United States Steel Corporation

Coke Oven Gas Pipeline Residue

Safety Data Sheet (SDS)

USS IHS Number: IHS13960
(Replaces USS Code Number IHS-13960/SRP-019)

Locations: Mon Valley

Original: 12/16/2010 **Revision: 10/22/2020**

Section 1 – Identification

1(a) Product Identifier used on Label: Coke Oven Gas Pipeline Residue

1(b) Other Means of Identification: Coke Oven Gas Line Sludge, Coke Oven Gas Line Cleaning Sludge, Moon Dust

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

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

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

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

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

Section 2 – Hazard(s) Identification

2(a) Classification of the Chemical: Coke Oven Gas Pipeline Residue 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)
	Acute Toxicity-Oral - 3	**WARNING**	Toxic if swallowed. Causes severe skin burns and eye damage. May cause cancer. May cause genetic defects. May damage fertility or the unborn child. Causes serious eye irritation. Causes central nervous system depression, respiratory irritation drowsiness or dizziness and damage to lungs, liver and blood cells. Causes damage to blood and blood forming system through prolonged or repeated exposure. Causes damage to lungs and central nervous system through prolonged or repeated inhalation exposure. May form combustible dust concentrations in air.
	Skin Irritation - 1B Eye Irritation - 2A		
	Carcinogenicity - 1A Germ Cell Mutagenicity - 1B Reproductive Toxicity - 1B Single Target Organ Toxicity (STOT) Single Exposure - 1 STOT Repeated Exposure - 1		
None	Combustible Dust		

Precautionary Statement(s):

Prevention	Response	Storage/Disposal
Do not breathe dusts or fume. Wear protective gloves / protective clothing / eye protection / face protection. Wash thoroughly after handling. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood.	If exposed, concerned or feel unwell: Get medical advice/attention. If inhaled: Remove person to fresh air and keep comfortable for breathing. Immediately call a poison center or doctor. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.	Store locked up. Dispose of contents in accordance with federal, state and local regulations.

Section 2 – Hazard(s) Identification

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

Precautionary Statement(s) (continued):

Prevention	Response	Storage/Disposal
Do not eat, drink or smoke when using this product.	If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse. If swallowed: Immediately call a poison center or doctor. Rinse mouth. Do NOT induce vomiting.	

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
Sulfur	7704-34-9	231-722-6	40-55
Iron	7439-89-6	231-096-4	5-15
Ammonia	7664-41-7	231-635-3	1-5
Cyanide	57-12-5	200-821-6	0.1-4
Crystalline Silica (as Quartz)	14808-60-7	238-878-4	0-1
Benzene	71-43-2	200-753-7	0-0.5

EC- European Community
CAS- Chemical Abstract Service

Section 4 – First-aid Measures

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

- **Inhalation:** If Inhaled: Remove person to fresh air and keep comfortable for breathing. Immediately call a poison center or doctor.
- **Eye Contact:** If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice attention.
- **Skin Contact:** If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse.
- **Ingestion:** If swallowed: Immediately call a poison center or doctor. Rinse mouth. Do NOT induce vomiting.

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. Particles of iron or iron compounds may become imbedded in the eye.
- **Skin:** Skin contact with dusts may cause irritation or sensitization, possibly leading to dermatitis. Skin contact with 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: Use extinguishers appropriate for surrounding materials.

5(b) Specific Hazards Arising from the Chemical: When burned, toxic smoke and vapor may be emitted. **Coke Oven Gas Pipeline Residue** may form combustible mixtures in the air.

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. 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.

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. 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.

7(b) Conditions for Safe Storage, including any Incompatibilities: 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 [1]	ACGIH TLV [2]	NIOSH REL [3]	IDLH [4]
Sulfur	NE [5]	NE [6]	NE	NE
Iron	10 mg/m³ (iron oxide fume)	5.0 mg/m³ (iron oxide, respirable fraction[7])	5.0 mg/m³ (iron oxide dust and fume)	2,500 mg/m³ (as Fe)
Ammonia	50 ppm	25 ppm "STEL" 35 ppm	25 ppm "STEL" 35 ppm	300 ppm
Cyanide (free)	NE	NE	NE	NE
Crystalline Silica (as Quartz)	0.05 mg/m³ "AL" 0.025 mg/m³	0.025 mg/m³ (as respirable fraction)	0.05 mg/m³ (as respirable dust), Ca	50 mg/m³ (as quartz, Tripoli) 25 mg/m³ (as cristobalite, tridymite), Ca
Benzene	1.0 ppm * "STEL" 5.0 ppm *	0.5 ppm, skin "STEL" 2.5 ppm	0.1 ppm "STEL" 1.0 ppm	500 ppm, Ca

NE - None Established

* Exposure limits based on 29 CFR 1910.1028, however refer to 29 CFR 1910.1000, Table Z-2 for exclusions.

