



# United States Steel Corporation

## Iron Desulfurization Scrap

Safety Data Sheet (SDS)

USS IHS Number: 75371

Locations: Fairfield, Gary, Granite City, Great Lakes, Hamilton, Lake Erie, and Mon Valley

Original: 12/16/2010

Revision: 7/01/2017

Expiration: 7/01/2020

### Section 1 – Identification

1(a) Product Identifier used on Label: Iron Desulfurization Scrap

1(b) Other Means of Identification: Desulf Scrap, Iron Scrap, Kish Scrap, Desulfurization Iron

1(c) Recommended use of the chemical and restrictions on use: None

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

United States Steel Corporation Phone number: (412) 433-6840 (8:00 am to 5:00 pm)  
 600 Grant Street, Room 1662 FAX: (412) 433-5019  
 Pittsburgh, PA 15219-2800

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

### Section 2 – Hazard(s) Identification

2(a) Classification of the Chemical: Iron Desulfurization Scrap is considered a hazardous material according to the criteria specified in REACH [REGULATION (EC) No 1907/2006] and CLP [REGULATION (EC) No 1272/2008] and OSHA 29 CFR 1910.1200 Hazard Communication Standard. 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.

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

Hazard Symbol	Hazard Classification	Signal Word	Hazard Statement(s)	Precautionary Statement(s)
	Single Target Organ Toxicity (STOT) Repeated Exposure - 1	<b>Danger</b>	Causes damage to lungs through prolonged or repeated exposure. Causes severe skin burns and serious eye damage. May cause respiratory irritation.	Do not breathe dusts or fume. Wear protective gloves / eye protection / face protection. Wash thoroughly after handling. Do not eat drink or smoke when using this product. Use only outdoors or in a well-ventilated area. Get medical advice/attention if you feel unwell. If inhaled: Remove person to fresh air and keep comfortable for breathing. call a poison center or doctor/physician if you feel unwell. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center or doctor/physician. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. Take off contaminated clothing and wash it before reuse. If skin irritation occurs: Get medical advice/attention. If swallowed: Call a poison control center or doctor/physician if you feel unwell. Store locked up. Dispose of contents in accordance with federal, state and local regulations.
	Skin Irritation - 2 Eye Irritation - 1			
	STOT Single Exposure - 3			

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 and Iron Oxides	7439-89-6 1345-25-1 1309-37-1	231-096-4 215-721-8 215-168-2	29-66
Calcium Oxide	1305-78-8	215-138-9	12-28
Silica, Fused	60676-86-0	262-373-8	3.8-12
Magnesium Oxide	1309-48-4	215-171-9	3-10
Manganese	7439-96-5	231-105-1	0.9-3
Aluminum Oxide	1344-28-1	215-691-6	0.5-3
Titanium Dioxide	13463-67-7	236-675-5	0.2-1.3

EC- European Community

CAS- Chemical Abstract Service

### Section 4 – First-aid Measures

**4(a) Description of Necessary Measures:** Get medical advice/attention if you feel unwell.

- **Inhalation:** If Inhaled: Remove person to fresh air and keep comfortable for breathing.
- **Eye Contact:** If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center or doctor/physician.
- **Skin Contact:** If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
- **Ingestion:** Rinse mouth.

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

**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. Excessive inhalation of calcium oxide dusts may cause severe irritation and burns of the respiratory tract.
- **Eye:** Particles of iron or iron compounds may become imbedded in the eye. Excessive exposure to high concentrations of dust may cause irritation to the eyes.
- **Skin:** Skin contact with dusts may cause irritation or sensitization, possibly leading to dermatitis. Skin contact with metallic fumes and dusts may cause physical abrasion.
- **Ingestion:** Ingestion of dust may cause nausea and/or vomiting.

**Chronic Effects:**

Individuals with chronic respiratory disorders (i.e., asthma, chronic bronchitis, emphysema, etc.) may be adversely affected by any fume or airborne particulate matter exposure. Persons with pre-existing skin disorders may be more susceptible to dermatitis.

**4(c) Immediate Medical Attention and Special Treatment:** Treat symptomatically.

### Section 5 – Fire-fighting Measures

**5(a) Suitable (and Unsuitable) Extinguishing Media:** Molten metal may react violently with water. Use extinguishers appropriate for surrounding materials.

