, H410 (M=1) **UN GHS Revision 3:** Eye Irrit. 2; Resp. Sens. 1; Skin Sens. 1; Carc. 2 (Inhl); STOT RE 2 (Lung / Inhl); Aquatic Acute 2; Aquatic Chronic 2 **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 (Lung / Inhl)	NDA
Chromium	**CAS:**7440-47-3 **EC Number:**231-157-5	0% TO 0.5%	NDA	**EU CLP:** Not Classified **UN GHS Revision 3:** Not Classified **OSHA HCS 2012:** Comb. Dust **WHMIS 2015:** Comb. Dust	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
- Wash skin with soap and water. If skin irritation occurs: Get medical advice/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. Get medical attention if symptoms occur.

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
- Use dry powder extinguishing agent.

Unsuitable Extinguishing Media
- No data available

5.2 Special hazards arising from the substance or mixture

Unusual Fire and Explosion Hazards
- Metal powder dispersed in air may cause fire and explosion.
  Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.
  Molten metal can ignite combustibles.
  Molten metal will react violently with water.

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 (no smoking, flares, sparks or flames in immediate area). 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.
  Solid ingot material should be picked up and recycled.
  Where possible allow molten material to solidify naturally.
  Residue from cutting or grinding should be swept or vacuumed and placed in suitable containers.
  Use clean nonsparking tools to collect material.
  Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosive mixture if they are released into the atmosphere in sufficient concentration. Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air).

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

- Under normal conditions, exposure to cast ingots presents few health hazards in itself. Thermal cutting and melting of ingots may produce fumes and dust containing the component elements which may present potentially significant health hazards. Nickel can react with carbon monoxide in reducing atmospheres to form nickel carbonyl, an extremely toxic gas. Use only with adequate ventilation. Minimize dust generation and accumulation. Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Dry powders can build static electricity charges when subjected to the friction of transfer and mixing operations. Provide adequate precautions, such as electrical grounding and bonding, or inert atmospheres. Cobalt causes a dermatitis of the allergic sensitivity type at points in friction. Cobalt toxicity also results in a progressive diffuse, interstitial pneumonia with a non-productive cough, dyspnea on exertion, interstitial fibrosis and cell damage. Other workers have experienced a sensitized respiratory disease characterized by cough, wheezing and shortness of breath where upon removal from the environment, the symptoms subside. Wear appropriate personal protective equipment, avoid direct contact. Do not breathe dust or fumes. Avoid contact with skin, eyes, and clothing. Wash thoroughly with soap and water after handling and before eating, drinking, or using tobacco.

7.2 Conditions for safe storage, including any incompatibilities

Storage

- Keep away from incompatible materials.

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**	**Europe**	**NIOSH**	**OSHA**	**United Kingdom**
Chromium (7440-47-3)	TWAs	0.5 mg/m3 TWA	2 mg/m3 TWA	0.5 mg/m3 TWA	1 mg/m3 TWA	0.5 mg/m3 TWA
	STELs	Not established	Not established	Not established	Not established	1.5 mg/m3 STEL (calculated)
Manganese	STELs	Not established	Not established	3 mg/m3 STEL	Not established	1.5 mg/m3 STEL (calculated)
	TWAs	0.02 mg/m3 TWA (respirable fraction); 0.1 mg/m3 TWA (inhalable fraction)	Not established	1 mg/m3 TWA (fume)	Not established	0.5 mg/m3 TWA (as Mn)
	Ceilings	Not established	Not established	Not established	5 mg/m3 Ceiling (fume)	Not established
Cobalt (powder) (7440-48-4)	STELs	Not established	Not established	Not established	Not established	0.3 mg/m3 STEL (calculated)
	TWAs	0.02 mg/m3 TWA	Not established	0.05 mg/m3 TWA (dust and fume)	0.1 mg/m3 TWA (dust and fume)	0.1 mg/m3 TWA
Aluminum (7429-90-5)	STELs	Not established	Not established	Not established	Not established	30 mg/m3 STEL (calculated, inhalable dust); 12 mg/m3 STEL (calculated, respirable dust)
	TWAs	1 mg/m3 TWA (respirable fraction)	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)	10 mg/m3 TWA (inhalable dust); 4 mg/m3 TWA (respirable dust)
Silicon (7440-21-3)	STELs	Not established	Not established	Not established	Not established	30 ppm STEL (calculated, inhalable dust); 12 mg/m3 STEL (calculated, respirable dust)
	TWAs	Not established	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)	10 mg/m3 TWA (inhalable dust); 4 mg/m3 TWA (respirable dust)
Copper (7440-50-8)	STELs	Not established	Not established	Not established	Not established	0.6 mg/m3 STEL (calculated, fume); 2 mg/m3 STEL (dust and mist)
	TWAs	0.2 mg/m3 TWA (fume)	Not established	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)	1 mg/m3 TWA (dust and mists); 0.2 mg/m3 TWA (fume)
Nickel (7440-02-0)	STELs	Not established	Not established	Not established	Not established	1.5 mg/m3 STEL (calculated)
	TWAs	1.5 mg/m3 TWA (inhalable fraction)	Not established	0.015 mg/m3 TWA	1 mg/m3 TWA	0.5 mg/m3 TWA

8.2 Exposure controls

Engineering

- Use a local exhaust when cutting, grinding, welding, or melting. It is recommended

Measures/Controls that dust control equipment such as local exhaust ventilation and material transport systems involved in handling of this product contain explosion relief vents or an explosion supression system or an oxygen-deficient environment. 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). Use only appropriately classified electrical equipment.

Personal Protective Equipment

Respiratory
- For limited exposure, use P95 or N95 respirator. 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 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or symptoms are experienced.

Eye/Face
- Wear safety goggles.

Skin/Body
- Wear appropriate gloves. Wear long sleeves and/or protective coveralls.

Environmental Exposure Controls
- 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	A metallic gray metal ingot with no odor.
Color	Metallic gray.	Odor	Odorless
Odor Threshold	Data lacking		
General Properties			
Boiling Point	Data lacking	Melting Point/Freezing Point	2700 °F(1482.2222 °C)
Decomposition Temperature	Data lacking	pH	Data lacking
Specific Gravity/Relative Density	= 8 Water=1	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	Volatiles (Wt.)	0 %
Volatiles (Vol.)	0 %		
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

- No dangerous reaction known under conditions of normal use.

10.2 Chemical stability

- Stable under normal temperatures and pressures.

10.3 Possibility of hazardous reactions

- Hazardous polymerization will not occur.

10.4 Conditions to avoid

- Avoid generating dust.

10.5 Incompatible materials

- Cast Ingot is stable at ordinary temperature, however, caution should be taken with acids, bases, and oxidizers. Molten metal will react violently with water.

10.6 Hazardous decomposition products

- Under normal conditions, exposure to cast ingots presents few health hazards in itself. Thermal cutting and melting of ingots may produce fumes containing the component elements and breathing those fumes may present potentially significant health hazards.

Section 11 - Toxicological Information

11.1 Information on toxicological effects

Components		
Nickel (25% TO 70%)	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-Rat 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/m³ 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/m³ 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/m³ 91 Week(s)-Intermittent; *Tumorigenic*:**Equivocal tumorigenic agent by RTECS criteria**; *Lungs, Thorax, or Respiration*:**Tumors**; *Lungs, Thorax, or Respiration*:**Bronchiogenic carcinoma**
Manganese (0% TO 2%)	7439-96-5	**Acute Toxicity:** Ingestion/Oral-Rat LD50 • 9 g/kg; Inhalation-Man TCLo • 2300 µg/m³; *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; **Multi-dose Toxicity:** Inhalation-Rat TCLo • 0.7 mg/m³ 24 Hour(s) 22 Week(s)-Continuous; *Lungs, Thorax, or Respiration*:**Fibrosis (interstitial)**; *Immunological Including Allergic*:**Decrease in cellular immune response**; Inhalation-Rat TCLo • 0.3 mg/m³ 5 Hour(s) 26 Week(s)-Intermittent; *Lungs, Thorax, or Respiration*:**Fibrosis (interstitial)**; *Immunological Including Allergic*:**Decrease in cellular immune response**; **Reproductive:** Ingestion/Oral-Mouse TDLo • 322.5 mg/kg (43D male); *Reproductive Effects:Paternal 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**; Ingestion/Oral-Rat TDLo • 90 mg/kg (18D post); *Reproductive Effects:Effects on Newborn*:**Growth statistics (e.g., reduced weight gain)**; *Reproductive Effects:Effects on Newborn*:**Biochemical and metabolic**; *Reproductive Effects:Effects on Newborn*:**Other postnatal measures or effects**
		Multi-dose Toxicity: Inhalation-Man TCLo • 4 mg/m³ 1 Year(s)-Intermittent; *Lungs, Thorax, or Respiration*:**Cough**; *Lungs,*

Aluminum (0% TO 5%)	7429-90-5	*Thorax, or Respiration*:**Dyspnea**; *Nutritional and Gross Metabolic:Gross Metabolite Changes*:**Weight loss or decreased weight gain**; Inhalation-Rat TCLo • 206 mg/m³ 5 Hour(s) 30 Day(s)-Intermittent; *Lungs, Thorax, or Respiration*:**Fibrosis (interstitial)**; *Endocrine*:**Hypoglycemia**; *Blood*:**Changes in serum composition (e.g., TP, bilirubin cholesterol)**
Silicon (0% TO 8%)	7440-21-3	**Acute Toxicity:** Ingestion/Oral-Rat LD50 • 3160 mg/kg; **Irritation:** Eye-Rabbit • 3 mg • Mild irritation
Cobalt (powder) (0% TO 2%)	7440-48-4	**Acute Toxicity:** Ingestion/Oral-Rat LD50 • 6171 mg/kg; *Behavioral*:**Somnolence (general depressed activity)**; *Behavioral*:**Ataxia**; *Gastrointestinal*:**Hypermotility, diarrhea**; **Multi-dose Toxicity:** Inhalation-Rabbit TCLo • 10 mg/m³ 2 Hour(s) 56 Day(s)-Intermittent; *Behavioral*:**Food intake (animal)**; *Lungs, Thorax, or Respiration*:**Emphysema**; *Liver*:**Fatty liver degeneration**; Inhalation-Rat TCLo • 0.09 mg/m³ 24 Hour(s) 4 Week(s)-Continuous; *Peripheral Nerve and Sensation*:**Recording from afferent nerve**; Inhalation-Rat TCLo • 2 mg/m³ 4 Day(s)-Intermittent; *Lungs, Thorax, or Respiration*:**Fibrosing alveolitis**
Copper (20% TO 70%)	7440-50-8	**Acute Toxicity:** Ingestion/Oral-Mouse TDLo • 108 mg/kg; *Behavioral*:**Tremor**; *Gastrointestinal*:**Hypermotility, diarrhea**; *Gastrointestinal*:**Nausea or vomiting**; Ingestion/Oral-Mouse TDLo • 158 mg/kg; *Kidney, Ureter, and Bladder*:**Changes in tubules (including acute renal failure, acute tubular necrosis)**; Ingestion/Oral-Mouse TDLo • 232 mg/kg; *Kidney, Ureter, and Bladder*:**Changes primarily in glomeruli**; *Blood*:**Changes in spleen**; *Blood*:**Changes in serum composition (e.g., TP, bilirubin cholesterol)**; **Multi-dose Toxicity:** Ingestion/Oral-Rabbit TDLo • 3 g/kg 60 Day(s)-Continuous; *Cardiac*:**Other changes**; *Liver*:**Hepatitis (hepatocellular necrosis), zonal**; *Related to Chronic Data*:**Death in the Other Multiple Dose data type field**; **Reproductive:** Ingestion/Oral-Rat TDLo • 1520 µg/kg (22W pre); *Reproductive Effects:Specific Developmental Abnormalities*:**Musculoskeletal system**; Ingestion/Oral-Rat TDLo • 152 mg/kg (22W pre); *Reproductive Effects:Effects on Embryo or Fetus*:**Fetotoxicity (except death, e.g., stunted fetus)**; *Reproductive Effects:Specific Developmental Abnormalities*:**Central nervous system**; Ingestion/Oral-Rat TDLo • 1210 µg/kg (35W pre); *Reproductive Effects:Effects on Fertility*:**Pre-implantation mortality**; *Reproductive Effects:Effects on Fertility*:**Post-implantation mortality**; **Tumorigen / Carcinogen:** Ingestion/Oral-Mouse TDLo • 10.08 mg/kg 12 Week(s)-Continuous; *Tumorigenic*:**Carcinogenic by RTECS criteria**; *Lungs, Thorax, or Respiration*:**Other changes**
Iron (0% TO 5%)	7439-89-6	**Acute Toxicity:** Ingestion/Oral-Rat LD50 • 750 mg/kg; *Blood*:**Changes in serum composition (e.g., TP, bilirubin cholesterol)**; *Biochemical:Enzyme inhibition, induction, or change in blood or tissue levels*:**Transaminases**; Ingestion/Oral-Child TDLo • 77 mg/kg; *Behavioral*:**Irritability**; *Gastrointestinal*:**Nausea or vomiting**; *Blood*:**Normocytic anemia**; **Multi-dose Toxicity:** Ingestion/Oral-Rat TDLo • 105 mg/kg 5 Week(s)-Continuous; *Liver*:**Tumors**; *Tumorigenic*:**Active as anti-cancer agent**; *Tumorigenic*:**Protects against induction of experimental tumors**

GHS Properties	Classification
Acute toxicity	**EU/CLP** • Data lacking **UN GHS 3** • Data lacking **OSHA HCS 2012** • Data lacking **WHMIS 2015** • Data lacking
Skin corrosion/Irritation	**EU/CLP** • Data lacking **UN GHS 3** • Data lacking **OSHA HCS 2012** • Data lacking **WHMIS 2015** • Data lacking
Serious eye damage/Irritation	**EU/CLP** • Data lacking **UN GHS 3** • Data lacking **OSHA HCS 2012** • Data lacking **WHMIS 2015** • Data lacking
Skin sensitization	**EU/CLP** • Skin Sensitizer 1 **UN GHS 3** • Skin Sensitizer 1 **OSHA HCS 2012** • Skin Sensitizer 1 **WHMIS 2015** • Skin Sensitizer 1
	EU/CLP • Respiratory Sensitizer 1

Respiratory sensitization	**UN GHS 3** • Respiratory Sensitizer 1 **OSHA HCS 2012** • Respiratory Sensitizer 1 **WHMIS 2015** • Respiratory Sensitizer 1
Aspiration Hazard	**EU/CLP** • Data lacking **UN GHS 3** • Data lacking **OSHA HCS 2012** • Data lacking **WHMIS 2015** • Data lacking
Carcinogenicity	**EU/CLP** • Carcinogenicity 2; Suspected of causing cancer **UN GHS 3** • Carcinogenicity 2 **OSHA HCS 2012** • Carcinogenicity 2 **WHMIS 2015** • Carcinogenicity 2
Germ Cell Mutagenicity	**EU/CLP** • Data lacking **UN GHS 3** • Data lacking **OSHA HCS 2012** • Data lacking **WHMIS 2015** • Data lacking
Toxicity for Reproduction	**EU/CLP** • Toxic to Reproduction 1B **UN GHS 3** • 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 1; Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation **UN GHS 3** • Specific Target Organ Toxicity Single Exposure 1; Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation **OSHA HCS 2012** • Specific Target Organ Toxicity Single Exposure 1; Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation **WHMIS 2015** • Specific Target Organ Toxicity Single Exposure 1; Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation
STOT-RE	**EU/CLP** • Specific Target Organ Toxicity Repeated Exposure 1; Specific Target Organ Toxicity Repeated Exposure 2 **UN GHS 3** • Specific Target Organ Toxicity Repeated Exposure 1; Specific Target Organ Toxicity Repeated Exposure 2 **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. Cobalt toxicity also results in a progressive diffuse, interstitial pneumonia with a non-productive cough, dyspnea on exertion, interstitial fibrosis and cell damage. Other workers have experienced a sensitized respiratory disease characterized by cough, wheezing and shortness of breath where upon removal from the environment, the symptoms subside.

Chronic (Delayed)

- Chronic exposure to Nickel can cause effects such as rhinitis, sinusitis, nasal septal perforations and asthma have been reported in nickel refinery and nickel plating workers.

Skin

Acute (Immediate)

- Exposure to dust may cause mechanical irritation. Cobalt causes a dermatitis of the allergic sensitivity type at points in friction. Contact allergy to nickel is very common in human beings.

Chronic (Delayed)

- No data available.