1. OSHA PELs (Permissible Exposure Limits) are 8-hour TWA (time-weighted average) concentrations unless otherwise noted. A ("C") designation denotes a ceiling limit, which should not be exceeded during any part of the working exposure unless otherwise noted. A Short Term Exposure Limit (STEL) is defined as a 15-minute exposure, which should not be exceeded at any time during a workday. An Action level (AL) is used by OSHA and NIOSH to express a health or physical hazard. They indicate the level of a harmful or toxic substance/activity, which requires medical surveillance, increased industrial hygiene monitoring, or biological monitoring. Action Levels are generally set at one half of the PEL but the actual level may vary from standard to standard. The intent is to identify a level at which the vast majority of randomly sampled exposures will be below the PEL.
2. Threshold Limit Values (TLV) established by the American Conference of Governmental Industrial Hygienists (ACGIH) are 8-hour TWA concentrations unless otherwise noted. ACGIH TLVs are for guideline purposes only and as such are not legal, regulatory limits for compliance purposes. DSEN – May cause dermal sensitization. This notation is used to indicate the potential for dermal sensitization resulting from the interaction of an absorbed agent and ultraviolet light (i.e. photosensitization). RSEN – May cause respiratory sensitization.
3. The National Institute for Occupational Safety and Health Recommended Exposure Limits (NIOSH-REL)- Compendium of Policy and Statements. NIOSH, Cincinnati, OH (1992). NIOSH is the federal agency designated to conduct research relative to occupational safety and health. As is the case with ACGIH TLVs, NIOSH RELs are for guideline purposes only and as such are not legal, regulatory limits for compliance purposes.
4. The "immediately dangerous to life or health air concentration values (IDLHs)" are used by NIOSH as part of the respirator selection criteria and were first developed in the mid-1970's by NIOSH. The Documentation for Immediately Dangerous to Life or Health Concentrations (IDLHs) is a compilation of the rationale and sources of information used by NIOSH during the original determination of 387 IDLHs and their subsequent review and revision in 1994. Ca is designated as carcinogen.
5. PNOR (Particulates Not Otherwise Regulated). All inert or nuisance dusts, whether mineral, inorganic, or organic, not listed specifically by substance name are covered by a limit which is the same as the inert or nuisance dust limit of 15 mg/m³ for total dust and 5.0 mg/m³ for the respirable fraction.
6. PNOS (Particulates Not Otherwise Specified). Particulates identified under the PNOS heading are "nuisance dusts" containing no asbestos or crystalline silica.
7. Respirable fraction. The concentration of respirable dust for the application of this limit is to be determined from the fraction passing a size-selector with the characteristics defined in ACGIH 2020 TLVs ® and BEIs ® Appendix D, paragraph C.

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 … (continued)

Section 8 - Exposure Controls / Personal Protection

8(c) Individual Protection Measures (continued):

- **Respiratory Protection (continued):** … (continued) 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.
- **Skin**: Persons handling this product should wear appropriate clothing to prevent skin contact. Wear protective gloves.
- **Other Protective Equipment**: An eyewash fountain and deluge shower should be readily available in the work area.

