

Material Safety Data Sheet

Material Name: Nickel Scrap

ID: NFE-0108

*** Section 1 - Chemical Product and Company Identification ***

Chemical Name: Mixture

Product Use: Scrap metal usage.

Manufacturer Information

OmniSource Corporation

1610 Nourth Calhoun St.

Ft. Wayne IN 46808

Safety Dept. 800-666-4789

24 hr. Emergency: 800-424-9300

*** Section 2 - Composition / Information on Ingredients ***

| CAS # | Component | Percent |
|-----------|------------|---------|
| 7439-89-6 | Iron | <37 |
| 7440-02-0 | Nickel | >34 |
| 7439-98-7 | Molybdenum | <33 |
| 7440-50-8 | Copper | <33 |
| 7440-47-3 | Chromium | <28 |
| 7440-33-7 | Tungsten | <20 |
| 7440-48-4 | Cobalt | <19 |
| 7440-21-3 | Silicon | <10 |
| 7440-25-7 | Tantalum | <9 |
| 7429-90-5 | Aluminum | <8 |
| 7440-03-1 | Niobium | <6 |
| 7440-32-6 | Titanium | <6 |
| 7440-67-7 | Zirconium | <2 |
| 7440-58-6 | Hafnium | <2 |
| 7439-96-5 | Manganese | <2 |
| 7440-44-0 | Carbon | <1 |
| 7440-62-2 | Vanadium | <1 |

Component Related Regulatory Information

This product may be regulated, have exposure limits or other information identified as the following: Iron oxide (1309-37-1).

Component Information/Information on Non-Hazardous Components

Processing of this article may produce hazardous vapors, fumes, mists and dusts which are considered hazardous under 29 CFR 1910.1200 (Hazard Communication). This data sheet is prepared as a guideline for typical uses of scrap materials. The user should be aware that the composition of the scrap can vary based upon the raw materials, processes used, and protective coatings that may have been applied to the original materials. The list of ingredients above are typical ingredients thought to be present in the scrap material. This list includes contaminants that may or may not be present. The percentages given vary from shipment to shipment and may not be entirely accurate for a given shipment.

Protective coatings, including paints, lubricants, corrosion inhibitors, etc., may have been applied to the material before it came under the control of the recycler. These coatings may contain hazardous materials. Typical hazardous materials contained in these coatings include: lead, zinc, chromium, and cadmium. Some organic materials may also be present. The supplier (recycler) may have no specific knowledge of the particular contaminant. However, it is anticipated that the hazardous materials present in the coatings would generally represent less than 0.1% of the total material present. The health hazards presented by these contaminants would produce their greatest potential for exposure during processes such as melting, cutting, welding. These processes could generate metal fumes that might produce the health hazards identified in section 3 of this MSDS.

It is suggested that the user protect employees by utilizing engineering controls that reduce exposures to acceptable concentrations. Where engineering controls are not feasible, appropriate personal protective equipment should be utilized.

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*** Section 3 - Hazards Identification ***

Emergency Overview

Product is supplied as scrap metal consisting of nickel alloy. This is a non-combustible, non-reactive solid material. Processing of the product for some final uses can include formation of dusts, particulates or fumes which may present certain health hazards. Generation of large quantities of airborne dusts and particulates may produce a fire hazard. Molten metal may react violently with water. Exposure to powder or dusts may be irritating to eyes, nose and throat. Product may cause mechanical abrasions and irritation to the eyes and skin.

Hazard Statements

CAUTION Dusts, particulates or fumes generated from this product may be irritating to the eyes, skin and respiratory system and may cause fever, chills and muscular aches. May contain nickel, cobalt, chromium, and arsenic which may cause allergic skin and/or respiratory sensitization reactions. May contain cobalt and nickel which may cause cancer. Chronic overexposure to dusts, particulates and fumes may result in gastrointestinal damage, lung, liver and kidney damage, anemia, bone softening, anorexia, cardiac abnormalities and neurological damage.

Potential Health Effects: Eyes

Dust or powder may cause irritation and/or inflammation to the eye tissue. Rubbing may cause abrasion of cornea.