Eye

Acute (Immediate)
- Exposure to dust may cause mechanical 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)
- Chronic exposure to Manganese dust and fumes can cause Manganism (Parkinson like disease).

Carcinogenic Effects
- Repeated and prolonged exposure to fumes and dust created in processing this product may cause cancer.

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

Reproductive Effects
- Repeated and prolonged exposure to fumes and dust created in processing this product may cause reproductive effects.

Key to abbreviations

LD = Lethal Dose

TC = Toxic Concentration

TD = Toxic Dose

Section 12 - Ecological Information

12.1 Toxicity

Components		
Nickel (25% TO 70%)	7440-02-0	**Aquatic Toxicity-Fish:** 96 Hour(s) LC50 *Oncorhynchus mykiss (Rainbow Trout)* 0.06 mg/L 28 Day(s) NOEC *Cyprinus carpio (Common Carp)* 0.0035 µg/L **Aquatic Toxicity-Crustacea:** 7 Day(s) NOEC *Americamysis bahia (Opossum Shrimp)* 0.213 mg/L **Aquatic Toxicity-Algae and Other Aquatic Plant(s):** 96 Hour(s) EC50 *Pseudokirchneriella subcapitata (Green Algae)* 0.233 mg/L
Cobalt (powder) (0% TO 2%)	7440-48-4	**Aquatic Toxicity-Fish:** 96 Hour(s) LC50 *Pimephales promelas (Fathead Minnow)* 3.4 mg/L **Aquatic Toxicity-Crustacea:** 48 Hour(s) LC50 *Daphnia magna (Water Flea)* 4.4 mg/L 28 Day(s) NOEC *Daphnia magna (Water Flea)* 0.0028 mg/L
Copper (20% TO 70%)	7440-50-8	**Aquatic Toxicity-Fish:** 96 Hour(s) LC50 *Osteichthyes (Bony Fishes)* 0.0051 mg/L 7 Day(s) NOEC *Salmo trutta (Brown Trout)* 0.0075 mg/L **Aquatic Toxicity-Crustacea:** 21 Day(s) NOEC *Daphnia magna (Water Flea)* 0.002 mg/L 48 Hour(s) EC50 *Ceriodaphnia dubia (Water Flea)* 0.001 mg/L **Aquatic Toxicity-Algae and Other Aquatic Plant(s):** 48 Hour(s) EC50 *Chlorella sp. (Green Algae)* 0.0011 mg/L 7 Day(s) NOEC *Laminaria saccharina (Tangleweed, Brown Algae)* 0.01 mg/L
Iron (0% TO 5%)	7439-89-6	**Aquatic Toxicity-Fish:** 96 Hour(s) LC50 *Mudskipper(Periophthalmus waltoni)* 0.00648 mg/L 7 Day(s) NOEC *Brown Trout (Salmo trutta)* 0.305 mg/L **Aquatic Toxicity-Crustacea:** 7 Day(s) NOEC *Aquatic Sowbug, Isopod (Idotea balthica)* 0.5 mg/L

- The product is not expected to present an environmental hazard.

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
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, Pressure(Sudden Release of)

Inventory						
Component	**CAS**	**Canada DSL**	**Canada NDSL**	**EU EINECS**	**EU ELNICS**	**TSCA**
Aluminum	7429-90-5	Yes	No	Yes	No	Yes
Chromium	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	7439-96-5	Yes	No	Yes	No	Yes
Nickel	7440-02-0	Yes	No	Yes	No	Yes
Silicon	7440-21-3	Yes	No	Yes	No	Yes

Canada

Labor

Canada - WHMIS 1988 - Classifications of Substances

• Copper	7440-50-8	Uncontrolled product according to WHMIS classification criteria
• Chromium	7440-47-3	Uncontrolled product according to WHMIS classification criteria
• Manganese	7439-96-5	D2A; B4, D2A (powder)
• Cobalt (powder)	7440-48-4	D2A, D2B
• Aluminum	7429-90-5	B6 (powder); Uncontrolled product according to WHMIS classification criteria
• Nickel	7440-02-0	D2A, D2B; B6, D2A (Raney)
• Silicon	7440-21-3	B4
• Iron	7439-89-6	Uncontrolled product according to WHMIS classification criteria

Canada - WHMIS 1988 - Ingredient Disclosure List

• Copper	7440-50-8	1 %
• Chromium	7440-47-3	0.1 %
• Manganese	7439-96-5	1 %
• Cobalt (powder)	7440-48-4	0.1 %
• Aluminum	7429-90-5	1 %
• Nickel	7440-02-0	0.1 %
• Silicon	7440-21-3	Not Listed
• Iron	7439-89-6	Not Listed

Environment

Canada - CEPA - Priority Substances List

• Copper	7440-50-8	Not Listed
• Chromium	7440-47-3	Not Listed
• Manganese	7439-96-5	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum	7429-90-5	Not Listed
• Nickel	7440-02-0	Not Listed
• Silicon	7440-21-3	Not Listed
• Iron	7439-89-6	Not Listed

United States

Labor

U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals

• Copper	7440-50-8	Not Listed
• Chromium	7440-47-3	Not Listed
• Manganese	7439-96-5	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum	7429-90-5	Not Listed

• Nickel	7440-02-0	Not Listed
• Silicon	7440-21-3	Not Listed
• Iron	7439-89-6	Not Listed

U.S. - OSHA - Specifically Regulated Chemicals

• Copper	7440-50-8	Not Listed
• Chromium	7440-47-3	Not Listed
• Manganese	7439-96-5	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum	7429-90-5	Not Listed
• Nickel	7440-02-0	Not Listed
• Silicon	7440-21-3	Not Listed
• Iron	7439-89-6	Not Listed

Environment

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

• Copper	7440-50-8	Not Listed
• Chromium	7440-47-3	Not Listed
• Manganese	7439-96-5	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum	7429-90-5	Not Listed
• Nickel	7440-02-0	Not Listed
• Silicon	7440-21-3	Not Listed
• Iron	7439-89-6	Not Listed

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

• 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)
• Chromium	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	7439-96-5	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum	7429-90-5	Not Listed
• Nickel	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
• Iron	7439-89-6	Not Listed

U.S. - CERCLA/SARA - Radionuclides and Their Reportable Quantities

• Copper	7440-50-8	Not Listed
• Chromium	7440-47-3	Not Listed
• Manganese	7439-96-5	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum	7429-90-5	Not Listed
• Nickel	7440-02-0	Not Listed
• Silicon	7440-21-3	Not Listed
• Iron	7439-89-6	Not Listed

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

• Copper	7440-50-8	Not Listed
• Chromium	7440-47-3	Not Listed
• Manganese	7439-96-5	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum	7429-90-5	Not Listed
• Nickel	7440-02-0	Not Listed
• Silicon	7440-21-3	Not Listed
• Iron	7439-89-6	Not Listed

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

• Copper	7440-50-8	Not Listed
• Chromium	7440-47-3	Not Listed
• Manganese	7439-96-5	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum	7429-90-5	Not Listed
• Nickel	7440-02-0	Not Listed
• Silicon	7440-21-3	Not Listed
• Iron	7439-89-6	Not Listed

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

• Copper	7440-50-8	1.0 % de minimis concentration
• Chromium	7440-47-3	1.0 % de minimis concentration
• Manganese	7439-96-5	1.0 % de minimis concentration
• Cobalt (powder)	7440-48-4	0.1 % de minimis concentration
• Aluminum	7429-90-5	1.0 % de minimis concentration (dust or fume only)
• Nickel	7440-02-0	0.1 % de minimis concentration
• Silicon	7440-21-3	Not Listed
• Iron	7439-89-6	Not Listed

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

• Copper	7440-50-8	Not Listed
• Chromium	7440-47-3	Not Listed
• Manganese	7439-96-5	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum	7429-90-5	Not Listed
• Nickel	7440-02-0	Not Listed
• Silicon	7440-21-3	Not Listed
• Iron	7439-89-6	Not Listed

United States - California

Environment

U.S. - California - Proposition 65 - Carcinogens List

• Copper	7440-50-8	Not Listed
• Chromium	7440-47-3	Not Listed
• Manganese	7439-96-5	Not Listed
• Cobalt (powder)	7440-48-4	carcinogen, 7/1/1992 (powder)
• Aluminum	7429-90-5	Not Listed
• Nickel	7440-02-0	carcinogen, 10/1/1989 (metallic)
• Silicon	7440-21-3	Not Listed
• Iron	7439-89-6	Not Listed

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

• Copper	7440-50-8	Not Listed
• Chromium	7440-47-3	Not Listed
• Manganese	7439-96-5	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum	7429-90-5	Not Listed
• Nickel	7440-02-0	Not Listed
• Silicon	7440-21-3	Not Listed
• Iron	7439-89-6	Not Listed

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

• Copper	7440-50-8	Not Listed
• Chromium	7440-47-3	Not Listed
• Manganese	7439-96-5	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum	7429-90-5	Not Listed
• Nickel	7440-02-0	Not Listed
• Silicon	7440-21-3	Not Listed
• Iron	7439-89-6	Not Listed

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

• Copper	7440-50-8	Not Listed
• Chromium	7440-47-3	Not Listed
• Manganese	7439-96-5	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum	7429-90-5	Not Listed
• Nickel	7440-02-0	Not Listed
• Silicon	7440-21-3	Not Listed
• Iron	7439-89-6	Not Listed

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

• Copper	7440-50-8	Not Listed
• Chromium	7440-47-3	Not Listed
• Manganese	7439-96-5	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum	7429-90-5	Not Listed
• Nickel	7440-02-0	Not Listed
• Silicon	7440-21-3	Not Listed
• Iron	7439-89-6	Not Listed
U.S. - California - Proposition 65 - Reproductive Toxicity - Male		
• Copper	7440-50-8	Not Listed
• Chromium	7440-47-3	Not Listed
• Manganese	7439-96-5	Not Listed
• Cobalt (powder)	7440-48-4	Not Listed
• Aluminum	7429-90-5	Not Listed
• Nickel	7440-02-0	Not Listed
• Silicon	7440-21-3	Not Listed
• Iron	7439-89-6	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
  H261 - In contact with water releases flammable gas
  H302 - Harmful if swallowed
  H319 - Causes serious eye irritation
  H361 - Suspected of damaging fertility or the unborn child.
  H400 - Very toxic to aquatic life
  H410 - Very toxic to aquatic life with long lasting effects
  H412 - Harmful to aquatic life with long lasting effects
  H413 - May cause long lasting harmful effects to aquatic life

Revision Date
- 08/March/2018

Preparation Date
- 13/June/2011

Other Information
- To access SDS online, go to Doncasters.com/EHS/SDS.

Disclaimer/Statement of Liability
- The information herein is given in good faith but no warranty, expressed or implied, is made.

Key to abbreviations

NDA = No Data Available

SDS no. MI11298
Version 2
Revision date 03/Feb/2015
Supersedes date 21/Jul/2010

Safety Data Sheet
PLATINUM D-D†

Quantity restrictions apply! Not to be used in quantities of 1 tonne or more within the EEA.

1. Identification of the substance/preparation and of the Company/undertaking

1.1 Product identifier

Product name PLATINUM D-D†
Product code MI11298

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

Recommended Use Wetting agent

Uses advised against Consumer use

1.3 Details of the supplier of the safety data sheet

Supplier
M-I Australia Pty Ltd
Level 5
256 St. George Terrace
Perth
WA 6000
T= 08 9440 2900
MISDS@slb.com

1.4 Emergency Telephone Number

Emergency telephone - (24 Hour) Australia +61 2801 44558, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, New Zealand +64 9929 1483, USA 001 281 561 1600

2. Hazards identification

2.1 Classification of the substance or mixture

Classification according to (EC) No. 1272/2008

Health hazards

Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 1

Environmental hazards Not classified

Physical Hazards Not classified

2.2 Label elements

Signal word
DANGER

Hazard statements
H315 - Causes skin irritation
H318 - Causes serious eye damage

Precautionary Statements - EU (§28, 1272/2008)
P264 - Wash face, hands and any exposed skin thoroughly after handling
P280 - Wear protective gloves/ protective clothing/ eye protection/ face protection
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or doctor/ physician
P302 + P352 - IF ON SKIN: Wash with plenty of soap and water
P501 - Dispose of contents/container in accordance with local regulations.

Supplementary precautionary statements
P332 + P313 - If skin irritation occurs: Get medical advice/ attention
P362 - Take off contaminated clothing and wash before reuse

Classification according to EU Directives 67/548/EEC or 1999/45/EC

Indication of danger
Xi - Irritant

R-code(s)
R38, R41

Contains

Water

Sodium dodecylbenzenesulfonate

Tetrapotassium diphosphate

Alcohols, C10-16, ethoxylated, sulfates, sodium salts

For the full text of the R-phrases and H-Statements mentioned in this Section, see Section 16.

2.3 Other data

Not classified as PBT/vPvB by current EU criteria

Australian statement of hazardous/dangerous nature
Classified as Hazardous according to the criteria of NOHSC.
HAZARDOUS SUBSTANCE. NON-DANGEROUS GOODS.

3. Composition/information on ingredients

3.1 Substances

Not Applicable

3.2 Mixtures

Component	EC-No.	CAS-No	Weight % - range	Classification (67/548)	Classification (Reg. 1272/2008)	REACH registration number
Water	244-063-4	7732-18-5	60-100	-	Not classified	No data available
Sodium dodecylbenzenesulfonate	246-680-4	25155-30-0	1-5	Xn; R22 Xi; R38, R41	Acute Tox. 4 (H302) Skin Irrit. 2 (H315) Eye Dam. 1 (H318)	No data available
Tetrapotassium diphosphate	230-785-7	7320-34-5	1-5	Xi; R36	Eye Irrit. 2 (H319)	No data available
Alcohols, C10-16, ethoxylated, sulfates, sodium salts	500-223-8	68585-34-2	1-5	Xi; R36/38	Skin Irrit. 2 (H315) Eye Irrit 2. (H319)	No data available

Comments
The product contains other ingredients which do not contribute to the overall classification.

4. First aid measures

4.1 First-Aid Measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Ingestion Rinse mouth. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Seek medical attention if irritation occurs.

Skin contact Wash off immediately with soap and plenty of water removing all contaminated clothes and shoes. Get medical attention immediately if symptoms occur.

Eye contact Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first five minutes, then continue rinsing eye. Seek medical attention at once.

4.2 Most important symptoms and effects, both acute and delayed

General advice The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop, the casualty should be transferred to hospital as soon as possible.

Main symptoms

Inhalation Please see Section 11. Toxicological Information for further information.

Ingestion Please see Section 11. Toxicological Information for further information.

Skin contact Please see Section 11. Toxicological Information for further information.

Eye contact Please see Section 11. Toxicological Information for further information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician Treat symptomatically.

5. Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media
Water Fog, Alcohol Foam, CO_2, Dry Chemical.

Extinguishing media which shall not be used for safety reasons
Water may be ineffective.

5.2 Special hazards arising from the substance or mixture

Unusual fire and explosion hazards
None known.

Hazardous combustion products
Fire or high temperatures create:, Carbon oxides (COx).

5.3 Advice for firefighters

Special protective equipment for fire-fighters
As in any fire, wear self-contained breathing apparatus and full protective gear.

Special Fire-Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.

6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. See also section 8.

6.2 Environmental precautions

The product should not be allowed to enter drains, water courses or the soil.

Environmental exposure controls
Avoid release to the environment. Local authorities should be advised if significant spillages cannot be contained.

6.3 Methods and materials for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Dike far ahead of liquid spill for later disposal.

Methods for cleaning up
Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. After cleaning, flush away traces with water.

6.4 Reference to other sections

See section 13 for more information.

7. Handling and storage

7.1 Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin and eyes. Do not breathe vapors or spray mist. Avoid spills and splashing during use.

7.2 Conditions for safe storage, including any incompatibilities

Technical measures/precautions Ensure adequate ventilation.

Storage precautions Keep containers tightly closed in a dry, cool and well-ventilated place. Avoid: High temperatures. Avoid contact with: Strong oxidizing agents

Packaging material Use specially constructed containers only

7.3 Specific end uses

See Section 1.2.