**5(b) Specific Hazards Arising from the Chemical:** Not applicable for solid product. Do not use water on molten iron.

**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 in solid state. For spills involving molten iron, personnel should be protected against contact with eyes and skin and avoid inhalation of dust/fume. 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. Personnel should be protected against contact with eyes and skin. 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.

### Section 6 - Accidental Release Measures (continued)

**6(b) Methods and Materials for Containment and Clean Up:** 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:** Wash thoroughly after handling. Do not breathe dusts or fume. Do not eat drink or smoke when using this product. Wear protective gloves / protective clothing / eye protection / face protection. Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse. Use only outdoors or in a well-ventilated area. Avoid direct contact on skin, eyes or on clothing. Emergency safety showers and eye wash stations should be present.

**7(b) Conditions for Safe Storage, including any Incompatibilities:** Whenever feasible, store locked up.

### Section 8 - Exposure Controls / Personal Protection

**8(a) Occupational Exposure Limits (OELs):** The following exposure limits are offered as reference, for an experience industrial hygienist to review.

Ingredients	OSHA PEL <sup>1</sup>	ACGIH TLV <sup>2</sup>	NIOSH REL <sup>3</sup>	IDLH <sup>4</sup>
Iron and Iron Oxides	10 mg/m <sup>3</sup> (as iron oxide fume)	5.0 mg/m <sup>3</sup>	5.0 mg/m <sup>3</sup> (as iron oxide dust and fume)	2,500 mg/m <sup>3</sup>
Calcium Oxide	5.0 mg/m <sup>3</sup>	2.0 mg/m <sup>3</sup>	2.0 mg/m <sup>3</sup>	25 mg/m <sup>3</sup>
Silica, Fused	(10 mg/m <sup>3</sup> )/(%SiO <sub>2</sub> + 2) (as respirable fraction)	10 mg/m <sup>3</sup> (as inhalable fraction, <sup>5</sup> PNOS) <sup>6</sup> 3.0 mg/m <sup>3</sup> (as respirable fraction, <sup>7</sup> PNOS)	0.05 mg/m <sup>3</sup>	NE
Magnesium Oxide	15 mg/m <sup>3</sup>	10 mg/m <sup>3</sup>	NE	750 mg/m <sup>3</sup>
Manganese	"C" 5.0 mg/m <sup>3</sup> (as Fume & Mn compounds)	0.2 mg/m <sup>3</sup>	"C" 5.0 mg/m <sup>3</sup> 1.0 mg/m <sup>3</sup> (as fume) "STEL" 3.0 mg/m <sup>3</sup>	500 mg Mn/m <sup>3</sup>
Aluminum Oxide	15 mg/m <sup>3</sup> (as total dust, PNOR) <sup>8</sup> 5.0 mg/m <sup>3</sup> (as respirable fraction, PNOR)	10 mg/m <sup>3</sup>	NE	NE
Titanium Dioxide	15 mg/m <sup>3</sup> (as TiO <sub>2</sub> , total dust)	10 mg/m <sup>3</sup> (as TiO <sub>2</sub> )	LFC (as TiO <sub>2</sub> ) <sup>9</sup>	5,000 mg/m <sup>3</sup> (as TiO <sub>2</sub> )

NE - None Established

- 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.
- 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.
- 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.
- 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.
- 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 2017 TLVs<sup>®</sup> and BEIs<sup>®</sup> (Biological Exposure Indices) Appendix A, paragraph A.
- PNOS (Particulates Not Otherwise Specified). Particulates identified under the PNOS heading are "nuisance dusts" containing no asbestos and <1% crystalline silica.
- 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 2017 TLVs<sup>®</sup> and BEIs<sup>®</sup> Appendix D, paragraph C.
- 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<sup>3</sup> for total dust and 5 mg/m<sup>3</sup> for the respirable fraction.
- LFC - Lowest Feasible Concentration, Refer to Section 11, Toxicological Information.

**8(b) Appropriate Engineering Controls:** Local exhaust ventilation should be used to control the emission of air contaminants. General dilution ventilation may assist with the reduction of air contaminant concentrations. Emergency eye wash stations and deluge safety showers should be available in the work area.

