



# United States Steel Corporation

## Tin Mill Filter Cake MSA Safety Data Sheet (SDS)

USS IHS Number: IHS 82496  
(Replaces IHS 23)

Locations: Gary Works (Midwest Plant)

Original: 12/16/2010

Revision: 8/15/2017

Expiration: 8/15/2020

### Section 1 – Identification

- 1(a) Product Identifier used on Label:** Tin Mill Filter Cake MSA
- 1(b) Other Means of Identification:** Tin Plating Filter Cake {Methane Sulfonic Acid (MSA) Method}
- 1(c) Recommended use of the chemical and restrictions on use:** Processing for Tin Recovery; 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:** Tin Mill Filter Cake MSA 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)
	Carcinogenicity - 1	Danger	May cause cancer.	Do not breathe dusts or fume.
	Reproductive Toxicity - 1A Single Target Organ Toxicity (STOT) Repeated Exposure - 1		May damage fertility or the unborn child.	Wear protective gloves / protective clothing / eye protection / face protection.
	Skin Sensitization - 1		Causes damage to central nervous system, and lungs through prolonged or repeated exposure. May cause an allergic skin reaction.	Wash thoroughly after handling.
				Contaminated work clothing must not be allowed out of the workplace.
				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 exposed, concerned or feel unwell: Get medical advice/attention, call a poison center or doctor.
				If inhaled: Remove person to fresh air and keep comfortable for breathing.
				If on skin: Wash with plenty of water. Wash contaminated clothing before reuse. If skin irritation or rash occurs: Get medical advice/attention.
				Use only outdoors or in well ventilated area.
				Store in well ventilated place.
				Dispose of contents in accordance with federal, state and local regulations.

**2(c) Hazards not Otherwise Classified:** None Known

**2(d) Unknown Acute Toxicity Statement (Mixture):** None Known

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## 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
Tin	7440-31-5	231-141-8	25-60
Water	7732-18-5	231-791-2	15-35
Sulfur	7704-34-9	231-722-6	0-5.1
Iron	7439-89-6	231-096-4	0.3-3.2
Chlorides	Varies	Varies	0-2.5
Oil and Grease	Varies	Varies	0-2.5
Lead	7439-92-1	231-100-4	0-0.1
Nickel	7440-02-0	231-111-4	0-0.1
Arsenic	7440-38-2	231-148-6	0-0.1

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, call a poison center or Doctor.

- **Inhalation:** If inhaled: Remove person to fresh air and keep comfortable for breathing. Call a poison center or Doctor if you feel unwell.
- **Eye Contact:** If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- **Skin Contact:** If on skin: Wash with plenty of water. Take off contaminated clothing and wash it before reuse.
- **Ingestion:** If swallowed: Call a poison center or Doctor if you feel unwell.

**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.
- **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 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:** Use extinguishers appropriate for surrounding materials.

**5(b) Specific Hazards Arising from the Chemical:** 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:** Use only outdoors or in a well-ventilated area. 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. Do not release into sewers or waterways.

**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:** Do not eat, drink or smoke when using this product. Wash thoroughly after handling. Do not breathe dusts or fume. Wear protective gloves / protective clothing / eye protection / face protection. Contaminated work clothing must not be allowed out of the workplace. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Avoid direct contact on skin, eyes or on clothing. Emergency safety showers and eye wash stations should be present. Use only outdoors or in well ventilated area.

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## Section 7 - Handling and Storage (continued)