8. Exposure controls/personal protection

8.1 Control parameters

Exposure limits Contains no substances with occupational exposure limit values
No biological limit allocated

Component	EU OEL	Austria	Australia	Denmark
Water	Not determined	Not determined	Not determined	Not determined
Sodium dodecylbenzenesulfonate	Not determined	Not determined	Not determined	Not determined
Tetrapotassium diphosphate	Not determined	Not determined	Not determined	Not determined
Alcohols, C10-16, ethoxylated, sulfates, sodium salts	Not determined	Not determined	Not determined	Not determined

Component	Finland	France	Germany	Hungary
Water	Not determined	Not determined	Not determined	Not determined
Sodium dodecylbenzenesulfonate	Not determined	Not determined	Not determined	Not determined
Tetrapotassium diphosphate	Not determined	Not determined	Not determined	Not determined
Alcohols, C10-16, ethoxylated, sulfates, sodium salts	Not determined	Not determined	Not determined	Not determined

Component	New Zealand	Italy	Netherlands	Norway
Water	Not Determined	Not determined	Not determined	Not determined
Sodium dodecylbenzenesulfonate	Not Determined	Not determined	Not determined	Not determined
Tetrapotassium diphosphate	Not Determined	Not determined	Not determined	Not determined
Alcohols, C10-16, ethoxylated, sulfates, sodium salts	Not Determined	Not determined	Not determined	Not determined

Component	Poland	Portugal	Romania	Russia
Water	Not determined	Not determined	Not determined	Not determined
Sodium dodecylbenzenesulfonate	Not determined	Not determined	Not determined	Not determined
Tetrapotassium diphosphate	Not determined	Not determined	Not determined	Not determined
Alcohols, C10-16, ethoxylated, sulfates, sodium salts	Not determined	Not determined	Not determined	Not determined

Component	Spain	Switzerland	Turkey	UK
Water	Not determined	Not determined	Not determined	Not determined
Sodium dodecylbenzenesulfonate	Not determined	Not determined	Not determined	Not determined
Tetrapotassium diphosphate	Not determined	Not determined	Not determined	Not determined
Alcohols, C10-16, ethoxylated, sulfates, sodium salts	Not determined	Not determined	Not determined	Not determined

8.2 Exposure controls

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering measures to reduce exposure
Ensure adequate ventilation. Mechanical ventilation or local exhaust ventilation is required.

Personal protective equipment

Eye protection — It is good practice to wear goggles when handling any chemical. Tightly fitting safety goggles.

Hand protection — Use protective gloves made of:, Nitrile, Neoprene, Be aware that liquid may penetrate the gloves. Frequent change is advisable.

Respiratory protection — In case of insufficient ventilation wear suitable respiratory equipment, Use respirator with organic vapor protection (A, brown), At work in confined or poorly ventilated spaces, respiratory protection with air supply must be used.

Skin and body protection — Wear suitable protective clothing, Eye wash and emergency shower must be available at the work place.

Hygiene measures — Wash hands before eating, drinking or smoking, Remove and wash contaminated clothing before re-use.

9. Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state — Liquid
Appearance — Viscous
Odor — Lemon
Color — Pink
Odor threshold — Not applicable

Property	Values	Remarks

pH	8 - 10	
pH @ dilution	7.5-8.5	@ 1%
Melting/freezing point		
Boiling point/range	100 °C / 212 °F	
Flash point	> 93 °C / > 200 °F	
Evaporation rate (BuAc =1)	< 1	
Flammability (solid, gas)	Not Applicable	
Flammability Limits in Air		
Upper flammability limit	Not applicable	
Lower flammability limit	Not applicable	
Vapor pressure	No information available	
Vapor density	No information available	
Specific gravity	No information available	
Bulk density	No information available	
Relative density	1.038 sg	@ 20°C.
Water solubility	Soluble in water	
Solubility in other solvents	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity		
Dynamic viscosity	145 cP	
Log Pow	No information available	

Explosive properties	No information available
Oxidizing properties	No information available

9.2 Other information

Pour point	No information available
Molecular weight	No information available
VOC content(%)	0.07
Density	No information available

10. Stability and reactivity

10.1 Reactivity

No specific reactivity hazards associated with this product.

10.2 Chemical stability

Stable under normal temperature conditions and recommended use.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization
Hazardous polymerization does not occur.

10.4 Conditions to avoid

High temperatures.

10.5 Incompatible materials

Strong oxidizing agents.

10.6 Hazardous decomposition products

See also section 5.2.

11. Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Inhalation Vapors may irritate throat and respiratory system.

Eye contact Causes serious eye damage.

Skin contact Causes skin irritation.

Ingestion Ingestion may cause stomach discomfort.

Unknown acute toxicity .

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Water	> 90 mL/kg (Rat)	No data available	No data available
Sodium dodecylbenzenesulfonate	= 438 mg/kg (Rat)	No data available	No data available
Tetrapotassium diphosphate	No data available	> 4640 mg/kg (Rabbit)	No data available
Alcohols, C10-16, ethoxylated, sulfates, sodium salts	No data available	No data available	No data available

Sensitization This product does not contain any components suspected to be sensitizing.

Mutagenic effects This product does not contain any known or suspected mutagens.

Carcinogenicity This product does not contain any known or suspected carcinogens.

Reproductive toxicity This product does not contain any known or suspected reproductive hazards.

Routes of exposure Eye contact. Skin contact.

Routes of entry Eye contact.

Specific target organ toxicity (single exposure) Not classified

Specific target organ toxicity (repeated exposure) Not classified.

Aspiration hazard No hazard from product as supplied.

12. Ecological information

12.1 Toxicity

The product component(s) are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Toxicity to algae
This product is not considered toxic to algae.

Toxicity to fish
This product is not considered toxic to fish.

Toxicity to daphnia and other aquatic invertebrates
This product is not considered toxic to invertebrates.

Component	Toxicity to fish	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates
Water	No information available	No information available	No information available
Sodium dodecylbenzenesulfonate	10.8 mg/L LC50 (Oncorhynchus mykiss) = 96 h	No information available	No information available
Tetrapotassium diphosphate	100 mg/L LC50 (Oncorhynchus mykiss) = 96 h	No information available	100 mg/L EC50 (water flea) = 48 h
Alcohols, C10-16, ethoxylated, sulfates, sodium salts	No information available	No information available	No information available

Percent unknown aquatic toxicity

12.2 Persistence and degradability

No product level data available.

12.3 Bioaccumulative potential

No product level data available.

12.4 Mobility in soil

Mobility
Soluble in water.

12.5 Results of PBT and vPvB assessment

Not classified as PBT/vPvB by current EU criteria.

12.6 Other adverse effects.

None known.

13. Disposal considerations

13.1 Waste treatment methods

Waste from residues / unused products	Dispose of in accordance with local regulations.
Contaminated packaging	Empty containers should be taken for local recycling, recovery or waste disposal.
EWC Waste disposal No.	According to the European Waste Catalogue, Waste Codes are not product specific, but application specific. Waste codes should be assigned by the user based on the application for which the product was used. The following Waste Codes are only suggestions: EWC waste disposal No: 07 01 04 Waste Code: 7152 Organic waste without halogen.

14. Transport information

The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA,ADR/RID/ADG).

14.1 UN Number
Not regulated

14.2 Proper shipping name
Not regulated

14.3 Hazard class(es)

ADR/RID/ADN Hazard class	Not regulated
IMDG Hazard class	Not regulated
ICAO Hazard class/division	Not regulated

14.4 Packing group

ADR/RID/ADN Packing Group	Not regulated
IMDG Packing group	Not regulated
ICAO Packing group	Not regulated

14.5 Environmental hazard
No

14.6 Special precautions
Not Applicable

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
Please contact MISDS@slb.com for info regarding transport in Bulk.

15. Regulatory information

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

Germany, Water Endangering Classes (VwVwS)	Water endangering class = 2

Australian Standard for the Uniform Scheduling of Drugs and Poisons
No Poisons Schedule number allocated

Sodium dodecylbenzenesulfonate
Schedule 5

New Zealand hazard classification	Irritant

HSNO approval no.	HRS002503
Group number	6.3A, 8.3A

Commission Regulation (EU) No 453/2010 of 20 May 2010 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH). Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC, including amendments.

This safety data sheet complies with the requirements of Regulation (EC) No. 1272/2008.

National Code of Practice for the Preparation of Material Safety Data Sheets 2nd Edition [NOHSC: 2011 (2003)].

National Occupational Health and Safety Commission's Approved Criteria for Classifying Hazardous Substances [NOHSC:1008 (2004) 3rd Edition].

National Occupational Health and Safety Commission's Exposure Standards for Atmospheric Contaminants in the occupational Environment [NOHSC:1003 (1995)].

Safe Work Australia.

Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP).

Not classified as Dangerous Goods by the criteria of the Australian Dangerous Goods Code (ADG Code) for transport by road or rail.

International inventories

USA (TSCA)	Complies
European Union (EINECS and ELINCS)	Complies
Canada (DSL)	Complies
Philippines (PICCS)	Complies
Japan (ENCS)	Complies
China (IECSC)	Complies
Australia (AICS)	Complies
Korean (KECL)	Complies
New Zealand (NZIoC)	Complies

Restricted for use in Europe until REACH assessed. Please contact REACH@miswaco.slb.com if intended for use in Europe.

15.2 Chemical Safety Report

No information available

16. Other information

Prepared by	Global Regulatory Compliance - Chemicals (GRC - Chemicals) , Anne Karin (Anka) Fosse
Supersedes date	21/Jul/2010
Revision date	03/Feb/2015
Version	2
The following sections have been revised	This SDS has been made in a new database and therefore a new layout. There have been changes with regard to classification, Updated according to GHS/CLP.

Text of R phrases mentioned in Section 2 and 3
R22 - Harmful if swallowed
R36 - Irritating to eyes
R38 - Irritating to skin
R41 - Risk of serious damage to eyes

R36/38 - Irritating to eyes and skin

Full text of H-Statements referred to under sections 2 and 3

H315 - Causes skin irritation
H318 - Causes serious eye damage
H302 - Harmful if swallowed
H319 - Causes serious eye irritation

†A mark of M-I L.L.C.

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

SAFETY DATA SHEET

Sand Force

Section: 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Sand Force
Other means of identification	:	N/A
Recommended use	:	Viscosifier
Restrictions on use	:	None known
Company	:	Right Turn Supply LLC P.O. Box 132016 Spring, TX 77393
Emergency telephone number	:	(800) 424-9300 (24 Hours) CHEMTREC
Issuing date	:	08/01/2018

Section: 2. HAZARDS IDENTIFICATION

GHS Classification

Flammable liquids	:	Not classified
Skin irritation	:	Not classified
Eye irritation	:	Not classified
Carcinogenicity	:	Not classified
Reproductive toxicity	:	Not classified
Specific target organ toxicity - single exposure	:	Not classified
Aspiration hazard	:	Not classified

GHS Label element

Hazard pictograms :

Signal Word	:	Warning
Hazard Statements	:	May form combustible dust concentrations in air.

Precautionary Statements :

Prevention:
P201 – Obtain special instructions before use.
P264 – Wash face, hands and any exposed skin thoroughly after handling.
P280 – Wear protective gloves/protective clothing/eye protection/face protection.

Response:
P308 + P313 – If exposed or concerned: Get medical advice/attention.
P302 + P352 – IF ON SKIN: Wash with plenty of soap and water.
P332 + P313 – If skin irritation occurs: Get medical advice/attention.
P363 – Wash contaminated clothing before reuse.
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 attention/advice.

Storage:
P403 + P235: Store in a well-ventilated place. Keep cool
P404 – Store in a closed container
P405 – Store locked up.

Disposal:
P501 – Dispose of contents/container in accordance with local/regional/national regulations.

Other hazards : None Known

Section: 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	Percent	GHS Classification – US
Xanthan Gum	11138-66-22	60 – 100%	Expl. Dust (Combustible Dust)

The exact percentage (concentration) of the composition has been withheld as proprietary

Section: 4. FIRST AID MEASURES

In case of eye contact : Flush eyes with water for at least 15 minutes, holding eyelids open. Remove Any contact lenses. If irritation persists, seek medical attention.

In case of skin contact : Wash with soap and water. Get medical attention if irritation persists.

If swallowed : Under normal conditions, first aid procedures are not required.

If inhaled	:	If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.
Protection of first-aiders	:	Move to fresh air. Call a physician if symptoms develop or persist.
Notes to physician	:	Treat symptomatically.
Most important symptoms and effects, both acute and delayed	:	No significant hazards expected.

Section: 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Water, fog, carbon dioxide, foam, dry chemical.
Unsuitable extinguishing media	:	None known
Specific hazards during firefighting	:	Full protective clothing and approved self-contained breathing apparatus required for firefighting personnel.
Hazardous combustion products	:	Decomposition in fire may produce toxic gases. Organic dust in the presence of an ignition source can be explosive in high concentrations. Good housekeeping practices are required to minimize this potential
Special protective equipment for firefighters	:	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Specific extinguishing methods	:	Use standard firefighting procedures and consider the hazards of other involved materials.

Section: 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Avoid contact with skin, eyes and clothing. Ventilate area. Avoid creating and breathing dust. Wear appropriate personal protective equipment.
Environmental precautions	:	Prevent from entering sewers, waterways or low areas.
Methods and materials for containment and cleaning up	:	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal. In the event of spill or accidental release, notify relevant authorities in accordance with all applicable regulations. For waste disposal, see section 13 of the SDS.

Section: 7. HANDLING AND STORAGE

Advice on safe handling : Wear personal protective equipment. Avoid contact with eyes, skin or clothing. Wash hands after use. Do not eat, drink or smoke in work area. Wash contaminated clothing before reuse. Wear a NIOSH-approved, European Standard En 149, or equivalent when using this product. Material slippery when wet. Avoid creating or inhaling dust.

Conditions for safe storage : Store in a cool dry place. Keep away from oxidizers. Protect from physical damage.

Section: 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

8(a): OCCUPATIONAL EXPOSURE LIMITS:

Substances	CAS Number	OSHA PEL-TWA	ACGIH-TLV-TWA
Xanthan Gum	11138-66-2	15 mg/m³	10 mg/m³

Engineering measures : Use in a well-ventilated area. Use approved industrial ventilation and local exhaust. As required to maintain exposures below applicable exposure limits.

Personal protective equipment

Eye protection : Wear safety glasses with side shields or splash proof goggles.

Hand protection : Wear normal work gloves.

Skin protection : Wear suitable protective clothing.

Respiratory protection : Wear NIOSH-approved, European Standard EN 149 (FFP2/FFP3), AS/NZS 1715, or equivalent respirator when using this product. Handle only in a well-ventilated area.

Hygiene measures : Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

Section: 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Powder

Colour	:	Off white to tan
Odour	:	Slight
Flash point	:	200.0 °F (93.3 °C) estimated
pH	:	7 (1%)
Odour Threshold	:	no data available
Melting point/freezing point	:	no data available
Initial boiling point and boiling range	:	no data available
Evaporation rate	:	no data available
Flammability (solid, gas)	:	no data available
Upper explosion limit	:	no data available
Lower explosion limit	:	no data available
Vapour pressure	:	no data available
Relative vapour density	:	no data available
Relative density	:	1.6
Density	:	42.5 lbs/ft^3
Water solubility	:	Soluble in water
Solubility in other solvents	:	no data available
Partition coefficient: n-octanol/water	:	no data available
Auto-ignition temperature	:	no data available
Thermal decomposition temperature	:	no data available
Viscosity, dynamic	:	no data available
Viscosity, kinematic	:	no data available
Molecular weight	:	1,000,000

Section: 10. STABILITY AND REACTIVITY

Chemical stability	:	Material is stable under normal conditions.
Possibility of hazardous reactions	:	Hazardous polymerization will not occur
Conditions to avoid	:	Avoid creation of dust when handling and avoid all possible sources of ignition (spark or flame. Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity by grounding and bonding containers and equipment before transferring material. Prevent dust accumulation.
Incompatible materials	:	Strong oxidizing agents.

Hazardous decomposition products : Carbon monoxide and carbon dioxide.

Section: 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure : Eye, skin contact, inhalation

Potential Health Effects

Eyes : May cause mild irritation to the eye.

Skin : None known.

Ingestion : None known

Inhalation : May impede respiration

Acute oral toxicity : No data available

Acute inhalation toxicity : No data available

Acute dermal toxicity : No data available

Skin corrosion/irritation : No data available

Serious eye damage/eye irritation : May cause mild irritation to the eye.