Potential Health Effects: Skin

Prolonged contact with this product may cause allergic skin sensitization reactions. Dust or powder may irritate the skin. This product may produce skin abrasions, lesions, or cuts.

Potential Health Effects: Ingestion

Ingestion of this product is unlikely; however if ingested may cause gastrointestinal disturbances, abdominal pain, fever, vomiting, and diarrhea. Ingestion of large amounts of product may produce more serious toxicities including: shock, metabolic acidosis, decreased white blood cell count, neurological damage, cardiovascular shock, anemia, liver damage, renal failure, lethargy and coma.

Potential Health Effects: Inhalation

Product contains components that may cause allergic respiratory sensitization and cancer. Dusts, vapors, and fumes generated during processing may irritate the respiratory system. Overexposure to processing fumes may cause metal fume fever which is an influenza like illness. Symptoms include headache, metallic taste in the mouth, cough, thirst, throat irritation, shortness of breath, fever, sweating and pain in the limbs. Severe acute overexposure or chronic overexposure to dusts or processing fumes may produce more serious toxicities including: siderosis, lung damage, weakness, impairment of sleep and vision, personality changes, blood formation effects, kidney, nervous and circulatory damage.

HMIS Ratings: Health: 1* Fire: 0 Reactivity: 0 Pers. Prot.: safety glasses with side shields, gloves

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe * = Chronic hazard

*** Section 4 - First Aid Measures ***

First Aid: Eyes

In case of contact, flush immediately with water for at least 15 minutes. Do not rub eyes. If irritation persists get medical attention. In case of mechanical abrasions and cuts, seek medical attention immediately.

First Aid: Skin

For skin contact, wash immediately with soap and water. If irritation persists, get medical attention. Cuts or abrasions should be treated promptly with thorough cleansing of the affected area.

First Aid: Ingestion

Due to the physical nature of this material, ingestion is unlikely to occur. If ingestion of a large amount does occur, seek medical attention. Do not induce vomiting unless directed to do so by medical personnel.

First Aid: Inhalation

If inhaled, immediately remove the affected person to fresh air. If the affected person is not breathing, apply artificial respiration. Seek medical attention immediately.

First Aid: Notes to Physician

No additional information available.

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*** Section 5 - Fire Fighting Measures ***

Flash Point: Not applicable

Method Used: Not applicable

Upper Flammable Limit (UFL): Not available

Lower Flammable Limit (LFL): Not available

Auto Ignition: Not applicable

Flammability Classification: Non-flammable

Rate of Burning: Not applicable

General Fire Hazards

Dust accumulation from this product may present an explosion hazard in the presence of an ignition source. Coatings and oils applied to the product may enhance flammability.

Hazardous Combustion Products

This product may release metal oxide fumes by thermal decomposition.

Extinguishing Media

Dry chemical, soda ash, sand. Molten metal may react violently with water.

Fire Fighting Equipment/Instructions

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

NFPA Ratings: Health: 1 Fire: 0 Reactivity: 0

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

*** Section 6 - Accidental Release Measures ***

Containment Procedures

Containment of this material should not be necessary. If dusts or particulates are generated, eliminate sources of ignition.

Clean-Up Procedures

Small pieces of this product may be collected with a broom and shovel. Collect dust or particulates using a vacuum cleaner with a HEPA filter. Put material in suitable, covered, labeled containers.

Evacuation Procedures

Isolate area. Keep unnecessary personnel away.

Special Procedures

None necessary.

*** Section 7 - Handling and Storage ***

Handling Procedures

Do not inhale dusts or vapors produced during thermal processing. Avoid eye and excessive skin contact. Use only with adequate ventilation. As with all chemicals, good industrial hygiene practices should be followed when handling this material. Special care must be taken to avoid buildup of dusts.

Storage Procedures

Keep this material in a cool, well-ventilated place.

*** Section 8 - Exposure Controls / Personal Protection ***

Exposure Guidelines

A: General Product Information

Follow all applicable exposure limits. Keep formation of dusts, particulates and fumes to a minimum.