#### 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 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) ...

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

**8(c) Individual Protection Measures (continued):**

- **Respiratory Protection (continued):** ... 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 eye protection/face protection. For molten iron or the generation of airborne particulates, use safety glasses to prevent eye contact as required. A face shield should be used when appropriate to prevent contact with splashed materials.
- **Skin:** Wear protective gloves. For molten iron or the generation of airborne particulates, use protective clothing to prevent skin contact. Take off contaminated clothing and wash before reuse.
- **Other protective equipment:** An eyewash fountain and deluge shower should be readily available in the work area.

**Section 9 - Physical and Chemical Properties**






- |                                                                        |                                                              |
|------------------------------------------------------------------------|--------------------------------------------------------------|
| <b>9(a) Appearance (physical state, color, etc.):</b> Gray/black solid | <b>9(j) Upper/Lower Flammability or Explosive Limits:</b> NA |
| <b>9(b) Odor:</b> NA                                                   | <b>9(k) Vapor Pressure:</b> NA                               |
| <b>9(c) Odor Threshold:</b> NA                                         | <b>9(l) Vapor Density (Air = 1):</b> NA                      |
| <b>9(d) pH:</b> NA                                                     | <b>9(m) Relative Density:</b> NA                             |
| <b>9(e) Melting Point/Freezing Point:</b> ND                           | <b>9(n) Solubility(ies):</b> ND                              |
| <b>9(f) Initial Boiling Point and Boiling Range:</b> NA                | <b>9(o) Partition Coefficient n-octanol/water:</b> NA        |
| <b>9(g) Flash Point:</b> NA                                            | <b>9(p) Auto-ignition Temperature:</b> ND                    |
| <b>9(h) Evaporation Rate:</b> NA                                       | <b>9(q) Decomposition Temperature:</b> ND                    |
| <b>9(i) Flammability (solid, gas):</b> Not flammable                   | <b>9(r) Viscosity:</b> ND                                    |
- 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:** Iron Desulfurization Scrap is stable under normal storage and handling conditions.
- 10(c) Possibility of Hazardous Reaction:** None Known
- 10(d) Conditions to Avoid:** Calcium oxide will react with water to form calcium hydroxide.
- 10(e) Incompatible Materials:** Iron oxide dusts in contact with calcium hypochlorite evolve oxygen and may cause an explosion.
- 10(f) Hazardous Decomposition Products:** Oxides of carbon, metal oxides and toxic vapors may be released at elevated temperatures.

**Section 11 - Toxicological Information**

**11(a-e) Information on Toxicological Effects:** The following toxicity data has been determined for **Iron Desulfurization Scrap** by 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 1-4)	4	4 <sup>a</sup>		Warning	Harmful if swallowed.
Skin Irritation (covers Categories 1A, 1B, 1C, and 2)	1B	1B <sup>b</sup>		Danger	Causes severe skin burns and eye damage.
Eye Damage/Irritation (covers Categories 1, 2A and 2B)	1	1 <sup>c</sup>		Danger	Causes serious eye damage.
Specific Target Organ Toxicity (STOT) Following Single Exposure (covers Categories 1-3)	3	3 <sup>i</sup>		Warning	May cause respiratory irritation.
STOT Following Repeated Exposure (covers Categories 1 and 2)	1	2 <sup>j</sup>		Danger	Causes damage to lungs through prolonged or repeated exposure.

\* NR Not Rated - Available data does not meet criteria for classification.

