# Material Safety Data Sheet

**IPSCO Code Number: IPS-001**
**Original Issue Date: 02/07/01 Revised: 04/26/04**

## Section 1 - Chemical Product and Company Identification

**Product/Chemical Name: Steel Sheet, Plate, Slab and Coil**
**Manufacturer:** IPSCO, 650 Warrenville Road, Lisle, Illinois 60532
**General Information:** (630) 810-4737 (8:00 am to 5:00 pm)
**Off-Hour Emergency Phone Number:** (563) 381-5311

## Section 2 - Composition / Information on Ingredients

| Ingredient Name | CAS Number | Percentage by wt. | OSHA PEL [1] | ACGIH TLV [2] |
|---|---|---|---|---|
| Iron | 7439-89-6 | 99.8 max | 10 mg/m³ - as Iron oxide fume | 5 mg/m³ - Iron oxide dust and fume, as Fe |
| Chromium | 7440-47-3 | 3.0 | "C" 0.1 mg/m³ - as Chromic Acid & chromates (Cr VI)<br>0.5 mg/m³ - Chromium II & III compounds<br>1.0 mg/m³ - Chromium metal | 0.5 mg/m³ - Metal & Cr III compounds<br>0.05 mg/m³ - Water Soluble Cr VI compounds<br>0.01 mg/m³ - Insoluble Cr VI compounds |
| Carbon | 7440-44-0 | 1.0 | 15 mg/m³ - Total dust (PNOR) [3]<br>5.0 mg/m³ - Respirable fraction (PNOR) [3] | 10 mg/m³ - Inhalable fraction (PNOS) [4]<br>3 mg/m³ - Respirable fraction (PNOS) [4] |
| Copper | 7440-50-8 | 1.0 | 0.1 mg/m³ - Fume (as Cu)<br>1.0 mg/m³ - Dusts & mists (as Cu) | 0.2 mg/m³ - fume<br>1.0 mg/m³ - dust & mist as Cu |
| Manganese | 7439-96-5 | 2.2 | "C" 5.0 mg/m³ - Fume & Mn compounds | 0.3 mg/m³ - as Mn |
| Silicon | 7440-21-3 | 1.0 | 15 mg/m³ - Total dust (PNOR) [3]<br>5 mg/m³ - Respirable fraction (PNOR) [3] | 10 mg/m³ |
| Molybdenum | 7439-98-7 | 1.0 | 5.0 mg.m³ - Soluble compounds<br>15 mg.m³ - Insoluble compounds (total dust, PNOR) | 5 mg/m³ - Soluble compounds Respirable fraction<br>10 mg/m³ - Metal & Insoluble compounds inhalable fraction<br>3 mg/m³ - Metal & Insoluble compounds respirable fraction |
| Nickel | 7440-02-0 | 2.0 | 1.0 mg/m³ - Metal, soluble & insoluble compounds (as Ni) | 1.5 mg/m³ - Elemental (as Ni) inhalable fraction<br>0.1 mg/m³ - Soluble inorganic compounds inhalable fraction (NOS) [5]<br>0.2 mg/m³ - Insoluble inorganic compounds inhalable fraction (NOS) [5] |

**Notes:**

- All commercial steel products contain small amounts of various elements in addition to those specified. These small quantities frequently referred to as "trace" or "residual" elements, generally originate in the raw materials used. Individual trace elements vary in concentration by weight, and may include aluminum, titanium, vanadium, niobium, tin, sulfur, boron, and phosphorus.
- Element weight percents shown represent maximum concentrations possible over all product ranges. These do not represent actual steel specification limits for any IPSCO steel grade produced.

[1] OSHA Permissible Exposure Limits (PELs) 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. A Short Term Exposure Limit (STEL) is defined as a 15-minute exposure, which should not be exceeded at any time during a workday.

[2] Threshold Limit Values (TLV) established by the American Conference of Governmental Industrial Hygienists (ACGIH) are 8-hour TWA concentrations unless otherwise noted

[3] PNOR (Particulates Not Otherwise Regulated). All inert or nuisance dusts, whether mineral, inorganic, or organic, not listed specifically by substance name are covered by the PNOR limit which is the same as the inert or nuisance dust limit of 15 mg/m³ for total dust and 5.0 mg/m³ for the respirable fraction.

[4] PNOS (Particulates Not Otherwise Specified). Particulates identified under the PNOS heading are "nuisance dusts" containing no asbestos and <1% crystalline silica. A TWA-TLV of 10 mg/m³ for inhalable particulate and 3 mg/m³ for respirable particulate has been recommended. 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 TLVs and BEIs Appendix D, paragraph A. 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 the ACGIH TLVs and BEIs Appendix D, paragraph C.