Respiratory or skin sensitization : No data available

Carcinogenicity : No data available to indicate product or components present at greater than 0.1% are chronic health hazards

Section: 12. ECOLOGICAL INFORMATION

Ecotoxicity

Ecotoxicity for the component:

Substances	CAS Number	LD50 Oral	LD50 Dermal	LC50 Inhalation
Xanthan Gum	11138-66-2	>45,000 mg/kg (Rat)	No data available	>21 mg/L (Rat) 1h >4.25 mg/L (Rat) 4h

Substances	CAS Number	Skin corrosion/irritation
Xanthan Gum	11138-66-2	Non-irritating to the skin in rabbits

Substances	CAS Number	Eye damage/irritation
Xanthan Gum	11138-66-2	Mechanical irritation of the eyes is possible.

Substances	CAS Number	Skin Sensitization
Xanthan Gum	11138-66-2	No information available.

Substances	CAS Number	Respiratory Sensitization
Xanthan Gum	11138-66-2	No sensitation responses were observed

Substances	CAS Number	Mutagenic Effects
Xanthan Gum	11138-66-2	No information available

Substances	CAS Number	Carcinogenic Effects
Xanthan Gum	11138-66-2	Did not show carcinogenic effects in animal experiments

Substances	CAS Number	Reproductive toxicity
Xanthan Gum	11138-66-2	Animal testing did not show any effects on fertility

Substances	CAS Number	STOT - single exposure
Xanthan Gum	11138-66-2	No significant toxicity observed in animal studies at concentration requiring classification.

Substances	CAS Number	STOT - repeated exposure
Xanthan Gum	11138-66-2	No significant toxicity observed in animal studies at concentration requiring classification.

Substances	CAS Number	Aspiration hazard
Xanthan Gum	11138-66-2	Not applicalbe

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Toxicity to Invertebrates
Xanthan Gum	11138-66-2	No information available	TLM96 320-560 ppm (Oncorhynchus mykiss) LC50 (96h) 490 mg/L (Oncorhynchus mykiss)	No information available	TLM96 >75,000 ppm (Mysidopsis bahia) LC50 (48h) 980 mg/L (Daphnia magna)

Environmental Effects : The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Persistence and degradability: no data available

Mobility: no data available

Bioaccumulative potential: no data available

Other information

No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

Section: 13. DISPOSAL CONSIDERATIONS

Disposal methods : Bury in a licensed landfill according to federal, state and local regulations. Follow all applicable national and local regulations.

Contaminated packaging	:	Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

Section: 14. TRANSPORT INFORMATION

US D.O.T Non-bulk (packages less than 119 gallons).:

Land transport (DOT):

Not regulated as dangerous goods.

Air transport (IATA)

Not regulated as dangerous goods

Sea transport (IMDG/IMO)

Not regulated as dangerous goods

Section: 15. REGULATORY INFORMATION

This product is not known to be a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA list	:	All components listed on inventory or are exempt

EPA SARA Title III Extremely hazardous substances: Not applicable.

EPA SARA (311, 312) Hazard Class: None

EPA SARA (313) Chemicals: This product does not contain a toxic chemical for routine annual “Toxic Chemical Release Reporting” under Section 313 (10 CFR 372)

EPA CERCLA/Superfund Reportable Spill Quantity: Not applicable

EPA RCRA Hazardous waste classification: If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.

US STATE REGULATION:

US. California Controlled Substances. CA Department of Justice (California Health and Safety Code Section 11100): All components listed do not apply to the California Proposition 65 Regulation.

US. Massachusetts RTK - Substance List: Does not apply

US. New Jersey Worker and Community Right-to-Know Act: Does not apply

US. Pennsylvania Worker and Community Right-to-Know Law: Does not apply

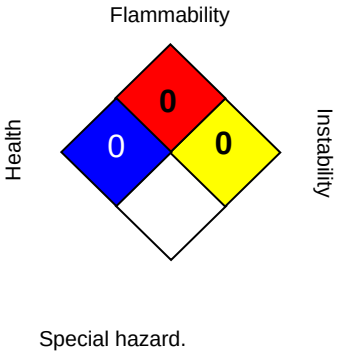
INTERNATIONAL CHEMICAL CONTROL LAWS:

United States TSCA Inventory: On TSCA Inventory

Canadian Domestic Substances List (DSL): On DSL Inventory

Section: 16. OTHER INFORMATION

NFPA:



HMIS III:

HEALTH	0
FLAMMABILITY	0
PHYSICAL HAZARD	0

0 = not significant, 1 =Slight,
2 = Moderate, 3 = High
4 = Extreme, * = Chronic

Revision Date	:	08/01/2018
Version Number	:	1.0

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Safety Data Sheet
Sodium Carbonate, Anhydrous

Date Reviewed: September 2015 Supersedes: February 2015

This document has been prepared to meet the requirements of the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200; the Canada's Workplace Hazards Materials Information System (WHMIS) and, the EC Directive, 2001/58/EC.

SECTION 1: Product and Company Identification

Product Name	Sodium Carbonate, Anhydrous
Alternate Product Name(s)	Soda Ash, Disodium Carbonate Also: Dense Soda Ash, Soda Ash Light, Synthetic Light Soda Ash, Soda Ash Liquid, Natural Light Soda Ash, Natural Light HA Soda Ash
Chemical Formula	Na_2CO_3
Product Use	Oil well drilling fluid additive. Calcium precipitation.

This chemical is certified to ANSI/NSF Standard 60, Drinking Water Chemicals – Health Effects (as packaged in the original, unopened container). Concentration not to exceed 100 ppm when used for corrosion control or scale control pH adjustment.

Supplier	Drillchem Drilling Solutions PO Box 132107 Spring, TX 77393
Telephone No.	Ph: (281) 713-8941
Emergency No.	(24 Hours) 800-424-9300 CHEMTREC

SECTION 2: Hazards Identification

***Emergency Overview*:**
White, odorless, granular solid. Product is non-combustible. Reacts with acids to release carbon dioxide gas and heat. May irritate skin and eyes. Dusts may irritate respiratory tract. Not expected to be toxic to the environment, nor to aquatic organisms. Avoid simultaneous exposure to soda ash and lime dust. In the presence of moisture (i.e. perspiration) the two materials combine to form caustic soda (NaOH), which may cause burns.

Hazard Classification:

Class	Category	Hazard Statement
Eye Irritant	Category 2	H319 Causes serious eye irritation

EC Labelling:

Name of Substance to appear on label	Sodium Carbonate
Symbol(s)	Xi- irritating 
Label Phrases	R36: Irritating to eyes. S26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S2: Keep out of reach of children S22: Do not breath dust

Potential Health Effects:

Skin	Prolonged contact may cause skin irritation (red, dry, cracked skin).
Eyes	Irritating to the eyes.
Ingestions	Although low in toxicity, ingestion may cause nausea, vomiting, stomach ache, and diarrhea.
Inhalation	Prolonged inhalation of product dusts may irritate nose, throat, and lungs.
Chronic Effects	Excessive, long term contact may produce “soda ulcers” on hands and perforation of the nasal septum. Sensitivity reactions may occur from prolonged and repeated exposure. This product does not contain any ingredient designated by IARC, NTP, ACGIH or OSHA as probable or suspected human carcinogens.

SECTION 3: Composition/Information on Ingredients

Chemical Name	CAS #	Wt%	EC No.	EC Class
Sodium Carbonate	497-19-8	99.8	207-838-8	Xi, R36

SECTION 4: First Aid Measures

Skin	Wash with plenty of soap and water. Get medical attention if irritation occurs and persists. Remove and wash contaminated clothing before re-use.
Eyes	Immediately flush with water for at least 15 minutes lifting the upper and lower eyelids intermittently. See a medical doctor or ophthalmologist as necessary.
Ingestions	Rinse mouth with water. Dilute by giving 1 or 2 glasses of water. Do not induce vomiting. Never give anything by mouth to an unconscious person. If symptoms persist, contact a doctor or poison control center
Inhalation	Remove to fresh air. If breathing difficulty or discomfort occurs and persists, obtain medical attention.
Advice to Physician	While internal toxicity is low, irritant effects of high concentrations may produce corneal opacities, and vesicular skin reactions in humans with abraded skin only. Treatment is symptomatic and supportive.

SECTION 5: Firefighting measures

Extinguishing Media	Not combustible, use extinguishing method suitable for surrounding fire.
Fire/Explosion Hazards	Not applicable.
Fire Fighting Procedures	Wear full protective clothing and self-contained breathing apparatus
Flammable Limits	Not applicable
Auto-Ignition Temperature	Not applicable
Hazardous Combustion Products	Carbon dioxide.
Sensitivity to Impact	None
Sensitivity to Static Discharge	None

SECTION 6: Accidental Release Measures

Personal Precautions	Refer to Section 8 “Exposure Controls / Personal Protection”
Containment	Prevent large quantities of this product from contacting vegetation or waterways; large spills could kill vegetation and fish.
Clean Up	This product, if spilled, can be recovered and re-used if contamination does not present a problem. Vacuum or sweep up the material and collect in a suitable container for disposal. If the spilled product is unusable due to contamination, consult state or federal environmental agencies for acceptable disposal procedures and locations. See Section 13 “Disposal Considerations”.
Notification Requirements	Federal regulations do not require notification for spills of this product. State and local regulations may contain different requirements; consult local authorities.

SECTION 7: Handling and Storage

Handling	Use air conveying / mechanical systems for bulk transfer to storage. For manual handling of bulk transfer use mechanical ventilation to remove airborne dust from railcar, ship or truck. Use approved respiratory protection when ventilation systems are not available. Selection of respirators is based on the dust cloud generation. Keep material out of lakes, streams, ponds and sewer drains. Avoid eye contact or prolonged skin contact. Avoid breathing dusts. When dissolving, add to water cautiously and with stirring; solutions can get hot. Use good personal hygiene and housekeeping.
Storage	Store in a cool dry area, away from incompatible products (acids). Prolonged storage may cause product to cake from atmospheric moisture.

SECTION 8: Exposure Controls/ Personal Protection

Engineering Controls	Where possible, provide general mechanical and/or local exhaust ventilation to prevent release of airborne dust into the work environment. Eye wash facility should be provided in storage and general work area.

Personal Protective Equipment:

Eyes and Face	For dusty or misty conditions, or when handling solutions where there is reasonable probability of eye contact, wear chemical safety goggles and hardhat. Under these conditions do not wear contact lenses. Otherwise, appropriate eye and face protection equipment (ANSI Z87 approved) should be selected for the particular use intended for this material. Safety glasses with side shields are recommended.
Respiratory	Whenever dust in the worker's breathing zone cannot be controlled with ventilation or other engineering means, workers should wear respirators or dust masks approved by NIOSH/MSHA, EU CEN or comparable certification organization to protect them against airborne dust.
Hands, Body, and Arms	Wear long-sleeve shirt and trousers, and impervious gloves for routine product use. Cotton gloves are sufficient for dry product; wear impervious (e.g., rubber, neoprene, etc.) gloves when handling solutions. Protective shoes or boots.

Exposure Guidelines:
Federal guidelines treat the ingredient(s) in this product as a nuisance dust, as no product-specific guidelines have been issued for exposure. As with all nuisance dusts, worker breathing zone concentrations should be measured by validated sampling and analytical methods. The following limits (OSHA and MSHA) apply to this material:

Particulates Not Otherwise Regulated:
OSHA (PEL / TWA): 15 mg/m^3 (total dust); 5 mg/m^3 (rasp fraction) MSHA (PEL / TWA): 10 mg/m^3 (total dust)

SECTION 9: Physical and Chemical Properties

Appearance	White, granular solid
Odor	Odorless
Odor Threshold	Not applicable
Formula	Na_2CO_3
Molecular Weight	105.99
pH	11.3
Melting point/freezing point	854°C (1569°F)
Initial boiling point/boiling range	Decomposes
Flash point	None
Evaporation rate	Not Applicable
Flammability (solid, gas)	Not combustible
Flammability in Air	
Upper flammability limit	No information available
Lower flammability limit	No information available
Vapor Pressure	Not applicable
Vapor Density	Not applicable
Bulk Density (g/l)	Dense grades: 0.9 – 1.1 Natural light grade: 0.7 – 0.9 Synthetic light grade: 0.5 – 0.7
Specific Gravity	2.533 (vs. Water)
Water Solubility(ies)	212.5 g/l @ 20°C
Partition coefficient	No information available
Auto-ignition temperature	No information available
Decomposition temperature	400°C
Viscosity	
Viscosity, dynamic	No information available
Viscosity, cinematic	No information available
Percent Volatile	0%

SECTION 10: Stability and Reactivity

Stability	Stable
Conditions to Avoid	Contract with acids will release carbon dioxide, heat. Contract with lime dust in the presence of moisture can produce corrosive sodium hydroxide.
Materials to Avoid	May react with aluminum, acids, fluorine, lithium, and 2,4,6- Trinitrotoluene.
Polymerization	Will not occur.
Hazardous Decomposition	When heated to decomposition, carbon dioxide is released.
Other Precautions	When dissolving, add to water cautiously and with stirring; solutions can get hot.

SECTION 11: Toxicological Information

Eye	Severe irritant (50 mg, rabbit).
Skin	Mild irritant (500 mg/24hr, rabbit). Minor irritation may occur on abraded skin. Not a sensitizer (tested at 0.25% solution).
Oral	LD_{50}, rat: 4,090 mg/kg
Inhalation	LC_{50}, rat, 2hr 2.3 mg/l 24 – hour LC_{50}: 800 mg/m^3, 20 h exposure (guinea pig) (moderate toxicity)
Chronic	Excessive, long term contact may produce “soda ulcers” on hands and perforation of the nasal septum. Sensitivity reactions may occur from prolonged and repeated exposure.
Carcinogenicity	Not designated by IARC, NTP, ACGIH or OSHA as probable or suspected human carcinogens.

SECTION 12: Ecological Information

Acute Ecotoxicity	96 – hour LC_{50}: 265 – 565 mg/l (daphnia magnia) (low toxicity) 300 – 320 mg/l (blue gill sunfish) (low toxicity) 96 – hour TL_m: 1200 mg/l (mosquito-fish) 48 – hour TL_m: 840 mg/l (mosquito-fish) 48 – hour EC_{50}: 265 mg/l (daphnia magnia) 5 Day EC_{50}: 242 mg/l (Nitszcheria linearis)
Chronic Ecotoxicity	7 Day EC, biomass:14 mg/l (phytoplankton)
Mobility	Air: Not Applicable Water: Considerable solubility and mobility. Soil / sediments: Non-significant adsorption
Abiotic Degradation	Water (hydrolysis): degradation's products: carbonate (pH>10) / carbonic acid / carbon dioxide (pH<6). Soil**:** Hydrolysis as a function of pH.
Biotic Degradation	Aerobic / anaerobic: Not applicable (inorganic compound)
Potential for Bioaccumulation	Not applicable (ionizable inorganic compound)

Observed effects are related to alkaline properties of the product. Product is not significantly hazardous for the environment

SECTION 13: Disposal Considerations

Disposal Method	When this product is discarded or disposed of, as purchased, it is neither a characteristic nor a listed hazardous waste according to US Federal RCRA regulations (40 CFR 261). As a non-hazardous waste the material may be disposed of in a landfill in accordance with government regulations; check local or state regulations for applicable requirements prior to disposal. Any processing, usage, alteration, chemical additions to, or contamination of, the product may atler the disposal requirements. Under Federal Regulations, it is the generator's responsibility to determine if a waste is a hazardous waste.

SECTION 14: Transport Information

Proper Shipping Name	Not regulated
Primary Hazard Class/Division	Not regulated
UN/NA Number	Not applicable
Label(s), Placard(s), Marking(s)	Not applicable
Reportable Quantity (RQ)	None
49 STCC Number	Not Applicable
ADR (EU), TDG (Canada)	Not regulated
IMDG (sea), ICAO (air), IATA (air)	Not regulated

SECTION 15: Regulatory Information

SARA Title III (Superfund Amendments and Reauthorization Act)

Section 302 Extremely Hazardous Substances: 40CFR355, Appendix A	Not listed
Section 311 Hazard Class 40CFR370	Immediate (acute)
Section 312 Threshold Planning Quantity (TPQ) 40CFR370	No TPQ listed for sodium carbonate
Section 313 Reportable Ingredients 40CFR372	Not listed

CERCLA (Comprehensive Environmental Response Compensation and Liability Act):
40CFR302.4 – There is no listed RQ (reportable quantity) for this product.

TSCA (Toxic Substance Control Act)
This product is listed on the TSCA Inventory of Chemical Substances. No other TSCA rules affect this product

State Regulations:
This product does not contain any components that are regulated under California Proposition 65.