**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 is 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>
Tin	2.0 mg/m <sup>3</sup> (as inorganic compounds, Sn)	2.0 mg/m <sup>3</sup> (as metal and inorganic compounds, Sn)	2.0 mg/m <sup>3</sup> (also applies to other inorganic tin compounds, as Sn except tin oxides)	100 mg/m <sup>3</sup> (as Sn)
Sulfur	15 mg/m <sup>3</sup> (as total dust, PNOR) <sup>5</sup> 5.0 mg/m <sup>3</sup> (as respirable fraction, PNOR)	10 mg/m <sup>3</sup> (as inhalable fraction <sup>6</sup> , PNOS <sup>7</sup> ) 3.0 mg/m <sup>3</sup> (as respirable fraction <sup>8</sup> , PNOS)	NE	NE
Iron	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>
Lead Oxide and Lead Compounds	0.05 mg/m <sup>3</sup> <sup>9</sup> "AL" 0.03 mg/m <sup>3</sup>	0.05 mg/m <sup>3</sup>	0.05 mg/m <sup>3</sup> <sup>10</sup>	100 mg/m <sup>3</sup>
Nickel	1.0 mg/m <sup>3</sup> (as Ni metal & insoluble compounds)	1.5 mg/m <sup>3</sup> (as inhalable fraction Ni metal) 0.2 mg/m <sup>3</sup> (as inhalable fraction Ni inorganic only insoluble and soluble compounds)	0.015 mg/m <sup>3</sup> (as Ni metal & insoluble and soluble compounds)	10 mg/m <sup>3</sup> (as Ni)
Arsenic	0.01 mg/m <sup>3</sup> (inorganic compounds) "AL" 5.0 µg/m <sup>3</sup>	0.01 mg/m <sup>3</sup>	0.002 mg/m <sup>3</sup> (15-minute)	5.0 mg/m <sup>3</sup> (as As)

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-1970s 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.
- 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.
- 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 D, 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.
- OSHA considers "Lead" to mean metallic lead, all inorganic lead compounds (lead oxides and lead salts), and a class of organic compounds called soaps; all other lead compounds are excluded from this definition. The OSHA PEL and other OSHA requirements can be found in 29 CFR 1910.1025. The OSHA PEL (8-hour TWA) for lead in "non-ferrous foundries with less than 20 employees" is 0.075 mg/m<sup>3</sup>.
- NIOSH considers "Lead" to mean metallic lead, lead oxides, and lead salts (including organic salts such as lead soaps but excluding lead arsenate). The NIOSH REL for lead (8-hour TWA) is 0.05 mg/m<sup>3</sup>; air concentrations should be maintained so that worker blood lead remains less than 0.060 mg Pb/100 g of whole blood.

**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 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. Use safety glasses with side shields or chemical goggles.

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## Section 8 - Exposure Controls / Personal Protection (continued)

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

- **Skin:** Persons handling this product should wear appropriate clothing to prevent skin contact. Wear protective gloves. 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





- |   |   |
|---|---|
| <p><b>9(a) Appearance (physical state, color, etc.):</b> Gray, granular, moist precipitate</p> <p><b>9(b) Odor:</b> ND</p> <p><b>9(c) Odor Threshold:</b> ND</p> <p><b>9(d) pH:</b> 2.1</p> <p><b>9(e) Melting Point/Freezing Point:</b> 450 °F, 232° C (Tin)</p> <p><b>9(f) Initial Boiling Point and Boiling Range:</b> ND</p> <p><b>9(g) Flash Point:</b> ND</p> <p><b>9(h) Evaporation Rate:</b> ND</p> <p><b>9(i) Flammability (solid, gas):</b> Not flammable</p> <p>NA - Not Applicable<br/>ND - Not Determined for product as a whole</p> | <p><b>9(j) Upper/Lower Flammability or Explosive Limits:</b> ND</p> <p><b>9(k) Vapor Pressure:</b> ND</p> <p><b>9(l) Vapor Density (Air = 1):</b> ND</p> <p><b>9(m) Relative Density:</b> 2.1-3.8 (SG)</p> <p><b>9(n) Solubility(ies):</b> ND</p> <p><b>9(o) Partition Coefficient n-octanol/water:</b> NA</p> <p><b>9(p) Auto-ignition Temperature:</b> ND</p> <p><b>9(q) Decomposition Temperature:</b> ND</p> <p><b>9(r) Viscosity:</b> ND</p> |
|---|---|

## Section 10 - Stability and Reactivity

- 10(a) Reactivity:** Not Determined (ND)
- 10(b) Chemical Stability:** Tin Mill Filter Cake MSA is 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:** Iron oxide dusts in contact with calcium hypochlorite evolve oxygen and may cause an explosion.
- 10(f) Hazardous Decomposition Products:** Toxic fumes and 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 **Tin Mill Filter Cake MSA** 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			
<b>Skin/Dermal Sensitization</b> (covers Category 1)	1	1 <sup>d</sup>		<b>Warning</b>	May cause an allergic skin reaction.
<b>Carcinogenicity</b> (covers Categories 1A, 1B, 2)	1	1 <sup>g</sup>		<b>Danger</b>	May cause cancer.
<b>Toxic Reproduction</b> (covers Categories 1A, 1B, 2)	1A	1A <sup>h</sup>		<b>Danger</b>	May damage fertility or the unborn child.
<b>STOT Following Repeated Exposure</b> (covers Categories 1, 2)	1	1 <sup>j</sup>		<b>Danger</b>	Causes damage to central nervous system, and lungs through prolonged or repeated exposure.