[5] NOS (Not Otherwise Specified)

## Section 3 - Hazards Identification

### ☆☆☆☆☆ 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. These operations should be performed in well-ventilated areas. Avoid inhalation of metal dusts and fumes. Iron or steel foreign bodies imbedded in the cornea of the eye will produce rust stains unless removed fairly promptly. If appropriate, respiratory protection and other personal protective equipment should be used.

**Primary Entry Routes:** Inhalation and/ or skin, if coated. Steel products in the natural state do not present an inhalation, ingestion or contact hazard. However, operations such as burning, welding, sawing, brazing, machining and grinding may result in the following effects if exposures exceed recommended limits as listed in Section 2.

**Target Organs:** Respiratory system.

**Acute Effects:**

- **Inhalation:** Excessive exposure to high concentrations of dust may cause irritation to the eyes, skin and mucous membranes of the upper respiratory tract. Excessive inhalation of fumes of freshly formed metal oxide particles sized below 1.5 microns and usually between 0.02-0.05 microns from many metals can produce an acute reaction known as "metal fume fever". Symptoms consist of chills and fever (very similar to and easily confused with flu symptoms), metallic taste in the mouth, dryness and irritation of the throat followed by weakness and muscle pain. The symptoms come on in a few hours after excessive exposures and usually last from 12 to 48 hours. Long-term effects from metal fume fever have not been noted. Freshly formed oxide fumes of manganese and copper have been associated with causing metal fume fever. Inhalation of chromium compounds may cause upper respiratory tract irritation. Sulfur compounds, present in generated fumes, may irritate the gastrointestinal tract. Boron oxide, molybdenum, nickel, phosphorus oxide and vanadium compounds, especially vanadium pentoxide, are respiratory tract irritants.

- **Eye:** Excessive exposure to high concentrations of dust may cause irritation to the eyes. Particles of iron or iron compounds, which become imbedded in the eye, may cause rust stains unless removed fairly promptly. Torching or burning operations on steel products with surface treatments, oil coatings, or acrylic films may produce emissions that can be irritating to the eyes. Sulfur compounds, present in generated fumes, may irritate the eyes. Vanadium compounds, especially vanadium pentoxide, are eye irritants.
- Torching or burning operations on steel products with surface treatments, oil coatings, or acrylic films may produce emissions that can be irritating to the eyes. Sulfur compounds, present in generated fumes, may irritate the eyes. Molybdenum and vanadium compounds, especially vanadium pentoxide, are eye irritants.

- **Skin:** Skin contact with dusts may cause irritation or sensitization, possibly leading to dermatitis. Repeated or prolonged contact with chemical surface treatments or oil residue may cause skin irritation, dermatitis, ulceration or allergic reactions in sensitized individuals.
- Skin contact with metallic fumes and dusts may cause physical abrasion. Sulfur compounds, present in generated fumes, may irritate the skin. Molybdenum and vanadium compounds, especially vanadium pentoxide, are skin irritants. Exposure to nickel may cause contact and atopic dermatitis and allergic sensitization. Repeated or prolonged contact with chemical surface treatments or oil residue may cause skin irritation, dermatitis, ulceration or allergic reactions in sensitized individuals.

- **Ingestion:** Ingestion of harmful amounts of this product as distributed is unlikely due to its solid insoluble form. Ingestion of dust may cause nausea and/or vomiting.

**Chronic Effects:** Chronic inhalation of metallic fumes and dusts are associated with the following conditions:

- **MANGANESE**: 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.
- **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. The National Toxicology Program (NTP) 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.

- **COPPER**: 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.
- **MOLYBDENUM**: 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.
- **IRON OXIDE**: 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 IARC.
- **NICKEL**: 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. IARC lists nickel and certain nickel compounds as Group 2B carcinogens (sufficient animal data). ACGIH 2001 TLVs® and BEIs® lists insoluble nickel compounds as confirmed human carcinogens.
- **CARBON**: Chronic inhalation of high concentrations to carbon may cause pulmonary disorders.
- **SILICON**: 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.

Long-term inhalation exposure to high concentrations (over-exposure) to pneumoconiotic agents may act synergistically with inhalation of oxides, fumes or dusts of this product to cause toxic effects.

**Carcinogenicity:** IARC, NTP, and OSHA do not list steel products as carcinogens. However, some nickel and chromium compounds are listed as nasal and lung carcinogens by IARC and ACGIH. The International Agency for Research on Cancer (IARC) identifies welding fumes as Group 2B carcinogens, which are possibly carcinogenic to humans.