Other:
Clean Water Act (CWA) – Section 301/ 311: Not listed
Clean Air Act (CAA) – Section 112: Not regulated

CANADA:

WHMIS Classification	D2B Toxic Class E Corrosive Symbol:  This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.
WHMIS Ingredient Disclosure List	Listed
DSL Status (Domestic Substances List)	Listed on DSL

EUROPEAN UNION:

EINECS Inventory	Listed: 207-838-8
Annex I (Substances Directive)	Listed: 011-005-00-2 Xi, R-36 (See label details in Section 16)
German Water Classification	Hazard class 1, low hazard to waters
EU – Food Additives Directive (95/2/EC) – Annex I – Generally Permitted for Use in Food	E500

INTERNATIONAL:

This product is also found in the chemical inventories of Australia, China, Korea, Japan and the Philippines.

SECTION 16: Other Information

HMIS (Hazardous Material Identification System)

Health	2
Flammability	0
Physical Hazard	0
Personal Protection (PPE)	B

Protection = B (Safety glasses and gloves)

4 = Severe, 3 = Serious, 2 = Moderate, 1 = Slight, 0 = Minimal

NFPA (National Fire Protection Association System)

Health	2
Flammability	0
Reactivity	0
Special	None

4 = Extreme, 3 = High, 2 = Moderate, 1 = Slight, 0 = Insignificant

Other Information:

Soda ash is produced in three principal grades: Dense, natural light and synthetic light soda ash. When these products are mixed in water they may be known as liquid soda ash. These grades differ only in physical characteristics such as bulk density and size and shape of particles, which influence flow characteristics and angle of repose. Other physical properties, as well as chemical as chemical properties of solutions, are common to each grade of soda ash.

Certified to ANSI / NSF 60

Concentration not to exceed 100 ppm when used for corrosion control or scale control pH adjustment.

WYO-BEN, INC.

SAFETY DATA SHEET

SECTION 1 — CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: **WYO-VIS® DP**
Chemical Family: Water soluble polymer
Application: Drilling Fluid Additive

Manufacturer/Supplier: Wyo-Ben, Inc.
1345 Discovery Drive
Billings, MT 59102 USA
Telephone: 800.548.7055
Facsimile: 406.656.0748
Emergency Phone Number: CHEMTREC® 800.424.9300

SECTION 2 — HAZARD IDENTIFICATION

Hazard Classification: Not classified according to 29 CFR 1910.120 (d) and does not require a hazard warning label.

Signal Word: None

Hazard Statement: None

Hazard Symbol: None

Precautionary Statements

Prevention: None

Response: None

Storage: None

Disposal: None

Hazards Not Otherwise Classified: Aqueous solutions or powders that become wet cause surfaces to become extremely slippery.

SECTION 3 — COMPOSITION/INFORMATION ON INGREDIENTS

Contains no reportable hazardous substances.

SECTION 4 — FIRST AID MEASURES

Inhalation: If difficulties occur after dust has been inhaled, remove to fresh air. No hazards that require special first aid measures.

Skin: Wash thoroughly with soap and plenty of water. If irritation develops and persists seek medical attention.

Eyes: Rinse immediately with plenty of water for at least 15 minutes with eyelids held open. Seek medical attention if irritation persists.

Ingestion: Rinse mouth with water. Do NOT induce vomiting. No hazards which require special first aid measures.

Most important symptoms and effects, both acute and delayed

None

Indication of any immediate medical attention and special treatment needed

None reasonably foreseeable.

Other information

Aqueous solutions or powders that become wet cause surfaces to become extremely slippery.

SECTION 5 — FIRE FIGHTING MEASURES

Suitable Fire Extinguishing Media:	Water spray, alcohol-resistant foam, dry chemical or carbon-dioxide.
Unsuitable Extinguishing Media:	None
Special Exposure Hazards:	CAUTION! extremely slippery when wet.
Thermal Decomposition Products:	Oxides of carbon and nitrogen; Hydrogen cyanide may be produced in the event of combustion in an oxygen deficit atmosphere.
Special Protective Equipment for Firefighters:	Wear self-contained breathing apparatus (SCBA)
NFPA Rating:	Health 0, Flammability 0, Reactivity 0, PPE Code B

SECTION 6 — ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures:	Wear appropriate PPE (see Sec. 8).
Environmental Precautionary Measures:	Do not allow product to contaminate drains or surface water systems.
Procedure for Cleaning/Absorption:	Clean up promptly by sweeping or vacuum. Keep in suitable appliance or suitable container for disposal. After cleaning, flush away traces with water.
Further information:	CAUTION! extremely slippery when wet.

SECTION 7 — HANDLING AND STORAGE

Handling

General advice:	Handle in accordance with good industrial hygiene and safety practice. Aqueous solutions cause surfaces to become extremely slippery.

Storage

General advice:	Store in unopened original containers in a cool and dry place. Keep container closed when not in use. Incompatible with oxidizing agents

SECTION 8 — EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational exposure limits	None
Exposure controls:	Use local exhaust if dusting occurs. Natural ventilation is adequate in the absence of dust.

Personal protective equipment

Respiratory protection:	No personal protective equipment normally required. Dust safety masks recommended where working dust concentration is more than 10 mg/m^3.
Hand protection:	Chemical resistant protective gloves
Eye/face protection:	Safety glasses with side-shields.
Skin and Body protection:	Work clothes protecting arms, legs and body.

General safety and hygiene measures: Handle in accordance with good industrial hygiene and safety practice.

Environmental exposure controls: Do not allow uncontrolled discharge of product into the environment. Do not allow to enter surface waters,.

SECTION 9 — PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Granular solid
Color:	White
Odor:	odorless
pH:	5-9 (0.5% aqueous solution)
Specific Gravity @ 20 C (Water=1):	No data available
Bulk Density @ 20 C (KG/M^3):	600 - 900
Boiling Point/Range (F/C):	Not applicable
Melting Point/Range (F/C):	<302 / 150
Vapor Pressure @ 20 C (mmHg):	Not applicable
Vapor Density (Air=1):	Not applicable
Percent Volatiles:	Not applicable
Evaporation Rate (Butyl Acetate=1):	Not applicable
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not determined
Decomposition Temperature:	>150C
Partition Coefficient:	-2
Flash Point/Range (F/C):	Not applicable
Autoignition Temperature (F/C):	Not applicable – does not autoignite (based on the chemical structure).
Explosive properties:	Kst = 0 Non-flammable to ignition sources of less than 2.5kJ

SECTION 10 — STABILITY AND REACTIVITY

Reactivity:	None known
Stability Data:	Stable under normal conditions
Hazardous Reactions:	Oxidizing agents may cause exothermic reactions.
Conditions to Avoid:	None known.
Incompatibility (Materials to Avoid):	Oxidizing agents.
Hazardous Decomposition Products:	Thermal decomposition may produce oxides of carbon (COx) and nitrogen (NOx); Hydrogen cyanide may be produced if oxygen is deficient.

SECTION 11 — TOXICOLOGICAL INFORMATION

Acute Oral Toxicity:	LD50/Rat/> 5000 mg/kg
Acute Dermal Toxicity:	LD50/Rat/> 5000 mg/kg
Acute Inhalation Toxicity:	Product is not expected to be toxic by inhalation.
Skin Corrosion / Irritation:	Non-irritating.
Serious Eye Damage / Irritation:	Not irritating
Respiratory / Skin Sensitization:	Not sensitizing.
Mutagenicity:	Not mutagenic
Carcinogenicity:	Not carcinogenic
Reproductive Toxicity:	Not a reproductive toxin.
STOT – single exposure:	No known effects
STOT – repeated exposure:	No known effects
Aspiration Hazard:	No hazards from the material as supplied.

SECTION 12 — ECOLOGICAL INFORMATION

Toxicity

Acute Fish Toxicity:	LC50/ Oncorhynchus mykiss /96 hours > 100 mg/l (OECD 203)
Acute Daphnia Toxicity:	EC50/Daphnia magna (Water Flea)/48 hours > 100 mg/l (OECD 202)
Acute Algae Toxicity:	IC50/Scenedesmus subspicatus/72 hours > 100 mg/L (OECD 201)
Chronic toxicity to fish:	No data available
Chronic toxicity to invertebrates:	No data available
Toxicity to microorganisms:	No data available
Effects on terrestrial organisms:	No known effects
Sediment toxicity:	No data available

Persistence/Degradability

Degradation:	Not readily biodegradable.
Hydrolysis:	Does not hydrolyze.
Photolysis:	No data available.

Bioaccumulative potential

Non-bioaccumulating	
Partition coefficient (log Pow):	-2
Bioconcentration factor (BCF):	~0

Mobility in soil: Not determined.

SECTION 13 — DISPOSAL CONSIDERATIONS

Disposal Method:	Landfill or incinerate in accordance with federal, state and local regulations.
Contaminated Packaging:	Rinse empty containers with water and use the rinse water to prepare additional working solutions. Can be landfilled or incinerated, in compliance with local, state and federal regulations.

SECTION 14 — TRANSPORT INFORMATION

Land Transportation

DOT – Not classified

Canadian TDG – Not classified

Air Transportation

ICAO/IATA – Not classified

Sea Transportation

IMDG – Not classified

SECTION 15 — REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components are either listed on the inventory or are exempt from listing.
EPA SARA Title III Extremely Hazardous Substances	Not applicable, non-hazardous
EPA SARA (311, 312) Hazard Class	Not applicable, Non-hazardous
EPA RCRA Hazardous Waste Classification	Not considered a hazardous waste as defined by 40 CFR 261.
California Proposition 65:	WARNING! This product contains a chemical which is known to the State of California to cause cancer, birth defects or other reproductive harm. Acrylamide.

SECTION 16 — OTHER INFORMATION

Prepared 3/20/2015

Last Revision 8/31/2015

DISCLAIMER

All information presented herein is believed to be accurate; however, it is the user's responsibility to determine in advance of need that the information is current and suitable for their circumstances. No warranty or guarantee, expressed or implied is made by WYO-BEN, INC. as to this information, or as to the safety, toxicity or effect of the use of this product.

SAFETY DATA SHEET

1. Identification

Product identifier	SUPER GEL-X®
Other means of identification	None.
Recommended use	Not available.
Recommended restrictions	Workers (and your customers or users in the case of resale) should be informed of the potential presence of respirable dust and respirable crystalline silica as well as their potential hazards. Appropriate training in the proper use and handling of this material should be provided as required under applicable regulations.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Company name	CETCO, an MTI Company	
Address	2870 Forbs Avenue Hoffman Estates, IL 60192 United States	
Telephone	General Information	800 527-9948
Website	http://www.cetco.com/	
E-mail	safetydata@amcol.com	
Emergency phone number	.	
Americas	1.866.519.4752 (US, Canada, Mexico) 1 760 476 3962 Access Code 333562	

2. Hazard(s) identification

Physical hazards	Not classified.
Health hazards	Not classified.
Environmental hazards	Not classified.
OSHA defined hazards	Not classified.

Label elements

Hazard symbol	None.
Signal word	None.
Hazard statement	Not applicable.
Precautionary statement	
Prevention	Observe good industrial hygiene practices.
Response	Wash hands after handling.
Storage	Store away from incompatible materials.
Disposal	Dispose of waste and residues in accordance with local authority requirements.
Hazard(s) not otherwise classified (HNOC)	None known.
Supplemental information	Not applicable.

3. Composition/information on ingredients

Mixtures

Chemical name	Common name and synonyms	CAS number	%
TRADE SECRET*		Proprietary*	< 0.1
Other components below reportable levels			90 - 100

Constituents

Chemical name	CAS number	%
CALCIUM CARBONATE	471-34-1	
SMECTITE GROUP MINERALS	1318-93-0	

Constituents

Chemical name	CAS number	%
QUARTZ	14808-60-7	<= 8
CRISTOBALITE	14464-46-1	<= 2

*Designates that a specific chemical identity and/or percentage of composition has been withheld as a trade secret. Bentonite is a UVCB substance sub-type 4. The purity of the product is 100 % w/w. Bentonite is composed mainly of smectite group minerals but the composition is varied, as expected for a UVCB substance, and other mineral constituents will be present in small and varying amounts. These minor constituents are not relevant for classification and labelling.

Composition comments	Occupational Exposure Limits for constituents are listed in Section 8. The purity of the product is 100% w/w. Impurities are not applicable for a UVCB substance.

4. First-aid measures

Inhalation	If dust from the material is inhaled, remove the affected person immediately to fresh air. Call a physician if symptoms develop or persist. No specific first aid measures noted.
Skin contact	No specific first aid measures noted. Get medical attention if irritation develops and persists. Wash skin with soap and water.
Eye contact	No specific first aid measures noted.
Ingestion	No specific first aid measures noted. Rinse mouth thoroughly. Get medical attention if any discomfort occurs.
Most important symptoms/effects, acute and delayed	Dust in the eyes will cause irritation.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically.
General information	No hazards which require special first aid measures. Provide general supportive measures and treat symptomatically.

5. Fire-fighting measures

Suitable extinguishing media	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2). Use any media suitable for the surrounding fires.
Unsuitable extinguishing media	Not applicable, non-combustible.
Specific hazards arising from the chemical	None known. The product itself does not burn.
Special protective equipment and precautions for firefighters	Material can be slippery when wet.
Fire fighting equipment/instructions	In the event of fire, cool tanks with water spray. Material can be slippery when wet.
Specific methods	Cool containers exposed to flames with water until well after the fire is out.
General fire hazards	No unusual fire or explosion hazards noted. This material will not burn.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Material can be slippery when wet. Use a NIOSH/MSHA approved respirator if there is a risk of exposure to dust/fume at levels exceeding the exposure limits. Avoid inhalation of dust from the spilled material. For personal protection, see section 8 of the SDS. No special precautions are necessary beyond normal good hygiene practices. See Section 8 for additional personal protection advice when handling this product.
Methods and materials for containment and cleaning up	If sweeping of a contaminated area is necessary use a dust suppressant agent which does not react with the product. Sweep up or vacuum up spillage and collect in suitable container for disposal. Collect dust using a vacuum cleaner equipped with HEPA filter. Minimize dust generation and accumulation. Avoid the generation of dusts during clean-up. Following product recovery, flush area with water. For waste disposal, see section 13 of the SDS. Collect powder using special dust vacuum cleaner with particle filter or carefully sweep into closed container.
Environmental precautions	Prevent further leakage or spillage if safe to do so. No special environmental precautions required.

7. Handling and storage

Precautions for safe handling	Minimize dust generation and accumulation. Provide appropriate exhaust ventilation at places where dust is formed. Avoid breathing dust. Avoid contact with skin and eyes. In case of insufficient ventilation, wear suitable respiratory equipment. Practice good housekeeping.

Conditions for safe storage, including any incompatibilities	No special restrictions on storage with other products. Store in a dry area. Store in original tightly closed container. Keep the container dry. Store in a well-ventilated place. Store away from incompatible materials (see Section 10 of the SDS). Guard against dust accumulation of this material.

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Constituents	Type	Value	Form
INERT OR NUISANCE DUSTS	PEL	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.

US. OSHA Table Z-3 (29 CFR 1910.1000)

Constituents	Type	Value	Form
INERT OR NUISANCE DUSTS	TWA	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.
		50 mppcf	Total dust.
		15 mppcf	Respirable fraction.

US. ACGIH Threshold Limit Values

Components	Type	Value
TRADE SECRET	TWA	2 ppm

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
TRADE SECRET	TWA	6 mg/m3
		2 ppm

Biological limit values: No biological exposure limits noted for the ingredient(s).

Exposure guidelines

US - California OELs: Skin designation

TRADE SECRET (CAS Proprietary): Can be absorbed through the skin.

US - Tennessee OELs: Skin designation

TRADE SECRET (CAS Proprietary): Can be absorbed through the skin.

US ACGIH Threshold Limit Values: Skin designation

TRADE SECRET (CAS Proprietary): Can be absorbed through the skin.

US NIOSH Pocket Guide to Chemical Hazards: Skin designation

TRADE SECRET (CAS Proprietary): Can be absorbed through the skin.

Appropriate engineering controls: Ventilation should be sufficient to effectively remove and prevent buildup of any dusts or fumes that may be generated during handling or thermal processing. If engineering measures are not sufficient to maintain concentrations of dust particulates below the OEL, suitable respiratory protection must be worn.

Individual protection measures, such as personal protective equipment

Eye/face protection: Use tight fitting goggles if dust is generated. Wear dust-resistant safety goggles where there is danger of eye contact.

Skin protection

Hand protection: No protection is ordinarily required under normal conditions of use.