B: Component Exposure Limits

Iron (7439-89-6)

ACGIH: 5 mg/m³ TWA (dust and fume, as Fe) (related to Iron oxide (Fe₂O₃))

OSHA: 10 mg/m³ TWA (fume) (related to Iron oxide)

NIOSH: 5 mg/m³ TWA (as Fe) (related to Iron oxide dust and fume)

Nickel (7440-02-0)

ACGIH: 1.5 mg/m³ TWA (inhalable fraction)

OSHA: 1 mg/m³ TWA

NIOSH: 0.015 mg/m³ TWA (as Ni)

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Molybdenum (7439-98-7)

ACGIH: 10 mg/m³ TWA (inhalable fraction); 3 mg/m³ TWA (respirable fraction)
OSHA: 10 mg/m³ TWA

Copper (7440-50-8)

ACGIH: 0.2 mg/m³ TWA (fume); 1 mg/m³ TWA (dusts and mists, as Cu)
OSHA: 0.1 mg/m³ TWA (fume, dusts, mists as Cu)
NIOSH: 1 mg/m³ TWA (dusts and mists); 0.1 mg/m³ TWA (fume)

Chromium (7440-47-3)

ACGIH: 0.5 mg/m³ TWA
OSHA: 1 mg/m³ TWA
NIOSH: 0.5 mg/m³ TWA

Tungsten (7440-33-7)

ACGIH: 5 mg/m³ TWA
10 mg/m³ STEL
OSHA: 5 mg/m³ TWA
10 mg/m³ STEL
NIOSH: 5 mg/m³ TWA
10 mg/m³ STEL

Cobalt (7440-48-4)

ACGIH: 0.02 mg/m³ TWA
OSHA: 0.05 mg/m³ TWA (dust and fume)
NIOSH: 0.05 mg/m³ TWA (dust and fume)

Silicon (7440-21-3)

ACGIH: 10 mg/m³ TWA
OSHA: 10 mg/m³ TWA (total dust); 5 mg/m³ TWA (respirable fraction)
NIOSH: 10 mg/m³ TWA (total); 5 mg/m³ TWA (respirable dust)

Tantalum (7440-25-7)

ACGIH: 5 mg/m³ TWA
OSHA: 5 mg/m³ TWA
NIOSH: 5 mg/m³ TWA (metal and oxide dust, as Ta)
10 mg/m³ STEL

Aluminum (7429-90-5)

ACGIH: 10 mg/m³ TWA (metal dust)
OSHA: 15 mg/m³ TWA (total dust); 5 mg/m³ TWA (respirable fraction)
NIOSH: 10 mg/m³ TWA (total); 5 mg/m³ TWA (respirable dust); 5 mg/m³ TWA (pyro powders and welding fumes)

Manganese (7439-96-5)

ACGIH: 0.2 mg/m³ TWA
OSHA: 1 mg/m³ TWA (fume)
5 mg/m³ Ceiling
NIOSH: 1 mg/m³ TWA
3 mg/m³ STEL

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Hafnium (7440-58-6)

ACGIH: 0.5 mg/m3 TWA

OSHA: 0.5 mg/m3 TWA

NIOSH: 0.5 mg/m3 TWA

Zirconium (7440-67-7)

ACGIH: 5 mg/m3 TWA

10 mg/m3 STEL

OSHA: 5 mg/m3 TWA

10 mg/m3 STEL

NIOSH: 5 mg/m3 TWA

10 mg/m3 STEL

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.

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment: Eyes/Face

Wear safety glasses with side shields.

Personal Protective Equipment: Skin

Use impervious gloves.

Personal Protective Equipment: Respiratory

When dusts or thermal processing fumes are generated and ventilation is not sufficient to effectively remove them, appropriate NIOSH approved respiratory protection must be provided.

Personal Protective Equipment: General

Use good industrial hygiene practices in handling this material.

*** Section 9 - Physical & Chemical Properties ***

Appearance: Depends upon scrap composition, most often appears as a silvery-white, hard, malleable and ductile metal.