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

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 **Tin Mill Filter Cake MSA** as a mixture. The following data has been determined for the components:

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• <b>Iron:</b> Rat LD<sub>50</sub> =98.6 g/kg (Oral/ Rat)<br/>Rat LD<sub>50</sub> =1060 mg/kg (Oral/ Rat)</li> <li>• <b>Sulfur:</b> LD<sub>50</sub> = 2500 mg/kg (Oral/Rabbit)</li> <li>• <b>Nickel:</b> LD<sub>50</sub> &gt;9000 mg/kg (Oral/Rat); NOAEC &gt;10.2 mg/l (Inhalation/Rat)</li> </ul> | <ul style="list-style-type: none"> <li>• <b>Arsenic:</b> LD<sub>50</sub> = 145 mg/kg (Oral/ Mouse)<br/>LD<sub>50</sub> = 763 mg/kg (Oral/ Rat)<br/>TD<sub>10</sub> = 7857 mg/kg (Oral/ Man)</li> </ul> |
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## Section 11 - Toxicological Information (continued)

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

- b. No Skin (Dermal) Irritation data available for **Tin Mill Filter Cake MSA** as a mixture. The following Skin (Dermal) Irritation data has been determined for the components:
- **Sulfur:** Rabbit irritation, edema and erythema 4 at 72 hours all resolved by day 7. (REACH)
  - **Arsenic:** Reported irritant
- c. No Eye Irritation data available for **Tin Mill Filter Cake MSA** as a mixture. The following Eye Irritation information was found for the components:
- **Iron:** Causes eye irritation.
  - **Nickel:** Slight eye irritation from particulate abrasion only.
  - **Arsenic:** Reported irritant
- d. No Skin (Dermal)/Respiratory Sensitization data available for **Tin Mill Filter Cake MSA** as a mixture or its individual components.
- **Nickel:** May cause allergic skin sensitization.
- e. No Aspiration Hazard data available for **Tin Mill Filter Cake MSA** as a mixture or its individual components.
- f. No Germ Cell Mutagenicity data available for **Tin Mill Filter Cake MSA** as a mixture. The following Germ Cell Mutagenicity information was found for the components:
- **Iron:** Both positive and negative data.
  - **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 **Tin Mill Filter Cake MSA** as carcinogens. The following Carcinogenicity information was found for the components:
- **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.
  - **Iron Oxide:** IARC-3, TLV-A4
  - **Lead:** NTP-R, IARC - 2B, EPA - Probable human carcinogen and ACGIH - A3
  - **Arsenic:** NTP-Known, IARC - 1, EPA - Human carcinogen and ACGIH - A1
- h. No Toxic to Reproduction data available for **Tin Mill Filter Cake MSA** as a mixture. The following Toxic to Reproductive information was found for the components:
- **Lead:** Male rats oral 60 day NOEL 250 mg/L. Effects on testes (lowest dose). Mouse reproduction study effects at 0.5% only dose tested. Rat teratology study LOEL 0.05% birth weight, size and effects on testis. Reproductive, endocrine and growth effects have been reported.
  - **Nickel:** Effects on fertility.
- i. No Specific Target Organ Toxicity (STOT) following a Single Exposure data available for **Tin Mill Filter Cake MSA** as a mixture. The following STOT following a Single Exposure data was found for the components:
- **Iron:** Irritating to respiratory tract.
- j. No Specific Target Organ Toxicity (STOT) following Repeated Exposure data was available for **Tin Mill Filter Cake MSA** as a mixture. The following STOT following Repeated Exposure data was found for the components:
- **Tin and Tin Oxide:** CICAD has found Occupational exposures to tin can cause a benign pneumoconiosis termed 'stannosis'.
  - **Iron Oxide:** Some pulmonary and lung effects reported.
  - **Lead:** Rat Oral 6 mo NOEL 0.0015 mg/kg CNS Testes and Kidney Effects. Rat inhalation – immunosuppression, Dermal – percutaneous absorption
  - **Nickel:** Rat 4 wk inhalation LOEL 4 mg/m<sup>3</sup> Lung and Lymph node histopathology. Rat 2 yr inhalation LOEL 0.1 mg/ m<sup>3</sup> Pigment in kidney, effects on hematopoiesis spleen and bone marrow and adrenal tumor, Rat 13 Week Inhalation LOAEC 1.0 mg/m<sup>3</sup> Lung weights and Alveolar histopathology.