Other: Normal work clothing (long sleeved shirts and long pants) is recommended.

Respiratory protection: Use a NIOSH/MSHA approved respirator if there is a risk of exposure to dust/fume at levels exceeding the exposure limits.

Thermal hazards: Not applicable.

General hygiene considerations: Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Use good industrial hygiene practices in handling this material.

9. Physical and chemical properties

Appearance: Lump, granular or fine powder.

Physical state: Solid.

Form	Powder. Various.
Color	Various.
Odor	None.
Odor threshold	Not applicable.
pH	8.5 - 11
Melting point/freezing point	> 842 °F (> 450 °C) / Not applicable.
Initial boiling point and boiling range	Not applicable.
Flash point	Not applicable.
Evaporation rate	Not available.
Flammability (solid, gas)	This product is not flammable.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not applicable.
Flammability limit - upper (%)	Not applicable.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	Not applicable.
Vapor density	Not applicable.
Relative density	2.6 g/cm³
Solubility(ies)	
Solubility (water)	< 0.9 mg/l
Partition coefficient (n-octanol/water)	Not applicable. Not applicable.
Auto-ignition temperature	Not applicable.
Decomposition temperature	> 932 °F (> 500 °C)
Viscosity	Not applicable.
Viscosity temperature	Not applicable.
Other information	
Bulk density	0.9 - 1.4 g/cm³
Explosive limit	Not applicable.
Explosive properties	Not explosive
Explosivity	Not applicable.
Flame extension	Not applicable.
Flammability	Not applicable.
Flammability (flash back)	Not applicable.
Flammability (Heat of combustion)	Not applicable.
Flammability (Train fire)	Not applicable.
Flammability class	Not applicable.
Flash point class	Not flammable
Molecular formula	UVCB Substance
Molecular weight	Not applicable.
Oxidizing properties	None.
Percent volatile	0 %
pH in aqueous solution	8.5 - 11
Specific gravity	Not applicable.
VOC (Weight %)	CARB 0 %

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Stable at normal conditions.
Possibility of hazardous reactions	Will not occur.
Conditions to avoid	Moisture. Avoid temperatures exceeding the decomposition temperature. Contact with incompatible materials. Avoid dispersal of dust in the air (i.e., clearing dust surfaces with compressed air).
Incompatible materials	None known.
Hazardous decomposition products	None.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Inhalation of dusts may cause respiratory irritation.
Skin contact	Not classified.
Eye contact	Dust in the eyes will cause irritation.
Ingestion	Not classified.
Symptoms related to the physical, chemical and toxicological characteristics	None known.

Information on toxicological effects

Product	Species	Test Results
Bentonite		
Acute		
Inhalation		
Dust		
LC50	Rat	> 5.27 mg/l, 4 hr OECD 436
Oral		
Dust		
LD50	Rat	> 2000 mg/kg OECD 425
Components	**Species**	**Test Results**
TRADE SECRET		
Acute		
Inhalation		
LC50	Rat	10600 mg/l/4h
		1200 mg/l, 4 Hours
Oral		
LD50	Mouse	2400 mg/kg
	Rat	33.5 mg/kg

* Estimates for product may be based on additional component data not shown.

Skin corrosion/irritation	Not classified.
Serious eye damage/eye irritation	Dust in the eyes will cause irritation. Mild irritant to eyes (according to the modified Kay & Calandra criteria)
Respiratory or skin sensitization	
Respiratory sensitization	Not classified.
Skin sensitization	Not classified.
Germ cell mutagenicity	Not classified.

Carcinogenicity	In June 2003, SCOEL (the EU Scientific Committee on Occupational Exposure Limits) concluded that the main effect in humans of the inhalation of respirable crystalline silica dust is silicosis. "There is sufficient information to conclude that the relative risk of lung cancer is increased in persons with silicosis (and, apparently, not in employees without silicosis exposed to silica dust in quarries and in the ceramic industry). Therefore, preventing the onset of silicosis will also reduce the cancer risk..." (SCOEL SUM Doc 94-final, June 2003) According to the current state of the art, worker protection against silicosis can be consistently assured by respecting the existing regulatory occupational exposure limits. Occupational exposure to respirable dust and respirable crystalline silica should be monitored and controlled. No carcinogenicity data available for this product. Sepiolite was evaluated by IARC as class 3 ("Cannot be classified as to carcinogenicity to humans"). Based on read-across with sepiolite, bentonite was assessed as non-carcinogenic. Therefore classification of bentonite for carcinogenicity is not warranted.

IARC Monographs. Overall Evaluation of Carcinogenicity

TRADE SECRET (CAS Proprietary)	3 Not classifiable as to carcinogenicity to humans.

Reproductive toxicity	Not classified.
Specific target organ toxicity - single exposure	Not classified.
Specific target organ toxicity - repeated exposure	Not classified.
Aspiration hazard	Not available.

12. Ecological information

Ecotoxicity — The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Product		Species	Test Results
Bentonite			
Aquatic			
Algae	EC50	Freshwater algae	> 100 mg/l, 72 hours
Crustacea	EC50	Coon stripe shrimp (Pandalus danae)	24.8 mg/l, 96 hours
		Daphnia	> 100 mg/l, 48 hours
		Dungeness or edible crab (Cancer magister)	81.6 mg/l, 96 hours
Fish	LC50	Freshwater fish	16000 mg/l, 96 hours
		Marine water fish	2800 - 3200 mg/l, 24 hours

Components		Species	Test Results
TRADE SECRET			
Aquatic			
Crustacea	EC50	Daphnia	47 mg/L, 48 Hours
Fish	LC50	Fish	222 mg/L, 96 Hours

* Estimates for product may be based on additional component data not shown.

Persistence and degradability	Not relevant for inorganic substances
Bioaccumulative potential	Will not bio-accumulate.

Partition coefficient n-octanol / water (log Kow)

TRADE SECRET	0.35

Mobility in soil	Bentonite is almost insoluble and thus presents a low mobility in most soils.
Mobility in general	The product has poor water-solubility.
Other adverse effects	No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

Disposal instructions	Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose in accordance with all applicable regulations.
Local disposal regulations	Dispose in accordance with all applicable regulations.
Hazardous waste code	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied. Store containers and offer for recycling of material when in accordance with the local regulations.

14. Transport information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not applicable.

15. Regulatory information

US federal regulations

CERCLA Hazardous Substance List (40 CFR 302.4)

TRADE SECRET (CAS Proprietary) Listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories	Immediate Hazard - No Delayed Hazard - No Fire Hazard - No Pressure Hazard - No Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical	No

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

TRADE SECRET (CAS Proprietary)

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA)	Not regulated.
Food and Drug Administration (FDA)	Total food additive Direct food additive GRAS food additive

US state regulations

US - New Jersey RTK - Substances: Listed substance

TRADE SECRET (CAS Proprietary)

US - Pennsylvania RTK - Hazardous Substances: Listed substance

TRADE SECRET (CAS Proprietary)

US. California Controlled Substances. CA Department of Justice (California Health and Safety Code Section 11100)

Not listed.

US. California. Candidate Chemicals List. Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3, subd. (a))

TRADE SECRET (CAS Proprietary)

US. Massachusetts RTK - Substance List

TRADE SECRET (CAS Proprietary)

US. New Jersey Worker and Community Right-to-Know Act

TRADE SECRET (CAS Proprietary)

US. Pennsylvania Worker and Community Right-to-Know Law

TRADE SECRET (CAS Proprietary)

US. Rhode Island RTK

TRADE SECRET (CAS Proprietary)

US. California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date	10-October-2013
Revision date	24-July-2015
Version #	20
Further information	This safety datasheet only contains information relating to safety and does not replace any product information or product specification. UVCB = a substance of Unknown or Variable composition, Complex reaction products or Biological materials SWERF = Size Weighted Respirable Fraction methodology is a scientific method developed to quantify the content of respirable particles within a bulk product. All details about the SWERF method are available at www.crystallinesilica.eu. HMIS® is a registered trade and service mark of the NPCA.
HMIS® ratings	Health: 1 Flammability: 0 Physical hazard: 0
NFPA ratings	Health: 1 Flammability: 0 Instability: 0
List of abbreviations	SWERF = Size-Weighted Relevant Fine Fraction methodology is a scientific method developed to quantify the content of respirable particles within a bulk product. All details about the SWERF method are available at www.crystallinesilica.eu. UVCB = a substance of Unknown or Variable composition, Complex reaction products or Biological materials
References	For any information on literature references or toxicity/ecotoxicity studies, please contact the supplier.

Disclaimer	The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The manufacturer expressly does not make any representations, warranties, or guarantees as to its accuracy, reliability or completeness nor assumes any liability, for its use. It is the user's responsibility to verify the suitability and completeness of such information for each particular use. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text. The information in the sheet was written based on the best knowledge and experience currently available.
Revision Information	This document has undergone significant changes and should be reviewed in its entirety.

United States Steel Corporation

Standard Pipe

Safety Data Sheet (SDS)

USS IHS Number: 73711

(Replaces USS Code Number: 4A018, 4C018, 4H018)

Locations: LTO, FFTO, LSTO

Section 1 – Identification

1(a) Product Identifier Used on Label: Standard Pipe

1(b) Other Means of Identification: Carbon Steel Pipe, Alloy Steel Pipe, HSLA Steel Pipe

1(c) Recommended Use of the Chemical and Restrictions on Use: None

1(d) Name, Address, and Telephone Number:

United States Steel Corporation
600 Grant Street, Room 1662
Pittsburgh, PA 15219-2800

Phone number : (412) 433-6840 (8:00 am to 5:00 pm)
FAX: (412) 433-5019

1(e) Emergency Phone Number: 1-800-262-8200 (CHEMTREC)

Section 2 – Hazard(s) Identification

2(a) Classification of the Chemical: As sold, this product, **Standard Pipe** is not hazardous according to the criteria specified in REACH [REGULATION (EC) No 1907/2006] and CLP [REGULATION (EC) No 1272/2008]. Under 29 CFR 1910.1200 Hazard Communication Standard, steel products are considered mixtures due to further processing which may produce dusts and or fume. The categories of Health Hazards as defined in "GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS (GHS), Third revised edition ST/SG/AC.10/30/Rev. 3" United Nations, New York and Geneva, 2009 have been evaluated. Refer to Section 3, 8 and 11 for additional information. Precautionary Statement/Emergency Overview: This formed solid metal product poses little or no immediate health or fire hazard. When product is subjected to welding, burning, melting, sawing, brazing, grinding or other similar processes, potentially hazardous airborne particulate and fumes may be generated.

2(b) Signal Word, Hazard Statement(s), Symbols and Precautionary Statement(s):

Hazard Symbol	Hazard Classification	Signal Word	Hazard Statement(s)	Precautionary Statement(s)
	Carcinogenicity - 2 Toxic to Reproduction - 2 Single Target Organ Toxicity (STOT) Repeat Exposure -1	**Danger**	Suspected of causing cancer. Suspected of damaging fertility or the unborn child. Causes damage to lungs through prolonged or repeated inhalation exposure. Harmful if swallowed. May cause an allergic skin reaction. May cause respiratory irritation. Causes eye irritation.	Do not breathe dusts / fume / spray. Wear protective gloves / protective clothing / eye protection / face protection. Contaminated work clothing must not be allowed out of the workplace. Use only outdoors or in well ventilated areas. Wash thoroughly after handling. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not eat, drink or smoke when using this product. If inhaled: Remove person to fresh air and keep comfortable for breathing. If exposed, concerned or feel unwell: 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 on skin: Wash with plenty of water. If irritation or rash occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse. Dispose of contents in accordance with federal, state and local regulations.
	Acute Toxicity-Oral 4 Skin Sensitization - 1 STOT Single Exposure - 3			
NA	Eye Irritation - 2B			

2(c) Hazards Not Otherwise Classified: None Known

2(d) Unknown Acute Toxicity Statement (mixture): None Known

Section 3 – Composition/Information on Ingredients

3(a-c) Chemical Name, Common Name (synonyms), CAS Number and Other Identifiers, and Concentration:

Chemical Name	CAS Number	EC Number	% weight
Iron	7439-89-6	231-096-4	>95
Chromium	7440-47-3	231-157-5	≤2.0
Copper	7440-50-8	231-159-6	≤1.0
Manganese	7439-96-5	231-105-1	≤2.5
Molybdenum	7439-98-7	231-107-2	≤1.0
Nickel	7440-02-0	231-111-4	≤1.0
Silicon	7440-21-3	231-130-8	≤1.5

EC- European Community
CAS- Chemical Abstract Service

Section 4 – First-aid Measures

4(a) Description of Necessary Measures: If exposed, concerned or feel unwell: Get medical advice/attention.

- **Inhalation: Standard Pipe** as sold/shipped is not a likely form of exposure. However during further processing (welding, grinding, burning, etc.). If inhaled: Remove person to fresh air and keep comfortable for breathing. If exposed, concerned or feel unwell: Get medical advice/attention.
- **Eye Contact:** This product as sold/shipped is not a likely form of exposure. However during further processing (welding, grinding, burning, etc.). 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, concerned or feel unwell: Get medical advice/attention.
- **Skin Contact:** If on skin: Wash thoroughly after handling. Wash with plenty of water. If irritation or rash occurs: Get medical advice/attention. Take off and wash contaminated clothing before reuse.
- **Ingestion:** This product as sold/shipped is not a likely form of exposure. However during further processing (welding, grinding, burning, etc.). If swallowed: Call a poison center/doctor if you feel unwell. Rinse mouth. If exposed, concerned or feel unwell: Get medical advice/attention.

4(b) Most Important Symptoms/Effects, Acute and Delayed (chronic):

- **Inhalation:** This product as sold/shipped is not likely to present an acute or chronic health effect.
- **Eye:** This product as sold/shipped is not likely to present an acute or chronic health effect.
- **Skin:** This product as sold/shipped is not likely to present an acute or chronic health effect.
- **Ingestion:** This product as sold/shipped is not likely to present an acute or chronic health effect.

4(c) Immediate Medical Attention and Special Treatment: None Known

Section 5 – Fire-fighting Measures

5(a) Suitable (and unsuitable) Extinguishing Media: Not applicable for **Standard Pipe** as sold/shipped. Use extinguishers appropriate for surrounding materials.

5(b) Specific Hazards Arising From the Chemical: Not applicable for this product as sold/shipped. When burned, toxic smoke and vapor may be emitted.

5(c) Special Protective Equipment and Precautions for Fire-fighters: Self-contained NIOSH approved respiratory protection and full protective clothing should be worn when fumes and/or smoke from fire are present. Heat and flames cause emittance of acrid smoke and fumes. Do not release runoff from fire control methods to sewers or waterways. Firefighters should wear full face-piece self-contained breathing apparatus and chemical protective clothing with thermal protection. Direct water stream will scatter and spread flames and, therefore, should not be used.

Section 6 - Accidental Release Measures

6(a) Personal Precautions, Protective Equipment and Emergency Procedures: Not applicable for **Standard Pipe** as sold/shipped. For spills involving finely divided particles, clean-up personnel should be protected against contact with eyes and skin.

6(b) Methods and Materials for Containment and Clean Up: Not applicable for this product as sold/shipped. If material is in a dry state, avoid inhalation of dust. Fine, dry material should be removed by vacuuming or wet sweeping methods to prevent spreading of dust. Avoid using compressed air. Do not release into sewers or waterways. Collect material in appropriate, labeled containers for recovery or disposal in accordance with federal, state, and local regulations. Follow applicable OSHA regulations (29 CFR 1910.120) and all other pertinent state and federal requirements.

Section 7 - Handling and Storage

7(a) Precautions for Safe Handling: Not applicable for **Standard Pipe** as sold/shipped, however further processing (welding, burning, grinding, etc.) with the potential for generating high concentrations of airborne particulates should be evaluated and controlled as necessary. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Practice good housekeeping. Avoid breathing metal fumes and/or dust. Do not eat, drink or smoke when using this product.

7(b) Conditions for Safe Storage, Including any Incompatibilities: Store away from acids and incompatible materials.

Section 8 - Exposure Controls / Personal Protection

8(a) Occupational Exposure Limits (OELs): Standard Pipe as sold/shipped in its physical form does not present an inhalation, ingestion or contact hazard, nor would any of the following exposure data apply. However, operations such as high temperature (burning, welding, sawing, brazing, machining and grinding) may produce fumes and/or particulates. The following exposure limits are offered as reference, for an experience industrial hygienist to review.