Odor: Not available

Physical State: Solid

pH: Not applicable

Vapor Pressure: Not applicable

Vapor Density: Not applicable

Boiling Point: 4900 deg F (2700 deg C)

Melting Point: 2650 deg F (1450 deg C)

Solubility (H2O): Insoluble

Specific Gravity: 9

*** Section 10 - Chemical Stability & Reactivity Information ***

Chemical Stability

Stable under normal conditions.

Chemical Stability: Conditions to Avoid

Molten metal may react violently with water. Fine particles, dust or fumes may be flammable or explosive.

Incompatibility

Nickel, iron and copper may react with ammonium nitrate, fluorine, hydrazine, hydrazoic acid, hydrogen, dioxane, performic acid, phosphorus, selenium, sulfur, titanium, potassium perchlorate, chlorine, chlorine trifluoride, fluorine, hydrogen peroxide, nitrogen dioxide, acetylene, ammonium nitrate, barium bromate, barium chlorate, barium iodate, bromates, calcium bromate, phosphorus, potassium bromate, potassium chlorate, potassium iodate, potassium peroxide, sodium azide, sodium bromate, sodium chlorate, sodium iodate, sodium peroxide, zinc bromate, zinc chlorate and zinc iodate.

Hazardous Decomposition

Decomposition of this product may yield metallic oxides.

Hazardous Polymerization

Will not occur.

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*** Section 11 - Toxicological Information ***

Acute and Chronic Toxicity

A: General Product Information

No information available for the product. Operations which supply sufficient energy to the product (i.e. welding, high speed grinding or melting) can release dust or fumes which may make components of the product biologically available. Exposure to dusts or fumes from some metals including iron, manganese, chromium, cobalt and copper can produce a condition known as metal fume fever, a flu-like illness generally lasting 24 hours or less including symptoms of nausea, vomiting, chest tightness, muscle aches and weakness. Systemic effects from ingestion of nickel include capillary damage, kidney damage, myocardial weakness and central nervous system depression. Allergic skin sensitization reactions are the most frequent effect of exposure to nickel compounds. Contact with nickel compounds may also result in allergic lung sensitization reactions. Iron dust can irritate the eyes and respiratory tract by mechanical action. Acute iron poisoning may involve hemorrhagic vomiting and diarrhea, abdominal pain, acidosis, coagulaopathy, shock, coma and convulsions followed by hepatic and renal failure and perhaps cardiovascular collapse. Chronic inhalation of iron has resulted in mottling of the lungs, a condition referred to as siderosis. This is considered benign pneumoconiosis and does not ordinarily cause significant physiologic impairment. Early signs of manganese poisoning are sluggishness, loss of appetite, sleepiness, weakness in the legs, uncontrollable laughter, hallucinations, delusions, spastic or slow gait, speech impairment, aggressiveness, tremor, mask-like faces, and clumsy movements. Overexposure to manganese may result in CNS effects, anemia and lung damage. Aluminum soluble compounds, when ingested or inhaled, may have neurotoxic effects evidently due to the metal binding to nervous tissue. Exposure to molybdenum compounds may produce abnormal liver function, anemia, hypothyroidism and has been associated with gout. In animals, diarrhea, anorexia and fatty degeneration of the liver have been observed. Chronic overexposure to aluminum can result in lung damage and has been associated with asthma-like syndrome. Accumulation of aluminum in the body may result in neurological damage, anemia and bone softening. Repeated overexposure to high levels of aluminum oxide may lead to pulmonary fibrosis, a progressive lung disorder. Chronic exposure to copper fume or dust can cause respiratory tract irritation, hemolytic anemia and allergic contact dermatitis. Effects of overexposure to cobalt include lung effects (irritation, fibrosis, asthma, pneumoconiosis), goiter and cardiovascular effects (cardiomyopathy), and allergic skin and lung sensitization reactions. Overexposure may produce allergic sensitization reactions as well as irritation to the eyes and respiratory tract. Dusts and fumes from this product may cause cancer, reproductive and/or birth defects.