Section 9 - Physical and Chemical Properties

9(a) Appearance (physical state, color, etc.): Dark green to black, granular
9(b) Odor: sulfur
9(c) Odor Threshold: ND
9(d) pH: ND
9 (e) Melting Point/Freezing Point: ND
9(f) Initial Boiling Point and Boiling Range: NA
9(g) Flash Point: >140°F (>60°C)
9(h) Evaporation Rate: NA
9(i) Flammability (solid, gas): Combustible
9(j) Lower/Upper Flammability or Explosive Limits: NA
9(k) Vapor Pressure: ND
9(l) Vapor Density (Air = 1): NA
9(m) Relative Density: ND
9(n) Solubility(ies): ND
9(o) Partition Coefficient n-octanol/water: ND
9(p) Auto-ignition Temperature: ND
9(q) Decomposition Temperature: ND
9(r) Viscosity: 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: **Coke Oven Gas Pipeline Residue** 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. Flames and ignition sources where dust can accumulate.
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 **Coke Oven Gas Pipeline Residue** 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)	3	3[a]		**Danger**	Toxic if swallowed.
Skin Irritation (covers Categories 1A, 1B, and 2)	1B	1B[b]		**Danger**	Causes severe skin burns and eye damage.
Eye Damage/Irritation (covers Categories 1, 2A and 2B)	2	2A[c]		**Warning**	Causes serious eye irritation.
Germ Cell Mutagenicity (covers Categories 1A, 1B and 2)	1B	1B[f]		**Danger**	May cause genetic defects.
Carcinogenicity (covers Categories 1A, 1B and 2)	1A	1A[g]		**Danger**	May cause cancer.
Toxic Reproduction (covers Categories 1A, 1B and 2)	1B	1B[h]		**Danger**	May damage fertility or the unborn child.
Specific Target Organ Toxicity (STOT) Following Single Exposure (covers Categories 1-3)	1	1[i]		**Danger**	May cause central nervous system depression, respiratory irritation drowsiness or dizziness and damage to lungs, liver and blood cells.

Section 11 - Toxicological Information (continued)

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

Hazard Classification	Hazard Category		Hazard Symbols	Signal Word	Hazard Statement
	EU	OSHA			
STOT Following Repeated Exposure (covers Categories 1 and 2)	1	1[j]		**Danger**	Causes damage to blood and blood forming system through prolonged or repeated exposure. Causes damage to lungs and central nervous system through prolonged or repeated inhalation 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_{50} or LD_{50} has been established for **Coke Oven Gas Pipeline Residue**. The following data has been determined for the components:

- **Sulfur:** LD_{50} = 2500 mg/kg (Oral/Rabbit)
- **Ammonia:** LD_{50} = 350 mg/kg (Oral/Rat), LC_{50} = 13770 mg/m^3 (Inhalation/Rat), LC_{50} = 2000 ppm (Inhalation/Rat) (IUCLID)
- **Silica:** LD_{50} = 500 mg/kg (Inhalation/Rat) (IUCLID)
- **Iron:** LD_{50}= 1060 mg/kg (Oral/Rat)
- **Cyanide:** LD_{50} = 3.62 mg/kg (Oral/rat), LD_{50} = <29 mg/kg (Dermal/rabbit), LC_{50} = <68 mg/m^3 (Inhalation/rat)
- **Benzene:** LD_{50} 3.8 (2.9-4.8) and 5.6 (4.0-7.8) ml/kg young and old resp (Oral/rat), LD_{50} > 9.4 ml/kg (abraded skin)(Dermal/rabbit), LC_{50} > 13700 ppm (Inhalation/female rat)

b. No Skin (Dermal) Irritation data available for **Coke Oven Gas Pipeline Residue** 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)
- **Ammonia:** Corrosive and irritating.
- **Benzene:** Irritating to the skin.

c. No Eye Irritation data available for **Coke Oven Gas Pipeline Residue** as a mixture. The following Eye Irritation information was found for the components:

- **Iron:** Rabbit draize - irritating (IUCLID).
- **Silicon Dioxide:** Crystalline silica may cause abrasion of the cornea**.**
- **Benzene:** Irritating to the eyes.

d. No Skin (Dermal)/Respiratory Sensitization data available **for Coke Oven Gas Pipeline Residue** as a mixture or its individual components.

e. No Aspiration Hazard data available for **Coke Oven Gas Pipeline Residue** as a mixture or its individual components.

f. No Germ Cell Mutagenicity data available for **Coke Oven Gas Pipeline Residue** as a mixture. The following Germ Cell Mutagenicity information was found for the components:

- **Benzene:** Positive In vitro and In vivo clastogenicity results.

g. Carcinogenicity: IARC, NTP, and OSHA do not list **Coke Oven Gas Pipeline Residue** as carcinogens. The following Carcinogenicity information was found for the components:

- **Iron Oxide (Fe_2O_3):** IARC-3, unclassifiable as to carcinogenicity in humans; ACGIH TLV-A4, not classifiable as a human carcinogen
- **Silica, crystalline (as quartz):** IARC-1 (silica, crystalline), carcinogen to humans; ACGIH TLV-A2 (silica, crystalline), suspected human carcinogen; NTP–K, known to be a carcinogen; NIOSH–Ca, potential occupational carcinogen; OSHA-Ca, carcinogen.
- **Benzene:** IARC-1, carcinogen to humans; ACGIH TLV-A1, confirmed human carcinogen; NIOSH–Ca, potential occupational carcinogen; NTP–K, known to be a carcinogen; EPA-A, human carcinogen (by inhalation route of entry), EPA-K, cannot be determined, not classifiable as to human carcinogenicity; OSHA-Ca, carcinogen
- **Cyanide (free):** EPA-D, not classifiable as to human carcinogenicity (CBD, cannot be determined).

h. No Toxic Reproduction data available for **Coke Oven Gas Pipeline Residue** as a mixture. The following Toxic Reproduction information was found for the components:

- **Benzene**: Both reproductive and teratogenicity positive results found.

i. No Specific Target Organ Toxicity (STOT) following a Single Exposure data available for **Coke Oven Gas Pipeline Residue** as a mixture. The following STOT following a Single Exposure data was found for the components:

- **Anhydrous Ammonia:** Bradypnea, bradycardia, changes in serum enzyme levels, histological changes in the lung.
- **Cyanide** - Causes headache dizziness, abnormal heart rhythms (arrhythmia), loss of consciousness, coma and death.
- **Benzene:** Central and peripheral nervous system Depression, lung liver (vacuoled hepatocytes) and red blood cells. Mild to moderate respiratory tract irritation expected with breathing vapors.

j. No Specific Target Organ Toxicity (STOT) following Repeated Exposure data was available **for Coke Oven Gas Pipeline Residue** as a whole. The following STOT following Repeated Exposure data was found for the components:

- **Anhydrous Ammonia-** Eye irritation, corneal opacities, and diffuse lung inflammation.
- **Cyanide -** Dermatitis, skin ulcers, nose bleeds, dizziness, confusion, kidney damage, CNS damage, and possible thyroid, liver ans spleen damage
- **Silicon Dioxide:** Repeated exposure to crystalline silica causes silicosis and kidney damage as well as increased incidence of autoimmune disorders in humans.
- **Benzene:** Hematopoietic system, spleen, and liver damage. Induced blood dyscrasias in humans were characterized by erythrocytic anisocytosis and poikilocytosis, anemia, decreased hemoglobin, and reduced hematocrit. In addition, benzene is a human carcinogen.

Section 11 - Toxicological Information (continued)

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

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 2020, 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:

- **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.
- **AMMONIA:** Ammonia produces corrosive burns. Injury is dependent upon duration of exposure and ammonia concentration. Injury varies from mild edema and erythema to severe burns and life threatening pulmonary edema.
- **CYANIDES:** Fatal if swallowed, in contact with skin or inhaled. Causes irritation to skin and eyes. Can be absorbed through the skin. Causes headache dizziness, abnormal heart rhythms (arrhythmia), loss of consciousness, coma and death.
- **CRYSTALINE SILICA (Silicon Dioxide):** Causes irritation and inflammation of the respiratory tract. May cause abrasion of the cornea. Inhalation may cause cough. A single exposure to very high airborne levels may cause lung irritation in exposed humans
- **BENZENE:** Excessive exposures may cause irritation to eyes, skin, nose, throat, lungs, and respiratory tract. Central nervous system effects may occur due to excessive exposures. Excessive exposures may result in headaches, nausea, sleep disturbances, excitability, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

Delayed (chronic) Effects by Component:

- **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
- **AMMONIA:** Prolonged or repeated exposures may result in respiratory disorders. Chronic obstructive pulmonary disease may also develop from fibrous obstruction of the smaller always. Repeated exposure may cause chronic cough, bronchitis, asthma, vocal cord dysfunction, reactive airways disease, and lung fibrosis. A permanent decrement in pulmonary function has been noted to occur.
- **CYANIDES:** Repeat contact causes dermatitis, skin ulcers, nose bleeds, dizziness, confusion, kidney damage, CNS damage, and possible thyroid, liver and spleen damage.
- **SILICA (Crystalline Quartz):** Chronic exposure can cause Silicosis, a form of lung scarring that can cause shortness of breath, reduced lung function, and in severe cases, death. Repeated exposure may cause kidney damage as well as increased incidence of autoimmune disorder.
- **BENZENE:** Early signs and symptoms of chronic overexposure include effects on CNS and the GI tract (headache, loss of appetite, drowsiness, nervousness, and pallor) but the major manifestation of toxicity is aplastic anemia. Bone marrow depression may occur resulting in leucopoenia, anemia, or thrombocytopenia (leukemogenic action). With continued overexposure the disease states may progress to pancytopenia resulting from bone marrow aplasia. Evidence has linked benzene in the etiology of leukemia.