Ingredients	8(a) OSHA PEL [1]	ACGIH TLV [2]	NIOSH REL [3]	IDLH [4]
Iron	10 mg/m³ (as iron oxide fume)	5.0 mg/m³ (as iron oxide dust and fume)	5.0 mg/m³ (as iron oxide dust and fume)	2,500 mg Fe/m^3
Chromium	0.5 mg/m³ (as Cr II & III, inorganic compounds) 1.0 mg/m³ (as Cr, metal) 0.005 mg/m³ (as Cr VI, inorganic compounds & certain water insoluble) "AL" 0.0025 mg/m³ (as Cr VI, inorganic compounds & certain water insoluble)	0.5 mg/m³ (as Cr III, inorganic compounds) 0.5 mg/m³ (as Cr, metal) 0.05 mg/m³ (as Cr VI, inorganic compounds) 0.01 mg/m³ (as Cr VI, inorganic compounds & certain water insoluble)	0.5 mg/m³ (as Cr II & III, inorganic compounds) 0.5 mg/m³ (as Cr, metal) 0.001 mg/m³ (as Cr VI, inorganic compounds & certain water insoluble)	250 mg/m³ (as Cr II & metal) 25 mg/m³ (as Cr III) 15 mg/m³ (as Cr VI)
Copper	0.1 mg/m³ (as fume, Cu) 1.0 mg/m³ (as dusts & mists, Cu)	0.1 mg/m³ (as fume) 1.0 mg/m³ (as dusts & mists, Cu)	1.0 mg/m³ (as dusts & mists)	100 mg Cu/m^3
Manganese	"C" 5.0 mg/m³ (as Fume & Mn compounds)	0.2 mg/m³	"C" 5.0 mg/m³ 1.0 mg/m³ (as fume) "STEL" 3.0 mg/m³	500 mg Mn/m^3
Molybdenum	15 mg/m³ (as total dust, PNOR[5]) 5.0 mg/m³ (as respirable fraction, PNOR)	10 mg/m³ (as Mo insoluble compounds, inhalable fraction[6]) 3.0 mg/m³ (as Mo insoluble compounds, respirable fraction[7]) 0.5 mg/m³ (as Mo soluble compounds, respirable fraction)	NE	NE
Nickel	1.0 mg/m³ (as Ni metal & insoluble compounds)	1.5 mg/m³ (as inhalable fraction Ni metal) 0.2 mg/m³ (as inhalable fraction Ni inorganic only insoluble and soluble compounds)	0.015 mg/m³ (as Ni metal & insoluble and soluble compounds)	10 mg/m³ (as Ni)
Silicon	15 mg/m³ (total dust, PNOR) 5.0 mg/m³ (as respirable fraction, PNOR)	10 mg/m³	10 mg/m³ (as total dust) 5.0 mg/m³ (as respirable dust)	NE

NE - None Established

1. OSHA PELs (Permissible Exposure Limits) are 8-hour TWA (Time-Weighted Average) concentrations unless otherwise noted. A ("C") designation denotes a ceiling limit, which should not be exceeded during any part of the working exposure unless otherwise noted. An Action level (AL) is used by OSHA and NIOSH to express a health or physical hazard. They indicate the level of a harmful or toxic substance/activity, which requires medical surveillance, increased industrial hygiene monitoring, or biological monitoring. Action Levels are generally set at one half of the PEL but the actual level may vary from standard to standard. The intent is to identify a level at which the vast majority of randomly sampled exposures will be below the PEL.
2. Threshold Limit Values (TLV) established by the American Conference of Governmental Industrial Hygienists (ACGIH) are 8-hour TWA concentrations unless otherwise noted. ACGIH TLVs are for guideline purposes only and as such are not legal, regulatory limits for compliance purposes. A Short Term Exposure Limit (STEL) is defined as the maximum concentration to which workers can be exposed for a short period of time (15 minutes) for only four times throughout the day with at least one hour between exposures.
3. The National Institute for Occupational Safety and Health Recommended Exposure Limits (NIOSH-REL) Compendium of Policy and Statements. NIOSH, Cincinnati, OH (1992). NIOSH is the federal agency designated to conduct research relative to occupational safety and health. As is the case with ACGIH TLVs, NIOSH RELs are for guideline purposes only and as such are not legal, regulatory limits for compliance purposes.
4. The "Immediately Dangerous to Life or Health air concentration values (IDLHs)" are used by NIOSH as part of the respirator selection criteria and were first developed in the mid-1970's by NIOSH. The Documentation for Immediately Dangerous to Life or Health Concentrations (IDLHs) is a compilation of the rationale and sources of information used by NIOSH during the original determination of 387 IDLHs and their subsequent review and revision in 1994.
5. PNOR (Particulates Not Otherwise Regulated). All inert or nuisance dusts, whether mineral, inorganic, or organic, not listed specifically by substance name are covered by a limit which is the same as the inert or nuisance dust limit of 15 mg/m^3 for total dust and 5 mg/m^3 for the respirable fraction.
6. Inhalable fraction. The concentration of inhalable particulate for the application of this TLV is to be determined from the fraction passing a size-selector with the characteristics defined in the ACGIH 2013 TLVs ® and BEIs® (Biological Exposure Indices) Appendix D, paragraph A.
7. Respirable fraction. The concentration of respirable dust for the application of this limit is to be determined from the fraction passing a size-selector with the characteristics defined in ACGIH 2013 TLVs ® and BEIs ® Appendix D, paragraph C

8(b) Appropriate Engineering Controls: Use controls as appropriate to minimize exposure to metal fumes and dusts during handling operations. Provide general or local exhaust ventilation systems to minimize airborne concentrations. Local exhaust is necessary for use in enclosed or confined spaces. Provide sufficient general/local exhaust ventilation in pattern/volume to control inhalation exposures below current exposure limits.

Section 8 - Exposure Controls / Personal Protection (continued)

8(c) Individual Protection Measures:

- **Respiratory Protection:** Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, use only a NIOSH-approved respirator. Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen. Concentration in air of the various contaminants determines the extent of respiratory protection needed. Half-face, negative-pressure, air-purifying respirator equipped with P100 filter is acceptable for concentrations up to 10 times the exposure limit. Full-face, negative-pressure, air-purifying respirator equipped with P100 filter is acceptable for concentrations up to 50 times the exposure limit. Protection by air-purifying negative-pressure and powered air respirators is limited. Use a positive-pressure-demand, full-face, supplied air respirator or self-contained breathing apparatus (SCBA) for concentrations above 50 times the exposure limit. If exposure is above the IDLH (Immediately Dangerous to Life or Health) for any of the constituents, or there is a possibility of an uncontrolled release or exposure levels are unknown, then use a positive-demand, full-face, supplied air respirator with escape bottle or SCBA.

  Warning! Air-purifying respirators both negative-pressure, and powered-air do not protect workers in oxygen-deficient atmospheres.
- **Eyes**: Wear appropriate eye protection to prevent eye contact. For operations, which result in elevating the temperature of the product to or above its melting point or result in the generation of airborne particulates, use safety glasses to prevent eye contact. Contact lenses should not be worn where industrial exposures to this material are likely. Use safety glasses or goggles as required for welding, burning, sawing, brazing, grinding or machining operations.
- **Skin**: Wear appropriate personal protective clothing to prevent skin contact. Cut resistant gloves and sleeves should be worn when working with steel products. For operations, which result in elevating the temperature of the product to or above its melting point or result in the generation of airborne particulates, use protective clothing, and gloves to prevent skin contact. Protective gloves should be worn as required for welding, burning or handling operations. Contaminated work clothing must not be allowed out of the workplace.
- **Other Protective Equipment**: An eyewash fountain and deluge shower should be readily available in the work area.

Section 9 - Physical and Chemical Properties

9(a) Appearance (physical state, color, etc.): Metallic Gray

9(b) Odor: Odorless

9(c) Odor Threshold: NA

9(d) pH: NA

9(e) Melting Point/Freezing Point: ~ 2750 ºF (~ 1510 °C)

9(f) Initial Boiling Point and Boiling Range: ND

9(g) Flash Point: NA

9(h) Evaporation Rate: NA

9(i) Flammability (solid, gas): Non-flammable, non-combustible

9(j) Upper/lower Flammability or Explosive Limits: NA

9(k) Vapor Pressure: NA

9(l) Vapor Density (Air = 1): NA

9(m) Relative Density: 7.85 g/cc

9(n) Solubility(ies): Insoluble

9(o) Partition Coefficient n-octanol/water: ND

9(p) Auto-ignition Temperature: NA

9(q) Decomposition Temperature: ND

9(r) Viscosity: NA

NA - Not Applicable

ND - Not Determined for product as a whole

Section 10 - Stability and Reactivity

10(a) Reactivity: Not Determined (ND)

10(b) Chemical Stability: Steel products are stable under normal storage and handling conditions.

10(c) Possibility of Hazardous Reaction: None Known

10(d) Conditions to Avoid: Storage with strong acids or calcium hypochlorite.

10(e) Incompatible Materials: Will react with strong acids to form hydrogen. Iron oxide dusts in contact with calcium hypochlorite evolve oxygen and may cause an explosion.

10(f) Hazardous Decomposition Products: Thermal oxidative decomposition of steel products can produce fumes containing oxides of iron and manganese as well as other alloying elements.

Section 11 - Toxicological Information

11(a-e) Information on Toxicological Effects: The following toxicity data has been determined for **Standard Pipe** as a mixture when further processed using the information available for its components applied to the guidance on the preparation of an SDS under the GHS requirements of OSHA and the EU CPL:

Hazard Classification	Hazard Category		Hazard Symbols	Signal Word	Hazard Statement
	EU	OSHA			
Acute Toxicity Hazard (covers Categories 1-5)	NA*	4[a]		**Warning**	Harmful if swallowed.
Eye Damage/ Irritation (covers Categories 1, 2A and 2B)	NA*	2B[c]	No Pictogram	**Warning**	Causes eye irritation.

Section 11 - Toxicological Information (continued)

11(a-e) Information on Toxicological Effects (continued)

Hazard Classification	Hazard Category		Hazard Symbols	Signal Word	Hazard Statement
	EU	OSHA			
Skin/Dermal Sensitization (covers Category 1)	NA*	1[d]		**Warning**	May cause an allergic skin reaction.
Carcinogenicity (covers Categories 1A, 1B and 2)	NA*	2[g]		**Warning**	Suspected of causing cancer.
Toxic to Reproduction (covers Categories 1A, 1B and 2)	NA*	2[h]		**Warning**	Suspected of damaging fertility or the unborn child.
Specific Target Organ Toxicity (STOT) Following Single Exposure (covers Categories 1-3)	NA*	3[i]		**Warning**	May cause respiratory irritation.
STOT following Repeated Exposure (covers Categories 1 and 2)	NA*	1[j]		**Danger**	Causes damage to lungs through prolonged or repeated inhalation exposure.

* Not Applicable

Toxicological data listed below are presented regardless to classification criteria. Individual hazard classification categories where the toxicological information has met or exceeded a classification criteria threshold are listed above.

a. No LC_{50} or LD_{50} has been established for **Standard Pipe**. The following data has been determined for the components:

- **Iron:** Rat LD_{50} =98.6 g/kg (REACH)
  Rat LD_{50} =1060 mg/kg (IUCLID)
  Rat LD_{50} =984 mg/kg (IUCLID)
  Rabbit LD_{50} =890 mg/kg (IUCLID)
  Guinea Pig LD_{50} =20 g/kg (TOXNET)
  Human LD_{LO} =77 g/kg (IUCLID)
- **Copper:** Rat LD_{50} = 481 mg/kg (REACH
  Rat LD_{50} > 2500 mg/kg (REACH)
- **Nickel:** LD_{50} >9000 mg/kg (Oral/Rat); NOAEC >10.2 mg/l(Inhalation/Rat)
- **Silicon:** LD_{50} = 3160 mg/kg (Oral/Rat)
- **Manganese:** Rat LD_{50} > 2000 mg/kg (REACH)
  Rat LD_{50} > 9000 mg/kg (NLM Toxnet)

b. No Skin (Dermal) Irritation data available for **Standard Pipe** as a mixture. The following Skin (Dermal) Irritation information was found for the components:

- **Molybdenum:** May cause skin irritation.

c. No Eye Irritation data available for **Standard Pipe** as a mixture. The following Eye Irritation information was found for the components:

- **Iron and Molybdenum:** Causes eye irritation.
- **Silicon:** Slight eye irritation in rabbit protocol.
- **Nickel:** Slight eye irritation from particulate abrasion only.

d. No Skin (Dermal) Sensitization data available for **Standard Pipe** as a mixture. The following Skin (Dermal) Sensitization information was found for the components:

- **Nickel:** May cause allergic skin sensitization.

e. No Respiratory Sensitization data available for **Standard Pipe** as a mixture or its components.

f. No Germ Cell Mutagenicity data available for **Standard Pipe** as a mixture. The following Mutagenicity and Genotoxicity information was found for the components:

- **Iron:** IUCLID has found some positive and negative findings in vitro.
- **Nickel:** EU RAR has found positive results in vitro and in vivo but insufficient data for classification.

g. Carcinogenicity: IARC, NTP, and OSHA do not list **Standard Pipe** as carcinogens. The following Carcinogenicity information was found for the components:

- **Welding Fumes -** IARC Group 2B carcinogen, a mixture that is possibly carcinogenic to humans.
- **Chromium (as metal and trivalent chromium compounds)** – IARC Group 3 carcinogens, not classifiable as to their human carcinogenicity.
- **Nickel and certain nickel compounds –** Group 2B - metallic nickel Group 1 - nickel compounds ACGIH confirmed human carcinogen. Nickel – EURAR Insufficient evidence to conclude carcinogenic potential in animals or humans; suspect carcinogen classification Category 2 Suspected of causing cancer.

h. No Toxic to Reproduction data available for **Standard Pipe** as a mixture. The following Toxic to Reproductive information was found for the components:

- **Nickel**: Effects on fertility.

i. No Specific Target Organ Toxicity (STOT) following a Single Exposure data available for **Standard Pipe** as a mixture. The following STOT following a Single Exposure data was found for the components:

- **Iron and Molybdenum:** Irritating to respiratory tract.

Section 11 - Toxicological Information (continued)

11(a-e) Information on Toxicological Effects (continued):

j. No Specific Target Organ Toxicity (STOT) following Repeated Exposure data was available for **Standard Pipe** as a whole. The following STOT following Repeated Exposure data was found for the components:

- **Copper:** Target organs affected - Skin, eyes liver, kidneys and respiratory tract
- **Nickel**: Rat 4 wk inhalation LOEL 4 mg/m^3 Lung and Lymph node histopathology. Rat 2 yr inhalation LOEL 0.1 mg/ m^3 Pigment in kidney, effects on hematopoiesis spleen and bone marrow and adrenal tumor. Rat 13 Week Inhalation LOAEC 1.0 mg/m^3 Lung weights, and Alveolar histopathology.
- **Manganese**: Inhalation of metal fumes - Degenerative changes in human Brain; Behavioral: Changes in motor activity and muscle weakness (Whitlock *et al.,* 1966).

The above toxicity information was determined from available scientific sources to illustrate the prevailing posture of the scientific community. The scientific resources includes: The American Conference of Governmental Industrial Hygienist (ACGIH) Documentation of the Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs) with Other Worldwide Occupational Exposure Values 2013, The International Agency for Research on Cancer (IARC), The National Toxicology Program (NTP) updated documentation, the World Health Organization (WHO) and other available resources, the International Uniform Chemical Information Database (IUCLID), European Union Risk Assessment Report (EU-RAR), Concise International Chemical Assessment Documents (CICAD), European Union Scientific Committee for Occupational Exposure Limits (EU-SCOEL), Agency for Toxic Substances and Disease Registry (ATSDR), Hazardous Substance Data Bank (HSDB), and International Programme on Chemical Safety (IPCS).

The following health hazard information is provided regardless to classification criteria and is based on the individual component(s) and potential resultant components from further processing:

Acute Effects by component:

- **Iron and Oxides:** Iron is harmful if swallowed, causes skin irritation, and causes eye irritation. Contact with iron oxide has been reported to cause skin irritation and serious eye damage.
- **Chromium, Oxides and Hexavalent Chrome:** Hexavalent chrome causes damage to gastrointestinal tract, lung, severe skin burns and eye damage, serious eye damage, skin contact may cause an allergic skin reaction. Inhalation may cause allergic or asthmatic symptoms or breathing difficulties.
- **Copper and Oxides:** Copper may cause allergic skin reaction. Copper oxide is harmful if swallowed, causes skin and eye irritation, and may cause an allergic skin reaction.
- **Manganese and Oxides:** Manganese and Manganese oxide are harmful if swallowed.
- **Molybdenum and Oxides:** Molybdenum causes skin and eye irritation. Molybdenum oxide is toxic if swallowed, and causes eye irritation.
- **Nickel and Oxides:** Nickel may cause allergic skin sensitization. Nickel oxide may cause an allergic skin.
- **Silicon and Oxides:** May be harmful if swallowed.