B: Component Analysis - LD50/LC50

Iron (7439-89-6)

Oral LD50 Rat: 30 gm/kg

Cobalt (7440-48-4)

Oral LD50 Rat: 6171 mg/kg

Silicon (7440-21-3)

Oral LD50 Rat: 3160 mg/kg

Manganese (7439-96-5)

Oral LD50 Rat: 9 gm/kg

Carcinogenicity

A: General Product Information

No information available for the product. A significant excess of lung cancer mortality was seen in a study of hard metal workers with at least one year of cobalt exposure. The carcinogenic effect of nickel has been well documented in occupationally exposed nickel refinery workers. Lung and nasal cancers were the predominant forms of cancer in the exposed workers.

B: Component Carcinogenicity

Iron (7439-89-6)

ACGIH: A4 - Not Classifiable as a Human Carcinogen (dust and fume, as Fe) (related to Iron oxide (Fe₂O₃))

IARC: Supplement 7, 1987; Monograph 1, 1972 (related to Ferric oxide) (Group 3 (Not classifiable))

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Nickel (7440-02-0)

ACGIH: A5 - Not Suspected as a Human Carcinogen
NIOSH: occupational carcinogen
NTP: Suspect Carcinogen; (under Nickel and Certain Nickel Compounds) (Possible Select Carcinogen)
IARC: Monograph 49, 1990 (Group 2B (Possibly carcinogenic to humans))

Chromium (7440-47-3)

ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: Monograph 49, 1990 (Group 3 (Not classifiable))

Cobalt (7440-48-4)

ACGIH: A3 - Animal Carcinogen
IARC: Monograph 52, 1991; (Evaluated as a group) (Group 2B (Possibly carcinogenic to humans))

Zirconium (7440-67-7)

ACGIH: A4 - Not Classifiable as a Human Carcinogen

Epidemiology

No information available for the product.

Neurotoxicity

No information available for the product. Chronic overexposure to manganese compounds may result in CNS effects such as weakness, sleepiness, emotional instability and spastic gait. These effects can be permanent. Inhalation of fine aluminum particles has produced progressive encephalopathy, followed by dementia and convulsions.

Mutagenicity

No information available for the product. Aluminum and cobalt have been shown to increase the number of sister chromatid exchanges. Nickel inhibited DNA repair and induced transformation in experimental assays.

Teratogenicity

No information available for the product. Manganese and aluminum have been shown to have teratogenic effects. Manganese, copper and nickel have been reported to have adverse reproductive effects in experimental animals. Copper and nickel have been shown to be fetotoxic in experimental animals. A study of tungsten given orally caused birth defects and fetal death in rats.

Other Toxicological Information

Under normal conditions of handling, the likelihood of inhaling or ingesting amounts necessary for these effects to occur is very small.

* * * Section 12 - Ecological Information * * *

Ecotoxicity

A: General Product Information

No information available for the product.

B: Component Analysis - Ecotoxicity - Aquatic Toxicity

Nickel (7440-02-0)

Test & Species

| | |
|---|-----------|
| 96 Hr LC50 rainbow trout (adults) | 31.7 mg/L |
| 96 Hr LC50 fathead minnow | 3.1 mg/L |
| 72 Hr EC50 freshwater algae (4 species) | 0.1 mg/L |
| 96 Hr LC50 water flea | 510 ug/L |

Copper (7440-50-8)

Test & Species

| | |
|---|-----------|
| 96 Hr LC50 fathead minnow | 23 ug/L |
| 96 Hr LC50 rainbow trout | 13.8 ug/L |
| 96 Hr LC50 bluegill | 236 ug/L |
| 72 Hr EC50 freshwater algae (Scenedesmus subspicatus) | 120 ug/L |

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96 Hr LC50 water flea

10 ug/L

96 Hr LC50 water flea

200 ug/L

Environmental Fate

No information available for the product.

*** Section 13 - Disposal Considerations ***

US EPA Waste Number & Descriptions

A: General Product Information

This product contains a component or components identified as hazardous under 40 CFR 261.24.