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:

- **Tin:** Not Reported/ Not Classified
- **Sulfur:** Sulfur is harmful if swallowed, causes skin and eye irritation.
- **Iron** Upon inhalation, iron is an irritant to the lungs and gastrointestinal tract. The settling of iron particles in the eye results in siderosis. The extent of siderosis is affected by the location of the deposition. Deposition in the cornea results in a "rust ring" surrounding the area, which is associated with discomfort, hyperemia of the conjunctiva, and the influx of inflammatory cells.
- **Lead:** Acute exposure to lead can be manifested as abdominal pain, nausea, constipation, anorexia, or vomiting; and, in severe cases coma or death.
- **Nickel:** Nickel may cause allergic skin sensitization.
- **Arsenic:** Eye irritation has been reported in workers exposed to As containing dusts.

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## Section 11 - Toxicological Information (continued)

### Delayed (chronic) Effects by Component:

- **Tin:** No systemic effects have been reported from industrial exposure to tin. Occupational exposures to tin can cause a benign pneumoconiosis termed 'stannosis'. No cases of massive fibrosis from over-exposure to tin have been reported.
- **Sulfur:** Sulfur compounds, present in the fumes, may irritate the skin, eyes, lungs and gastrointestinal tract. May cause damage to the lung from prolonged or repeated exposure, Sulfur dioxide vapor is irritating to the respiratory tract and can cause lung damage with repeated or prolonged exposure.
- **Iron:** Iron dust may induce interstitial lung disease.
- **Lead:** Lead compounds can be toxic when ingested or inhaled. Lead is a cumulative poison. The predominant effects of excessive exposure are anemia, nervous system disorders, and kidney damage. Nervous system disorders may be displayed as irritability, headaches, insomnia, convulsions, muscular tremors, or palsy of the extremities. Excessive exposure can have adverse effects on human reproduction. Lead interferes with normal function of the adult and developing central nervous system in humans. Lead interferes with different enzyme systems. For this reason many organs or organ systems are potential targets for lead. Lead can damage fertility or the unborn child.
- **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. 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 2017 TLVs® and BEIs® lists insoluble nickel compounds as confirmed human carcinogens. Suspected of damaging the unborn child.
- **Arsenic:** Known Human Carcinogen (skin cancer). Multiple organ tumors observed after inhalation and drinking water exposures.

## Section 12 - Ecological Information

**12(a) Ecotoxicity (aquatic & terrestrial):** No data available for the product, **Tin Mill Filter Cake MSA** as a mixture. 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:

- **Nickel Oxide:** IUCLID found LC<sub>50</sub> 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

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

### Additional Information:

**Hazard Category:** Category 1

**Signal Word:** Warning

**Hazard Symbol:**



**Hazard Statement:** Very Toxic to aquatic life with long lasting effects.

## 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 11 01 09 (sludges and filter cakes containing dangerous substances; hazardous waste).

**Please note this information is for Tin Mill Filter Cake MSA 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 **Tin Mill Filter Cake MSA** 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 Regulated

**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) **Non-bulk:** NA

c) **Bulk:** NA

**Quantity Limitations**

a) **Passenger Aircraft or Rail:** NA

b) **Cargo Aircraft Only:** NA

**Vessel Stowage Location:** 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.

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### Section 14 - Transport Information (continued)

**Regulations Concerning the International Carriage of Dangerous Goods by Road (ADR)** does not regulate **Tin Mill Filter Cake MSA** as a hazardous material.

<b>Shipping Name: Not Regulated</b> <b>Classification Code:</b> NA <b>UN No.:</b> NA <b>Packing Group:</b> NA <b>ADR Label:</b> NA <b>Special Provisions:</b> NA <b>Limited Quantities:</b> NA	<b>Packaging</b> a) <b>Packing Instructions:</b> NA b) <b>Special Packing Provisions:</b> NA c) <b>Mixed Packing Provisions:</b> NA	<b>Portable Tanks &amp; Bulk Containers</b> a) <b>Instructions:</b> NA b) <b>Special Provisions:</b> NA
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**International Air Transport Association (IATA)** does not regulate **Tin Mill Filter Cake MSA** as a hazardous material.