## Section 11 - Toxicological Information (continued)

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

The 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<sub>50</sub> or LD<sub>50</sub> has been established for **Iron Desulfurization Scrap**. The following data has been determined for the components:
- **Iron Oxide:** LD<sub>50</sub> = >10,000 mg/kg (Oral/ Rat)
  - **Iron:** Rat LD<sub>50</sub> =98.6 g/kg (REACH)  
Rat LD<sub>50</sub> =1060 mg/kg (IUCLID)  
Rat LD<sub>50</sub> =984 mg/kg (IUCLID)  
Rabbit LD<sub>50</sub> =890 mg/kg (IUCLID)  
Guinea Pig LD<sub>50</sub> =20 g/kg (TOXNET)
  - **Titanium Dioxide:** LD<sub>50</sub> > 10,000 mg/kg (Oral/Rat); LC<sub>50</sub> > 6.82 mg/l (Inhalation/Rat)
  - **Manganese:** Rat LD<sub>50</sub> > 2000 mg/kg (REACH)  
Rat LD<sub>50</sub> > 9000 mg/kg (NLM Toxnet)
- b. No Skin (Dermal) Irritation data available for **Iron Desulfurization Scrap** as a mixture. The following Skin (Dermal) Irritation data has been determined for the components:
- **Iron Oxide:** Moderately irritating.
  - **Magnesium Dioxide:** Severe skin irritant in human (HSDB).
- c. No Eye Irritation data available for **Iron Desulfurization Scrap** as a mixture. The following Eye Irritation information was found for the components:
- **Iron Oxide:** Severely irritating; may cause burns. Human Corrosive (IUCLID).
  - **Iron:** Causes eye irritation.
  - **Calcium Oxide:** Rabbit Irritating (REACH).
  - **Magnesium dioxide:** Severe eye irritant in human (HSDB).
- d. No Skin (Dermal)/Respiratory Sensitization data available for **Iron Desulfurization Scrap** as a mixture or its individual components.
- e. No Aspiration Hazard data available for **Iron Desulfurization Scrap** as a mixture or its individual components.
- f. No Germ Cell Mutagenicity data available for **Iron Desulfurization Scrap** as a mixture. The following Germ Cell Mutagenicity information was found for the components:
- **Iron Oxide:** Both positive and negative data.
  - **Iron:** IUCLID has found some positive and negative findings in vitro
- g. Carcinogenicity: IARC, NTP, and OSHA do not list **Iron Desulfurization Scrap** as carcinogens. The following Carcinogenicity information was found for the components:
- **Iron Oxide:** IARC-3, TLV-A4
  - **Titanium Dioxide** - According to the experimental studies and reviewed IUCLID toxicological data, Rats (but not mice) exposed to ultrafine TiO<sub>2</sub> particles at 10 mg/m<sup>3</sup> developed lung tumors; probably results from inhibited particle clearance from lung. Titanium and titanium compounds, for the most part, have been considered virtually inert and not highly toxic to man. Titanium dioxide has recently been considered a potential occupational carcinogen based on inhalation studies on rats. Results indicated increases in bronchioloalveolar adenomas and squamous cell carcinomas. As a result, NIOSH recommends exposure to titanium dioxide be reduced to the lowest feasible concentration (LFC).
- h. No Toxic Reproduction data available for **Iron Desulfurization Scrap** as a mixture or its individual components.
- i. No Specific Target Organ Toxicity (STOT) following a Single Exposure data available for **Iron Desulfurization Scrap** as a mixture. The following STOT following a Single Exposure data was found for the components:
- **Iron Oxide:** May cause lung irritation.
  - **Iron:** Irritating to respiratory tract.
  - **Calcium Oxide:** Can cause respiratory tract irritation, skin and eye irritation.
- j. No Specific Target Organ Toxicity (STOT) following Repeated Exposure data was available for **Iron Desulfurization Scrap** as a whole. The following STOT following Repeated Exposure data was found for the components:
- **Iron Oxide:** Some pulmonary and lung effects reported.
  - **Titanium Dioxide:** Inflammatory lesions in rat lungs produced by 3-month exposures to either 22.3 mg/m<sup>3</sup> of ultrafine TiO<sub>2</sub>; lesions "regressed" during a 1-year period following cessation of exposure.
  - **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 2017, 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):

#### Acute Effects by Component:

- **IRON AND IRON OXIDE:** 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.
- **CALCIUM OXIDE:** Calcium oxide is an eye and skin irritant.
- **AMORPHOUS SILICA (SILICON DIOXIDE):** Not Reported/ Not Classified
- **MAGNESIUM OXIDE:** Not Reported/ Not Classified

**Section 11 - Toxicological Information (continued)**

**Acute Effects by Component(continued):**

- **MANGANESE:** Manganese is harmful if swallowed.
- **ALUMINUM OXIDE:** Inhalation may cause cough.
- **TITANIUM DIOXIDE:** Not Reported/ Not Classified