B: Component Waste Numbers

Chromium (7440-47-3)

RCRA: waste number D007; regulatory level = 5.0 mg/L

Disposal Instructions

Byproducts and residues from this product may be reprocessed or recycled. Upon disposal, collected dusts and other similar wastes could contain a constituent identified as a hazardous waste. Wastes must be tested using methods described in 40 CFR Part 261 to determine if it meets applicable definitions of hazardous wastes.

*** Section 14 - Transportation Information ***

US DOT Information

Shipping Name: Certain forms of this material (i.e. powders, borings, shavings, turnings, cuttings, dross, etc.) may be subject to U.S. DOT hazardous material shipping requirements. If products are shipped in quantities which exceed the reportable quantity (RQ) for individual components, they may also meet the requirements as DOT hazardous materials.

Hazard Class: Not available.

UN/NA #: Not available.

Packing Group: Not available.

Required Label(s): Not available.

Additional Info.: Not available.

*** Section 15 - Regulatory Information ***

US Federal Regulations

A: General Product Information

Processing of this article may produce hazardous vapors, fumes, mists and dusts which are considered hazardous under 29 CFR 1910.1200 (Hazard Communication). The following component analysis applies only to those facilities that are required to report under applicable regulations.

B: Component Analysis

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

Nickel (7440-02-0)

SARA 313: form R reporting required for 0.1% de minimis concentration

CERCLA: 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 equal to or exceeds 0.004 inches); 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 equal to or exceeds 0.004 inches)

Copper (7440-50-8)

SARA 313: form R reporting required for 1.0% de minimis concentration

CERCLA: 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 equal to or exceeds 0.004 inches); 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 equal to or exceeds 0.004 inches)

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Chromium (7440-47-3)

SARA 313: form R reporting required for 1.0% de minimis concentration

CERCLA: 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 equal to or exceeds 0.004 inches); 2270 kg final RQ (no reporting of releases of this hazardous material is required if the diameter of the pieces of the solid metal released is equal to or exceeds 0.004 inches)

Cobalt (7440-48-4)

SARA 313: form R reporting required for 0.1% de minimis concentration

Aluminum (7429-90-5)

SARA 313: form R reporting required for 1.0% de minimis concentration (fume or dust only)

Manganese (7439-96-5)

SARA 313: form R reporting required for 1.0% de minimis concentration

Vanadium (7440-62-2)

SARA 313: form R reporting required for 1.0% de minimis concentration (except when contained in an alloy)

C: Component Marine Pollutants

This material contains one or more of the following chemicals required by US DOT to be identified as marine pollutants.

| Component | CAS # | |
|-----------|-----------|---------------------------------------|
| Copper | 7440-50-8 | DOT regulated severe marine pollutant |

State Regulations

A: General Product Information

Other state regulations may apply. Check individual state requirements.

B: Component Analysis - State

The following components appear on one or more of the following state hazardous substances lists:

| Component | CAS # | CA | FL | MA | MN | NJ | PA |
|---|-----------|-----|------------------|------------------|------------------|------------------|------------------|
| Iron (related to Iron oxide fume) (related to Iron oxide (Fe2O3)) | 7439-89-6 | Yes | Yes ¹ | Yes ¹ | Yes ¹ | Yes ¹ | Yes ² |
| Nickel | 7440-02-0 | Yes | Yes | Yes | Yes | Yes | Yes |
| Molybdenum | 7439-98-7 | Yes | Yes | Yes | Yes | Yes | Yes |
| Copper | 7440-50-8 | Yes | Yes | Yes | Yes | Yes | Yes |
| Chromium | 7440-47-3 | Yes | Yes | Yes | Yes | Yes | Yes |
| Tungsten | 7440-33-7 | Yes | Yes | Yes | Yes | Yes | Yes |
| Cobalt | 7440-48-4 | Yes | Yes | Yes | Yes | Yes | Yes |
| Silicon | 7440-21-3 | No | No | Yes | Yes | Yes | Yes |
| Tantalum | 7440-25-7 | Yes | Yes | Yes | Yes | Yes | Yes |
| Aluminum | 7429-90-5 | Yes | Yes | Yes | Yes | Yes | Yes |
| Titanium | 7440-32-6 | Yes | No | No | No | Yes | No |
| Manganese | 7439-96-5 | Yes | Yes | Yes | Yes | Yes | Yes |
| Hafnium | 7440-58-6 | Yes | Yes | Yes | Yes | Yes | Yes |
| Zirconium | 7440-67-7 | Yes | Yes | Yes | Yes | Yes | Yes |
| Vanadium | 7440-62-2 | Yes | No | Yes | No | Yes | Yes |

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):

WARNING! This product contains a chemical known to the state of California to cause cancer.