Section 12 - Ecological Information

12(a) Ecotoxicity (aquatic & terrestrial): No data available for the product, **Coke Oven Gas Pipeline Residue** 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:

- **Anhydrous Ammonia:** LC_{50} (fat head minnow) = 1 - 1.5 ppm LC_{50} (invertebrates) = 25.4 mg/L
- **Cyanide:** LC_{50} (fish) = <0.113 mg/L
- **Benzene**: LC50 Lepomis macrochirus (bluegill sunfish) 20 mg/l/24 to 48 hr /Conditions of bioassay not specified/; LC50 Salmo trutta (brown trout yearlings) 12 mg/l/1 hr (static bioassay).

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: Acute 1, Chronic 2 **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 16 0709 (waste containing other dangerous substances; hazardous waste)

Please note this information is for Coke Oven Gas Pipeline Residue 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 **Coke Oven Gas Pipeline Residue** as a hazardous material on shipments under 2000 lbs. Shipments over 2000 lbs are regulated. All federal, state, and local laws and regulations that apply to the transport of this type of material must be adhered to.

Shipping Name: UN3077, Environmentally hazardous substances solid (benzene), 9, III **Shipping Symbols:** G **Hazard Class:** 9 **UN No.:** UN3077 **Packing Group:** III **DOT/ IMO Label:** 9 **Special Provisions (172.102):** 8, 146, 335, B54, IB8, IP3, N20, T1, TP33	**Packaging Authorizations:** **a) Exceptions:** 155 **b) Non-bulk:** 213 **c) Bulk:** 240	**Quantity Limitations:** **a) Passenger Aircraft or Rail:** No Limit **b) Cargo Aircraft Only:** No Limit **Vessel Stowage Location:** A **DOT reportable quantities**: Benzene

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) regulates **Coke Oven Gas Pipeline Residue** as a hazardous material.

Shipping Name: Environmentally hazardous substances solid (benzene), 9, III **Classification Code:** 9 **UN No.:** 3077 **Packing Group:** III **ADR Label:** NA **Special Provisions:** 179, 274, 335, 909 **Limited Quantities:** 5 Kg	**Packaging:** **a) Packing Instructions:** P002, LP02 **b) Special Packing Provisions:** PP12 **c) Mixed Packing Provisions:** B3	**Portable Tanks & Bulk Containers:** **a) Instructions:** T1, BK2 **b) Special Provisions:** TP33

International Air Transport Association (IATA) regulates **Coke Oven Gas Pipeline Residue** as a hazardous material.

	Passenger & Cargo Aircraft			
	Limited Quantity (EQ)		**Cargo Aircraft Only:**	**Special Provisions:**
Shipping Name: Environmentally hazardous substances solid (benzene), 9, II **Class/Division:** 9 **Hazard Label (s):** Miscellaneous **UN No.:** 3077 **Packing Group:** III **Excepted Quantities (EQ):** E1	**Pkg Inst:** Y911 **Max Net Qty/Pkg:** 30 Kg G	**Pkg Inst:** 911 **Max Net Qty/Pkg:** 400 Kg	**Pkg Inst:** 911 **Max Net Qty/Pkg:** 400 Kg	A97, A158 **ERG Code:** 9L

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

Coke Oven Gas Pipeline Residue has a **Transport Dangerous Goods (TDG)** classification: Environmentally hazardous substances solid (benzene), 9, II

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, **Coke Oven Gas Pipeline Residue** 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
71-43-2	Benzene	0-0.5

Section 15 - Regulatory Information (continued)

State Regulations: The product, **Coke Oven Gas Pipeline Residue** 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:

This product can expose you to chemicals including silica, crystalline (airborne particles of respirable size), and benzene which is known to the State of California to cause cancer; and benzene and hydrogen cyanide (HCN) & cyanide salts (CN salts) which is known to the State of California to cause reproductive toxicity. For more information go to www.P65Warnings.ca.gov.