**Medical Conditions Aggravated by Long-Term Exposure:** Individuals with chronic respiratory disorders (i.e., asthma, chronic bronchitis, emphysema, etc.) may be adversely affected by any fume or airborne particulate matter exposure.

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

## Section 4 - First Aid Measures

**Inhalation:** For over-exposure to airborne fumes and particulate, remove exposed person to fresh air. If breathing is difficult or has stopped, administer artificial respiration or oxygen as indicated. Seek medical attention promptly. Metal fume fever may be treated by bed rest, and administering a pain and fever reducing medication.

**Eye Contact:** Flush with large amounts of clean water to remove particles. Seek medical attention if irritation persists.

**Skin Contact:** Remove contaminated clothing. Wash affected areas with soap or mild detergent and water. If thermal burn has occurred, flush area with cold water and seek medical attention. If a persistent rash or irritation occurs, seek medical attention.

**Ingestion:** Not a probable route of industrial exposure. However, if ingested, seek medical attention immediately.

## Section 5 - Fire-Fighting Measures

**Flash Point:** NA

**LEL:** NA

**Flash Point Method:** NA

**UEL:** NA

**Burning Rate:** NA

**Auto-ignition Temperature:** NA

**Flammability Classification:** Non-flammable

**Extinguishing Media:** Not applicable for solid product. Use extinguishers appropriate for surrounding materials. Use water spray, dry chemical, alcohol foam or carbon dioxide. Water or foam may cause frothing. Use water to keep fire-exposed containers cool. Water spray may be used to flush spills away from exposures and to dilute spills to non-combustible mixtures.

**Unusual Fire or Explosion Hazards:** Not applicable for solid product. Do not use water on molten metal. Material can form explosive and flammable mixtures with air.

**Hazardous Combustion Products:** At temperatures above the melting point, fumes containing metal oxides and other alloying elements may be liberated.

**Fire-Fighting Instructions:** Do not release runoff from fire control methods to sewers or waterways.

**Fire-Fighting Equipment:** Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode and full protective clothing.

## Section 6 - Accidental Release Measures

**Spill/Leak Procedures:** Not applicable to steel in solid state. For spills involving finely divided particles, clean-up personnel should be protected against contact with eyes and skin. 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.

**Regulatory Requirements:** Follow applicable OSHA regulations (29 CFR 1910.120) and all other pertinent state and federal requirements.

**Disposal:** Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

## Section 7 - Handling and Storage

**Handling Precautions:** Operations with the potential for generating high concentrations of airborne particulates should be evaluated and controlled as necessary. Practice good housekeeping. Avoid breathing metal fumes and/or dust.

**Storage Requirements:** Store away from acids and incompatible materials. Store in cool, well-ventilated areas away from sources of heat and ignition, oxidizing agents, and incompatible materials.

## Section 8 - Exposure Controls / Personal Protection

**Engineering Controls:** Use controls as appropriate to minimize exposure to metal fumes and dusts during handling operations.

**Ventilation:** Provide general or local exhaust ventilation systems to minimize airborne concentrations. Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.

**Administrative Controls:** Do not use compressed air to clean-up spills.

**Respiratory Protection:** Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear 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.

**Protective Clothing/Equipment:** 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, gloves and safety glasses to prevent skin and 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. Protective gloves should be worn as required for welding, burning or handling operations. Where the oil coating is applied to the product, wear gloves when handling, do not continue to use gloves or work clothing that has become saturated or soaked through with oil coating. Wash skin that has been exposed to oil with soap and water or waterless hand cleaner.

## Section 9 - Physical and Chemical Properties

**Physical State:** Solid
**Appearance and Odor:** Grey-black, Odorless
**Odor Threshold:** Not applicable
**Vapor Pressure:** Not applicable
**Vapor Density (Air=1) :** Not applicable
**Formula Weight:** Not applicable
**Density:** Not applicable
**Specific Gravity ($H_2O$=1, at 4 °C):** .275-.282 lb/in$^3$
pH: **Not applicable**

**Water Solubility:** Insoluble
**Other Solubilities:** Not applicable
**Boiling Point:** 5252 F (approximate)
**Viscosity:** Not applicable
**Refractive Index:** Not applicable
**Surface Tension:** Not applicable
**% Volatile:** Not applicable
**Evaporation Rate:** Not applicable
**Melting Point:** 2786 F (approximate)

## Section 10 - Stability and Reactivity

**Stability:** Steel products are stable under normal storage and handling conditions. May react with strong acids to form hydrogen gas.

**Polymerization:** Hazardous polymerization cannot occur.

**Chemical Incompatibilities:** Will react with strong acids to form hydrogen. Iron oxide dusts in contact with calcium hypochlorite evolve oxygen and may cause an explosion.