**Delayed (chronic) Effects by Component:**

- **IRON AND IRON 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).
- **CALCIUM OXIDE:** Depending on the concentration and duration of exposure, repeated or prolonged inhalation may cause inflammation of the respiratory passages, ulcers of the mucous membranes, and possible perforation of the nasal septum. Repeated or prolonged skin contact may cause dermatitis.
- **AMORPHOUS SILICA (SILICON DIOXIDE):** 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.
- **MAGNESIUM OXIDE:** Irritation of eyes, nose, and throat. Symptoms may include dryness of nose and mouth, cough, feeling of weakness, tightness of chest, muscular pain, chills, fever, headache, nausea, and vomiting.
- **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. 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.
- **ALUMINUM OXIDE:** Considered to be an inert or nuisance dust.
- **TITANIUM DIOXIDE:** Titanium Oxide accumulates in the lungs – and over time mostly in alveoli and macrophages. Exposure by inhalation route should be reduced to lowest levels to reduce accumulation in lungs. This accumulation is apparently responsible for carcinogenesis in rats only (no such response in mouse or hamster).

**Section 12 - Ecological Information**

**12(a) Ecotoxicity (aquatic & terrestrial):** No data available for the product, **Iron Desulfurization Scrap** as a whole. However, individual components of the product have been found to be toxic to the environment. Dusts may migrate into soil and groundwater and be ingested by wildlife as follows:

- **Iron Oxide:** LC<sub>50</sub>: >1000 mg/L; Fish
- **Calcium Oxide:** LC<sub>50</sub>: 159 mg/L; invertebrates
- **Aluminum Oxide:** LC<sub>50</sub>: >100 mg/L; Fish and algae

**12(b) Persistence & Degradability:** No Data Available

**12(c) Bioaccumulative Potential:** No Data Available

**12(d) Mobility (in soil):** No Data Available

**12(e) Other Adverse Effects:** None Known

**Additional Information:**

**Hazard Category:** No Category

**Signal Word:** No Signal Word

**Hazard Symbol:** No Hazard Symbol

**Hazard Statement:** No Hazard Statement

**Section 13 - Disposal Considerations**

**Disposal:** Dispose of contents/container in accordance with local/regional/international regulations.

**Container Cleaning and Disposal:** Follow applicable federal, state and local regulations. Observe safe handling precautions. European Waste Catalogue 10-02-99 (wastes not otherwise specified), 16-03-04 (inorganic wastes other than those mentioned in 16-03-03).

**Please note this information is for Iron Desulfurization Scrap 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 **Iron Desulfurization Scrap** 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.

<p><b>Shipping Name:</b> Iron Desulfurization Scrap  <b>Shipping Symbols:</b> NA  <b>Hazard Class:</b> NA  <b>UN No.:</b> NA  <b>Packing Group:</b> NA  <b>DOT/IMO Label:</b> NA  <b>Special Provisions (172.102):</b> NA</p>	<p><b>Packaging Authorizations</b>  <b>a) Exceptions:</b> NA  <b>b) Non-bulk:</b> NA  <b>c) Bulk:</b> NA</p>	<p><b>Quantity Limitations</b>  <b>a) Passenger Aircraft or Rail:</b> NA  <b>b) Cargo Aircraft Only:</b> NA    <b>Vessel Stowage Location:</b> NA    <b>DOT reportable quantities:</b> NA</p>
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

**Section 14 - Transport Information (continued)**

**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 Iron Desulfurization Scrap as a hazardous material.**

<b>Shipping Name: Iron Desulfurization Scrap</b> Classification Code: NA UN No.: NA Packing Group: NA ADR Label: NA Special Provisions: NA Limited Quantities: NA	<b>Packaging</b> a) Packing Instructions: NA b) Special Packing Provisions: NA c) Mixed Packing Provisions: NA	<b>Portable Tanks &amp; Bulk Containers</b> a) Instructions: NA b) Special Provisions: NA
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------