Other Regulations:

WHMIS Classification (Canadian): The product, **Coke Oven Gas Pipeline Residue** is not listed as a whole. However individual components are listed.

Ingredients	WHMIS Classification
Sulfur	Flammable solids - Category 2; Skin corrosion/irritation - Category 2; Combustible dusts*
Iron	Combustible dusts - Category 1 (may form combustible dust concentrations in air)
Ammonia	Flammable gases - Category 1 [Flammable limit - concentration range = 13% (15 - 28 %)]; Gases under pressure - Liquefied gas; Acute toxicity - inhalation - Category 3; Serious eye damage/eye irritation - Category 1; Skin corrosion/irritation - Category 1 (Forms a corrosive substance upon contact with water: ammonium hydroxide.);
Silica Quartz	Carcinogenicity - Category 1A; Specific target organ toxicity - repeated exposure - Category 1
Benzene	Flammable liquids - Category 2 [Flash point = -11°C closed cup (non-reported method) and boiling point = 80°C]; Skin corrosion/irritation - Category 2; Serious eye damage/eye irritation - Category 2; Germ cell mutagenicity - Category 1B; Carcinogenicity - Category 1A; Specific target organ toxicity - repeated exposure - Category 1; Aspiration hazard - Category 1 (Liquid hydrocarbon with a kinematic viscosity of 0.74 mm^2/s at 20°C)

* This product belongs to the hazard class "Combustible dust" if 5% or more by weight of its composition has a particle size < 500 µm.

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:

10/22/2020 – Update to sections 2, 8, 11, 15
06/26/2017 – Update WHMIS 2015
2/11/2014 - Update to OSHA HAZ COM 2012
12/16/2010 - Original

Expiration Date: 10/22/2023

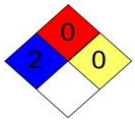
Additional Information:

Hazardous Material Identification System (HMIS) Classification

Health Hazard	2
Fire Hazard	0
Physical Hazard	0

HEALTH= **2**, Temporary or minor injury may occur.
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 =**2**, Intense or continued exposure could cause temporary incapacitation or possible residual injury unless prompt medical attention is given.
FIRE = **0,** Materials that will not burn.
INSTABILITY = **0**, Normally stable, even under fire exposure conditions, and are not reactive with water.

ABBREVIATIONS/ACRONYMS:

ACGIH	American Conference of Governmental Industrial Hygienists	**NIF**	No Information Found
BEIs	Biological Exposure Indices	**NIOSH**	National Institute for Occupational Safety and Health
CAS	Chemical Abstracts Service	**NTP**	National Toxicology Program
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	**ORC**	Organization Resources Counselors
CFR	Code of Federal Regulations	**OSHA**	Occupational Safety and Health Administration
CNS	Central Nervous System	**PEL**	Permissible Exposure Limit
GI, GIT	Gastro-Intestinal, Gastro-Intestinal Tract	**PNOR**	Particulate Not Otherwise Regulated
HMIS	Hazardous Materials Identification System	**PNOC**	Particulate Not Otherwise Classified
IARC	International Agency for Research on Cancer	**PPE**	Personal Protective Equipment
LC50	Median Lethal Concentration	**ppm**	parts per million
LD50	Median Lethal Dose	**RCRA**	Resource Conservation and Recovery Act
LD_{Lo}	Lowest Dose to have killed animals or humans	**RTECS**	Registry of Toxic Effects of Chemical Substances
LEL	Lower Explosive Limit	**SARA**	Superfund Amendment and Reauthorization Act
µg/m^3	microgram per cubic meter of air	**SCBA**	Self-contained Breathing Apparatus

Section 16 - Other Information (continued)

ABBREVIATIONS/ACRONYMS (continued):

mg/m^3	milligram per cubic meter of air		**STEL**	Short-term Exposure Limit
mppcf	million particles per cubic foot		**TLV**	Threshold Limit Value
SDS	Safety Data Sheet		**TWA**	Time-weighted Average
MSHA	Mine Safety and Health Administration		**UEL**	Upper Explosive Limit
NFPA	National Fire Protection Association			

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