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Other Regulations

A: General Product Information

All components are on the U.S. EPA TSCA Inventory List.

B: Component Analysis - Inventory

| Component | CAS # | TSCA | DSL | EINECS |
|------------|-----------|------|-----|--------|
| Iron | 7439-89-6 | Yes | Yes | Yes |
| Nickel | 7440-02-0 | Yes | Yes | Yes |
| Molybdenum | 7439-98-7 | Yes | Yes | Yes |
| Copper | 7440-50-8 | Yes | Yes | Yes |
| Chromium | 7440-47-3 | Yes | Yes | Yes |
| Tungsten | 7440-33-7 | Yes | Yes | Yes |
| Cobalt | 7440-48-4 | Yes | Yes | Yes |
| Silicon | 7440-21-3 | Yes | Yes | Yes |
| Tantalum | 7440-25-7 | Yes | Yes | Yes |
| Aluminum | 7429-90-5 | Yes | Yes | Yes |
| Niobium | 7440-03-1 | Yes | Yes | Yes |
| Titanium | 7440-32-6 | Yes | Yes | Yes |
| Manganese | 7439-96-5 | Yes | Yes | Yes |
| Hafnium | 7440-58-6 | Yes | Yes | Yes |
| Zirconium | 7440-67-7 | Yes | Yes | Yes |
| Vanadium | 7440-62-2 | Yes | Yes | Yes |
| Carbon | 7440-44-0 | Yes | Yes | Yes |

C: Component Analysis - WHMIS IDL

The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List:

| Component | CAS # | Minimum Concentration |
|------------|-----------|--|
| Iron | 7439-89-6 | 1%; English Item 762; French Item 1327 (related to Ferric oxide) |
| Nickel | 7440-02-0 | 0.1%; English Item 1126; French Item 1193 |
| Molybdenum | 7439-98-7 | 1%; English Item 1092; French Item 1167 |
| Copper | 7440-50-8 | 1%; English Item 433; French Item 578 |
| Chromium | 7440-47-3 | 0.1%; English Item 399; French Item 561 |
| Tungsten | 7440-33-7 | 1%; English Item 1664; French Item 1703 |
| Cobalt | 7440-48-4 | 0.1%; English Item 417; French Item 566 |
| Tantalum | 7440-25-7 | 1%; English Item 1491; French Item 1554 |
| Aluminum | 7429-90-5 | 1%; English Item 47; French Item 197 |
| Manganese | 7439-96-5 | 1%; English Item 974; French Item 1077 |
| Hafnium | 7440-58-6 | 1%; English Item 805; French Item 938 |
| Zirconium | 7440-67-7 | 1%; English Item 1733; French Item 1736 |

* * * Section 16 - Other Information * * *

Other Information

Reasonable care has been taken in the preparation of this information, but the manufacturer makes no warranty of merchantability or any other warranty, expressed or implied, with respect to this information. The manufacturer makes no representations and assumes no liability for any direct, incidental or consequential damages resulting from its use.

MSDS History:

New MSDS: 7/8/1998

Revision 2/Regulatory Update: 7/19/2002

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Key/Legend

EPA = Environmental Protection Agency; TSCA = Toxic Substance Control Act; ACGIH = American Conference of Governmental Industrial Hygienists; IARC = International Agency for Research on Cancer; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; TLV = Threshold Limit Value; NFPA = National Fire Protection Association; HMIS = High Efficiency Particulate Air; CERCLA = Comprehensive Environmental Response, Compensation and Liability Act; SARA = Superfund Amendments and Reauthorization Act.

This is the end of MSDS # NFE-0108