**International Air Transport Association (IATA) does not regulate Iron Desulfurization Scrap as a hazardous material.**

<b>Shipping Name: Iron Desulfurization Scrap</b> Class/Division: NA Hazard Label (s): NA UN No.: NA Packing Group: NA Excepted Quantities (EQ): NA	<b>Passenger &amp; Cargo Aircraft</b>		<b>Cargo Aircraft Only</b> Pkg Inst: NA Max Net Qty/Pkg: NA	<b>Special Provisions:</b> NA <b>ERG Code: NA</b>
	Limited Quantity (EQ) Pkg Inst: NA Max Net Qty/Pkg: NA	Pkg Inst: NA Max Net Qty/Pkg: NA		

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

**Iron Desulfurization Scrap does not have a Transport Dangerous Goods (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, **Iron Desulfurization Scrap** 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
7439-96-5	Manganese compounds	3 max
1344-28-1	Aluminum Oxide	3 max

**State Regulations:** The product, **Iron Desulfurization Scrap** 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:** The product, **Iron Desulfurization Scrap** does not contain elements known to the State of California to cause cancer or reproductive toxicity.

**Other Regulations:**

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

Ingredients	WHMIS Classification
Iron	Combustible dusts - Category 1
Calcium Oxide	Skin corrosion/irritation - Category 1; Serious eye damage/eye irritation - Category 1; Health hazards not otherwise classified (corrosion) - Category 1
Manganese	Specific target organ toxicity - repeated exposure - Category 1; Combustible dusts

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:**

- 07/01/2017 – Update WHMIS 2015
- 04/14/2015 - Revision
- 04/21/2014 - Update to OSHA HAZ COM 2012
- 05/10/2011 – Original

**Expiration Date: 07/01/2020**

**Section 16 - Other Information (continued)**

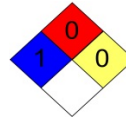
**Additional Information:**

**Hazardous Material Identification System (HMIS) Classification**

<b>Health Hazard</b>	<b>1</b>
<b>Fire Hazard</b>	<b>0</b>
<b>Physical Hazard</b>	<b>0</b>

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 HAZARDS = 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:**

<b>ACGIH</b>	American Conference of Governmental Industrial Hygienists	<b>NIF</b>	No Information Found
<b>BEIs</b>	Biological Exposure Indices	<b>NIOSH</b>	National Institute for Occupational Safety and Health
<b>CAS</b>	Chemical Abstracts Service	<b>NTP</b>	National Toxicology Program
<b>CERCLA</b>	Comprehensive Environmental Response, Compensation, and Liability Act	<b>ORC</b>	Organization Resources Counselors
<b>CFR</b>	Code of Federal Regulations	<b>OSHA</b>	Occupational Safety and Health Administration
<b>CNS</b>	Central Nervous System	<b>PEL</b>	Permissible Exposure Limit
<b>GI, GIT</b>	Gastro-Intestinal, Gastro-Intestinal Tract	<b>PNOR</b>	Particulate Not Otherwise Regulated
<b>HMIS</b>	Hazardous Materials Identification System	<b>PNOC</b>	Particulate Not Otherwise Classified
<b>IARC</b>	International Agency for Research on Cancer	<b>PPE</b>	Personal Protective Equipment
<b>LC50</b>	Median Lethal Concentration	<b>ppm</b>	parts per million
<b>LD50</b>	Median Lethal Dose	<b>RCRA</b>	Resource Conservation and Recovery Act
<b>LD<sub>Lo</sub></b>	Lowest Dose to have killed animals or humans	<b>RTECS</b>	Registry of Toxic Effects of Chemical Substances
<b>LEL</b>	Lower Explosive Limit	<b>SARA</b>	Superfund Amendment and Reauthorization Act
<b>µg/m<sup>3</sup></b>	microgram per cubic meter of air	<b>SCBA</b>	Self-contained Breathing Apparatus
<b>mg/m<sup>3</sup></b>	milligram per cubic meter of air	<b>STEL</b>	Short-term Exposure Limit
<b>mppcf</b>	million particles per cubic foot	<b>TLV</b>	Threshold Limit Value
<b>SDS</b>	Safety Data Sheet	<b>TWA</b>	Time-weighted Average
<b>MSHA</b>	Mine Safety and Health Administration	<b>UEL</b>	Upper Explosive Limit
<b>NFPA</b>	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.