Delayed (chronic) Effects by Component:

- **Iron and Oxides**: Chronic inhalation of excessive concentrations of iron oxide fumes or dusts may result in the development of a benign pneumoconiosis, called siderosis, which is observable as an X-ray change. No physical impairment of lung function has been associated with siderosis. Inhalation of excessive concentrations of ferric oxide may enhance the risk of lung cancer development in workers exposed to pulmonary carcinogens. Iron oxide is listed as a Group 3 (not classifiable) carcinogen by the International Agency for Research on Cancer (IARC).
- **Chromium, Oxides and Hexavalent Chromium:** The health hazards associated with exposure to chromium are dependent upon its oxidation state. The metal form (chromium as it exists in this product) is of very low toxicity. The hexavalent form is very toxic. Repeated or prolonged exposure to hexavalent chromium compounds may cause respiratory irritation, nosebleed, ulceration and perforation of the nasal septum. Industrial exposure to certain forms of hexavalent chromium has been related to an increased incidence of cancer. NTP (The National Toxicology Program) Fourth Annual report on Carcinogens cites "certain Chromium compounds" as human carcinogens. ACGIH has reviewed the toxicity data and concluded that chromium metal is not classifiable as a human carcinogen. Hexavalent chromium may cause genetic defects and is suspected of damaging the unborn child. Developmental toxicity in the mouse, suspected of damaging fertility or the unborn child.
- **Copper and Oxides**: Inhalation of high concentrations of freshly formed oxide fumes and dusts of copper can cause metal fume fever. Chronic inhalation of copper dust has caused, in animals, hemolysis of the red blood cells, deposition of hemofuscin in the liver and pancreas, injury to lung cells and gastrointestinal symptoms.
- **Manganese and Oxides:** Chronic exposure to high concentrations of manganese fumes and dusts may adversely affect the central nervous system with symptoms including languor, sleepiness, weakness, emotional disturbances, spastic gait, mask-like facial expression and paralysis. Animal studies indicate that manganese exposure may increase susceptibility to bacterial and viral infections. Occupational overexposure (Manganese) is a progressive, disabling neurological syndrome that typically begins with relatively mild symptoms and evolves to include altered gait, fine tremor, and sometimes, psychiatric disturbances. May cause damage to lungs with repeated or prolonged exposure. Neurobehavioral alterations in worker populations exposed to MnO including: speed and coordination of motor function are especially impaired.
- **Molybdenum and Oxides:** Certain handling operations, such as burning and welding, may generate both insoluble molybdenum compounds (metal and molybdenum dioxide) and soluble molybdenum compounds (molybdenum trioxide). Molybdenum compounds generally exhibit a low order of toxicity with the trioxide the more toxic. However, some reports indicate that the dust of the molybdenum metal, molybdenum dioxide and molybdenum trioxide may cause eye, skin, nose and throat irritation in animals. Also has been reported to cause induction of tumors in experimental animals, suspected of causing cancer. Molybdenum oxide is suspected of causing cancer in humans.
- **Nickel and Oxides:** Exposure to nickel dusts and fumes can cause sensitization dermatitis, respiratory irritation, asthma, pulmonary fibrosis, edema, and may cause nasal or lung cancer in humans. Causes damage to lungs through prolonged or repeated inhalation exposure. IARC lists nickel and certain nickel compounds as Group 2B carcinogens (sufficient animal data). ACGIH 2013 TLVs® and BEIs® lists insoluble nickel compounds as confirmed human carcinogens. Suspected of damaging the unborn child.
- **Silicon and Oxides:** Silicon dusts are a low health risk by inhalation and should be treated as a nuisance dust. Eye contact with pure material can cause particulate irritation. Skin contact with silicon dusts may cause physical abrasion.

Section 12 - Ecological Information

12(a) Ecotoxicity (aquatic & terrestrial): No Data Available for **Standard Pipe** as sold/shipped. However, individual components of the product when processed have been found to be toxic to the environment. Metal dusts may migrate into soil and groundwater and be ingested by wildlife as follows:

- **Iron Oxide**: LC_{50}: >1000 mg/L; Fish 48 h-EC_{50} > 100 mg/L (Currenta, 2008k); 96 h-$LC_0 \geq$ 50,000 mg/L. Test substance: Bayferrox 130 red (95 – 97% Fe_2O_3; < 4% SiO_2 and Al_2O_3) (Bayer, 1989a).
- **Hexavalent Chrome:** EU RAR listed as category 1, found acute EC_{50} and LD_{50} to algae and invertebrates < 1 mg.
- **Nickel Oxide:** IUCLID found LC_{50} in fish, invertebrates and algae > 100 mg/l.

12(b) Persistence & Degradability: No Data Available

12(c) Bioaccumulative Potential: No Data Available

12(d) Mobility (in soil): No data available for this product as sold/shipped. However, individual components of the product have been found to be absorbed by plants from soil.

12(e) Other Adverse Effects: None Known

Additional Information:

Hazard Category: Not Reported **Signal Word:** No Signal Word

Hazard Symbol: No Symbol

Hazard Statement: No Statement

Section 13 - Disposal Considerations

Disposal: Standard Pipe should be recycled whenever possible. Product dusts and fumes from processing operations should also be recycled, or classified by a competent environmental professional and disposed of in accordance with applicable federal, state or local regulations.

Container Cleaning and Disposal: Follow applicable federal, state and local regulations. Observe safe handling precautions. European Waste Catalogue (EWC): 16-01-17 (ferrous metals), 12-01-99 (wastes not otherwise specified), 16-03 (off specification batches and unused products), or 15-01-04 (metallic packaging).

Please note this information is for Standard Pipe in its original form. Any alterations can void this information.

Section 14 - Transport Information

14 (a-g) Transportation Information:

US Department of Transportation (DOT) under 49 CFR 172.101 **does not** regulate **Standard Pipe** as a hazardous material. All federal, state, and local laws and regulations that apply to the transport of this type of material must be adhered to.

Shipping Name: Not Applicable (NA) **Shipping Symbols:** NA **Hazard Class:** NA **UN No.:** NA **Packing Group:** NA **DOT/ IMO Label:** NA **Special Provisions (172.102):** NA	**Packaging Authorizations** **a) Exceptions:** NA **b) Group:** NA **c) Authorization:** NA	**Quantity Limitations** **a) Passenger, Aircraft, or Railcar:** NA **b) Cargo Aircraft Only:** NA **Vessel Stowage Requirements** **a) Vessel Stowage:** NA **b) Other:** NA **DOT Reportable Quantities**: NA

International Maritime Dangerous Goods (IMDG) and the Regulations Concerning the International Carriage of Dangerous Goods by Rail (RID) classification, packaging and shipping requirements follow the US DOT Hazardous Materials Regulation.

Regulations Concerning the International Carriage of Dangerous Goods by Road (ADR) does not regulate **Standard Pipe** as a hazardous material.

Shipping Name: Not Applicable (NA) **Classification Code:** NA **UN No.:** NA **Packing Group:** NA **ADR Label:** NA **Special Provisions:** NA **Limited Quantities:** NA	**Packaging** **a) Packing Instructions:** NA **b) Special Packing Provisions:** NA **c) Mixed Packing Provisions:** NA	**Portable Tanks & Bulk Containers** **a) Instructions:** NA **b) Special Provisions:** NA

International Air Transport Association (IATA) does not regulate **Standard Pipe** as a hazardous material.

Shipping Name: Not Applicable (NA) **Class/Division:** NA **Hazard Label (s):** NA **UN No.:** NA **Packing Group:** NA **Excepted Quantities (EQ):** NA	**Passenger & Cargo Aircraft** **Limited Quantity (EQ)** **Pkg Inst:** NA **Max Net Qty/Pkg:** NA	**Pkg Inst:** NA **Max Net Qty/Pkg:** NA	**Cargo Aircraft Only:** **Pkg Inst:** NA **Max Net Qty/Pkg:** NA	**Special Provisions:** NA **ERG Code:** NA

Pkg Inst – Packing Instructions Max Net Qty/Pkg – Maximum Net Quantity per Package ERG – Emergency Response Drill Code

Transport Dangerous Goods (TDG) Classification: Standard Pipe does not have a TDG classification.

Section 15 - Regulatory Information

Regulatory Information: *The following listing of regulations relating to a U. S. Steel product may not be complete and should not be solely relied upon for all regulatory compliance responsibilities.* This product and/or its constituents are subject to the following regulations:

SARA Potential Hazard Categories: Immediate Acute Health Hazard; Delayed Chronic Health Hazard.

Section 313 Supplier Notification: The product, **Standard Pipe** contains the following toxic chemicals subject to the reporting requirements of section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372:

CAS #	Chemical Name	Percent by Weight
7440-47-3	Chromium	2.0 max
7440-50-8	Copper	1.0 max
7439-96-5	Manganese	2.5 max
7440-02-0	Nickel	1.0 max

State Regulations: The product, **Standard Pipe** as a whole is not listed in any state regulations. However, individual components of the product are listed in various state regulations:

California Prop. 65: Contains elements known to the State of California to cause cancer or reproductive toxicity. This includes chromium compounds and nickel.

Other Regulations:

WHMIS Classification (Canadian): The product, **Standard Pipe** is not listed as a whole. However individual components are listed.

Ingredients	WHMIS Classification
Copper	D2B, B4
Manganese	B4, D2A
Molybdenum	B4, D2B
Nickel	D2B
Silicon	B4

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.

Section 16 - Other Information

Prepared By: United States Steel Corporation

Revision History: **Expiration Date: 4/01/17**

4/01/2014 - Update to OSHA HAZ COM 2012

12/16/10 – Combined the following three SDS's to create one that covers all three of these products:

Update of content and format to comply with GHS:

IHS Number	Product Name	USS Code	SRP Number
28456	Standard Pipe – Alloy Steel	4A018	
8182	Standard Pipe – Carbon Steel	4C018	
28458	Standard Pipe – HSLA Steel	4H018	

Additional Information:

Hazardous Material Identification System (HMIS) Classification

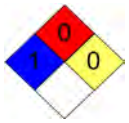
Health Hazard	1
Fire Hazard	0
Physical Hazard	0

HEALTH= **1**, * Denotes possible chronic hazard if airborne dusts or fumes are generated Irritation or minor reversible injury possible.

FIRE= **0**, Materials that will not burn.

PHYSICAL HAZARD= **0**, Materials that are normally stable, even under fire conditions, and will not react with water, polymerize, decompose, condense, or self-react. Non-explosives.

National Fire Protection Association (NFPA)



HEALTH = **1**, Exposure could cause irritation but only minor residual injury even if no treatment is given.

FIRE = **0,** Materials that will not burn.

INSTABILITY = **0**, Normally stable, even under fire exposure conditions, and are not reactive with water.

ABBREVIATIONS/ACRONYMS:

ACGIH	American Conference of Governmental Industrial Hygienists	**NIF**	No Information Found
BEIs	Biological Exposure Indices	**NIOSH**	National Institute for Occupational Safety and Health
CAS	Chemical Abstracts Service	**NTP**	National Toxicology Program
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	**ORC**	Organization Resources Counselors
CFR	Code of Federal Regulations	**OSHA**	Occupational Safety and Health Administration
CNS	Central Nervous System	**PEL**	Permissible Exposure Limit
GI, GIT	Gastro-Intestinal, Gastro-Intestinal Tract	**PNOR**	Particulate Not Otherwise Regulated
HMIS	Hazardous Materials Identification System	**PNOC**	Particulate Not Otherwise Classified

Section 16 - Other Information (continued)

ABBREVIATIONS/ACRONYMS (continued):

IARC	International Agency for Research on Cancer		**PPE**	Personal Protective Equipment
LC50	Median Lethal Concentration		**ppm**	parts per million
LD50	Median Lethal Dose		**RCRA**	Resource Conservation and Recovery Act
LD_{Lo}	Lowest Dose to have killed animals or humans		**RTECS**	Registry of Toxic Effects of Chemical Substances
LEL	Lower Explosive Limit		**SARA**	Superfund Amendment and Reauthorization Act
LOEL	Lowest Observed Effect Level		**SCBA**	Self-contained Breathing Apparatus
LOAEC	Lowest Observable Adverse Effect Concentration		**SDS**	Safety Data Sheet
µg/m^3	microgram per cubic meter of air		**STEL**	Short-term Exposure Limit
mg/m^3	milligram per cubic meter of air		**TLV**	Threshold Limit Value
mppcf	million particles per cubic foot		**TWA**	Time-weighted Average
MSHA	Mine Safety and Health Administration		**UEL**	Upper Explosive Limit
NFPA	National Fire Protection Association			

Disclaimer: This information is taken from sources or based upon data believed to be reliable. However, United States Steel Corporation makes no warranty as to the absolute correctness or sufficiency of any of the foregoing or that additional or other measures may not be required under particular conditions.

APPENDIX E POTENTIAL ECOTOXICITY EVALUATION

Additive	Constituent Percentage in Additive[1]	Pounds of Additive Used on 4/28/2020	Bore Hole Concentration (lbs/gal)	Bore Hole Concentration (mg/L)	Toxicity (mg/L)	Test Organism	Safety Data Sheet Source
Super Gel-X	**195 bags (50 lbs each)**	**9750 lbs**					
Trade Secret	0.10%	9.75E+00	1.46E-03	1.74E+02	4.7E+01 (EC_{50} at 48 hrs)	*Daphnia*	CETCO 2015
Other components - bentonite	90-100%	9.75E+03	1.46E+00	9.00E-01[3]	2.48E+01 (EC_{50} at 48 hrs)	Coon stripe shrimp (*Pandalus danae*)	CETCO 2015
Quartz	8%	7.80E+02	1.16E-01	1.39E+04	-	-	CETCO 2015
Cristobalite	2%	1.95E+02	2.91E-02	3.49E+03	-	-	CETCO 2015
Platinum D-D	**0.5 gal**	**0.06 lbs[2]**					
Water	60-100%	6.00E-02	8.95E-06	1.07E+00	-	-	MiSwACO 2015
Sodium dodecylbenzenesulfonate	1-5%	3.00E-01	4.47E-05	5.36E+00	1.08E+01 (LC_{50} at 96 hrs)	*Oncorhynchus mykiss*	MiSwACO 2015
Tetrapotassium diphosphate	1-5%	3.00E-01	4.47E-05	5.36E+00	1.00E+02 (LC_{50} at 96 hrs)	*Oncorhynchus mykiss*	MiSwACO 2015
Alcohols, C10-16, ethoxylated, sulfates, sodium salts	1-5%	3.00E-01	4.47E-05	5.36E+00	-	-	MiSwACO 2015
Wyo-Vis DP	**4 lbs**						
Water soluble polymer	100%	4.00E+00	5.97E-04	7.15E+01	1.00E+02 (LC_{50} at 96 hrs)	*Oncorhynchus mykiss*	Wyo-Ben, Inc. 2015
Sand Force	**4 lbs**						
Xanthan gum	60-100%	4.00E+00	5.97E-04	7.15E+01	3.20E+02 (LC_{50} at 96 hrs)	*Oncorhynchus mykiss*	Right Turn Supply 2018
Soda Ash	**4 lbs**						
Sodium carbonate	99.80%	3.99E+00	5.96E-04	7.14E+01	2.65E+02 (LC_{50} at 96 hrs)	*Daphnia magna*	Right Turn Supply 2015

Footnotes:

- = No ecotoxicity information was available for this constituent.

[1] = Percentage of the additive constituent used to determine concentration in the bore hole was the highest possible percentage given in the SDS.

[2] = It was assumed that the weight of Platinum D-D is equivelent to water. Therefore, 1 gal was equal to 8.34 lbs.

[3] = Bentonite is described as almost insoluble in water in CETCO 2015. Therefore, the solubility concentration was used as the maximum possible concentration of bentonite in the drilling fluid for this assessment.

Abbreviations:

EC_{50} = Concentration which induces a response halfway between the baseline response and the maximum response.

gal = Gallon

L = Liter

lbs = Pound

LC_{50} = Lethal concentration that kills 50 percent of the test organisms during the observation period.

mg = Milligram