**Conditions to Avoid:** Storage with strong acids or calcium hypochlorite.

**Hazardous Decomposition Products:** Thermal oxidative decomposition of steel products can produce fumes containing oxides of iron and manganese as well as other elements.

## Section 11 - Toxicological Information

**Eye Effects:**
Eye contact with the individual components may cause particulate irritation. Implantation of iron particles in guinea pig corneas has resulted in rust rings with corneal softening about rust ring.

**Skin Effects:**
Skin contact with the individual components may cause physical abrasion, irritation and dermatitis.

**Toxicity Data:***

**Acute Inhalation Effects:**
Inhalation of the individual alloy components has been shown to cause various respiratory effects.

**Acute Oral Effects:**
No data available

**Other:** No LC50 or LD50 has been established for the mixture as a whole. Iron LD50: 30 g/kg oral (rat). Carbon LD50: No data. Manganese LD50: 9 g/kg oral (rat).

**Chronic Effects:** See section 3.

**Carcinogenicity:** Chromium (in surface passivation treatment, if specified).

**Mutagenicity:** No data available

**Teratogenicity:** No data available

- See NIOSH, *RTECS*: (NO7400000) for additional toxicity data on iron oxide; (BD1200000) for aluminum oxide; (FF5250000) for carbon; (OO9275000) for manganese; (TH3500000) for phosphorous; (XR1700000) for titanium.

## Section 12 - Ecological Information

**Ecotoxicity:** No data available for Steel Sheet, Plate, Slab and Coil as a whole. However, individual components have been found to be toxic to the environment. Metal dusts may migrate into soil and groundwater and be ingested by wildlife.

**Environmental Fate:** No data available.

**Environmental Degradation:** No data available.

**Soil Absorption/Mobility:** No data available for Steel Sheet, Plate, Slab and Coil as a whole. However, individual components have been found to be absorbed by plants from soil.

## Section 13 - Disposal Considerations

**Disposal:** This material is considered to be a solid waste, not a hazardous waste. Follow applicable Federal, state, and local regulations for disposal of solid waste and airborne particulates accumulated during handling operations of steel. Do not release into sewers or waterways. Controlled burning for disposal. Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

**Disposal Regulatory Requirements:** None

**Container Cleaning and Disposal:** Follow applicable Federal, state and local regulations. Observe safe handling precautions.

## Section 14 - Transport Information

**DOT Transportation Data (49 CFR 172.101):**

Steel Sheet, Plate, Slab and Coil is not listed as hazardous substances under 49 CFR 172.101.

**Shipping Name:** Not applicable
**Shipping Symbols:** Not applicable
**Hazard Class:** Not applicable
**ID No.:** Not applicable
**Packing Group:** Not applicable
**Label:** Not applicable
**Special Provisions (172.102):** None

**Packaging Authorizations**
**a) Exceptions:** None
**b) Non-bulk Packaging:** Not applicable
**c) Bulk Packaging:** Not applicable

**Quantity Limitations**
**a) Passenger, Aircraft, or Railcar:** Not applicable
**b) Cargo Aircraft Only:** Not applicable

**Vessel Stowage Requirements**
**a) Vessel Stowage:** Not applicable
**b) Other:** Not applicable

## Section 15 - Regulatory Information

**Regulatory Information**

This product and/or its constituents are subject to the following regulations:

**OSHA Regulations:**

Air Contaminant (29 CFR 1910.1000, Tables Z-1& Z-2,): The product as a whole is not listed. However, individual components of the product are listed.

OSHA Specifically Regulated Substance: Not applicable

**EPA Regulations:**

RCRA: Not applicable

CERCLA Hazardous Substance (40 CFR 302.4): The product as a whole is not listed. However, individual components of the product are listed: Manganese is listed under SARA 302.

SARA 311/312 Codes: Immediate (acute) health hazard and delayed (chronic) health hazard.

SARA 313: Manganese is subject to SARA 313 reporting requirements. Please also note that if you prepackage or otherwise redistribute this product to industrial customers, SARA 313 requires that a notice be sent to those customers.

Clean Water Act: Not applicable.

Safe Drinking Water Act: Iron and Manganese are regulated under this act. The product as a whole is not listed.

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

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

## Section 16 - Other Information

**Prepared By:** AM Health and Safety, Inc.

**Hazard Rating Systems:** (for solid formed product)

NFPA Code: 0-0-0 HMIS Code: 0-0-0 PPE: See Section 8

**Disclaimer:** This information is taken from sources or based upon data believed to be reliable. However, IPSCO Steel, Inc and AM Health and Safety, Inc. 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.