<b>Shipping Name: Not Regulated</b> <b>Class/Division:</b> NA <b>Hazard Label (s):</b> NA <b>UN No.:</b> NA <b>Packing Group:</b> NA <b>Excepted Quantities (EQ):</b> NA	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: center;">Passenger &amp; Cargo Aircraft</th> </tr> <tr> <td style="width: 50%;"><b>Limited Quantity (EQ)</b></td> <td style="width: 50%;"></td> </tr> <tr> <td><b>Pkg Inst:</b> NA</td> <td><b>Pkg Inst:</b> NA</td> </tr> <tr> <td><b>Max Net Qty/Pkg:</b> NA</td> <td><b>Max Net Qty/Pkg:</b> NA</td> </tr> </table>	Passenger & Cargo Aircraft		<b>Limited Quantity (EQ)</b>		<b>Pkg Inst:</b> NA	<b>Pkg Inst:</b> NA	<b>Max Net Qty/Pkg:</b> NA	<b>Max Net Qty/Pkg:</b> NA	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"><b>Cargo Aircraft Only:</b></td> <td style="width: 50%;"><b>Special Provisions:</b></td> </tr> <tr> <td><b>Pkg Inst:</b> NA</td> <td>NA</td> </tr> <tr> <td><b>Max Net Qty/Pkg:</b></td> <td><b>ERG Code:</b> NA</td> </tr> <tr> <td>NA</td> <td></td> </tr> </table>	<b>Cargo Aircraft Only:</b>	<b>Special Provisions:</b>	<b>Pkg Inst:</b> NA	NA	<b>Max Net Qty/Pkg:</b>	<b>ERG Code:</b> NA	NA	
Passenger & Cargo Aircraft																		
<b>Limited Quantity (EQ)</b>																		
<b>Pkg Inst:</b> NA	<b>Pkg Inst:</b> NA																	
<b>Max Net Qty/Pkg:</b> NA	<b>Max Net Qty/Pkg:</b> NA																	
<b>Cargo Aircraft Only:</b>	<b>Special Provisions:</b>																	
<b>Pkg Inst:</b> NA	NA																	
<b>Max Net Qty/Pkg:</b>	<b>ERG Code:</b> NA																	
NA																		

Pkg Inst – Packing Instructions

Max Net Qty/Pkg – Maximum Net Quantity per Package

ERG – Emergency Response Drill Code

**Tin Mill Filter Cake MSA** 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, **Tin Mill Filter Cake MSA** 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
7439-92-1	Lead	0.1 max
7440-02-0	Nickel	0.1 max
744-38-2	Arsenic	0.1 max

**State Regulations:** The product, **Tin Mill Filter Cake MSA** as a mixture is not listed in any state regulations. However, individual components of the product are listed in various state regulations.

California Prop. 65:  This product can expose you to nickel which is known to the State of California to cause cancer, and lead and lead compounds which is known to the State of California to cause cancer and reproductive toxicity. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

**Other Regulations:**

**WHMIS Classification (Canadian):** The product, **Tin Mill Filter Cake MSA** is not listed as a mixture. However individual components are listed.

Ingredients	WHMIS Classification
Sulfur	Flammable solid- Category 2; Skin Corrosion - Category 2; Combustible dusts
Iron	Combustible dusts - Category 1
Lead	Carcinogenicity - Category 2; Reproductive Toxicity - Category 1A; Specific target organ toxicity - repeated exposure - Category 1
Nickel	Skin sensitization – Category 1; Carcinogenicity – Category 2; Specific target organ toxicity - repeated exposure - Category 1
Arsenic	Carcinogenicity – Category 1A

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:**

08/15/2017 – Update WHMIS 2015

2/11/2014 - Update to OSHA HAZ COM 2012

**Expiration Date:** 08/15/2020

## Tin Mill Filter Cake MSA

USS IHS No.: IHS 82496

Rev. 08/17

### Section 16 - Other Information (continued)

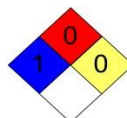
**Additional Information:**

**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.