United States Steel Corporation

Light Oil

Safety Data Sheet (SDS)

USS IHS Number: 4

(Replaces USS Code Number C1040; SRP 53)

Locations: Clairton, Gary, Granite City, Hamilton, Lake Erie Works

Original: 12/16/2010 **Revision: 11/06/2020**

Section 1 – Identification

1(a) Product Identifier Used on Label: Light Oil

1(b) Other Means of Identification: Crude Benzol, BTX, or BTXE

1(c) Recommended Use of the Chemical and Restrictions on Use: Chemical Feed Stock

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: Light Oil 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)
	Flammable Liquid, Category - 2	**DANGER**	Highly flammable liquid and vapor. Toxic if inhaled. May be fatal if swallowed and enters airways. May cause genetic defects. May cause cancer. May damage fertility or the unborn child. May cause 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 olfactory system. Causes damage to lungs and central nervous system through prolonged or repeated inhalation exposure. Causes skin irritation. Causes serious eye irritation. May cause an allergic skin reaction.
	Acute Toxicity, Inhalation - 3		
	Aspiration Hazard - 1 Germ Cell Mutagenicity - 1B Carcinogenicity - 1A Reproductive Toxicity - 1A Single Target Organ Toxicity (STOT) Single Exposure - 2 STOT Repeated Exposure - 1		
	Skin Irritation - 2 Eye Irritation - 2A Skin Sensitization - 1		

Precautionary Statement(s):

Prevention	Response	Storage/Disposal
Keep away from heat/sparks/open flames/hot surfaces – No smoking. Keep container tightly closed. Ground/Bond container and receiving equipment.	If inhaled: Remove person to fresh air and keep comfortable for breathing. 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. Store in well ventilated place. Keep cool. Dispose of contents in accordance with federal, state and local regulations.

Section 2 – Hazard(s) Identification (continued)

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

Precautionary Statement(s) (continued):

Prevention	Response	Storage/Disposal
Use explosion-proof electrical/ventilating/ lighting/equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Wash thoroughly after handling. 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. Do not breathe / gas / mist / vapor / spray. Wear protective gloves / protective clothing / eye protection / face protection. Use only outdoors or in well ventilated areas. Contaminated work clothing must not be allowed out of the workplace.	If on skin (or hair): Take off immediately all contaminated clothing and wash it before reuse. Wash/shower with plenty of water. If skin irritation occurs: Get medical advice/attention. In case of fire: Use foam, carbon dioxide, dry chemical to extinguish. If swallowed: Immediately call a poison center or doctor. Do NOT induce vomiting. If exposed, concerned or feel unwell: Get medical advice/attention, call a poison center or Doctor.	Store in well ventilated place. Keep cool. 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

Section 3 – Composition/Information on Ingredients

3(a-c) Chemical Name, Common Name (synonyms), CAS Number and Other Identifiers, and Concentration: (Light Oil Cas Number 65996-78-3)

Chemical Name	CAS Number	EC Number	% weight
Benzene	71-43-2	200-753-7	60-85
Toluene	108-88-3	203-625-9	3-25
Naphthalene	91-20-3	202-049-5	0-6
Styrene, monomer	100-42-5	202-851-5	0-3
Indene	95-13-6	202-393-6	0-3
Carbon Disulfide	75-15-0	200-843-6	0-3
Thiophene	110-02-1	203-729-4	0-1
m-Xylene	108-38-3	203-576-3	0-4.8
p-Xylene	106-42-3	203-396-5	0-4.8
o-Xylene	95-47-6	202-422-2	0-1.2
Various Aromatic Hydrocarbons *	Not Applicable (NA)	NA	Balance

EC - European Community

CAS - Chemical Abstract Service

* Each less than 1.0% and no known carcinogens

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.
- **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 and wash it before reuse. Wash/shower with plenty of water. If skin irritation occurs: Get medical advice/attention.
- **Ingestion:** If swallowed: Immediately call a poison center or doctor. Do NOT induce vomiting.

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

- **Inhalation:** May produce airway irritation. Systemic effects may include headache, dizziness, and loss of coordination, collapse and death. Systemic effects may include CNS excitation and cardiovascular depression. Inhalation of coal tar light oil may cause bronchial irritation, cough, hoarseness and/or pulmonary edema. Repeated or prolonged exposure may cause irritation of the respiratory tract, nausea, dizziness, headache, staggering, anorexia, and central nervous system problems. Inhalation of excessive concentrations of this product may cause confusion, convulsions, and abdominal pain. Kidney and/or liver functions may be disturbed.
- **Eye:** Direct contact may produce irritation. Vapors may be moderately irritating. Irritation and reversible corneal injury may occur.

Section 4 – First-aid Measures (continued)

4(b) Most Important Symptoms/Effects, Acute and Delayed (chronic) (continued):

- **Skin:** May cause moderate to severe irritation, with prolonged contact resulting in dryness and defatting, characterized by dermatitis, dryness, blistering and/or redness. Material can be absorbed through the skin producing systemic toxicity and possible death.
- **Ingestion:** Unlikely route of exposure. If ingested, may cause headache, drunkenness, nausea, vomiting, weakness, convulsions, unconsciousness and coma. Aspiration of this material into the lungs can cause chemical pneumonia.

4(c) Immediate Medical Attention and Special Treatment: If quantity ingested is 1.0 ml/kg or greater, careful gastric lavage may be indicated, being careful to avoid aspiration.

Section 5 – Fire-fighting Measures

5(a) Suitable (and unsuitable) Extinguishing Media: In case of fire: Use foam, carbon dioxide, dry chemical to extinguish. Water may be ineffective.

5(b) Specific Hazards Arising from the Chemical: Heat/fire conditions: vapors form flammable /explosive mixtures in air. Vapors heavy, may travel (ground, pit, sewer) to ignition source-flash. Open/closed containers may contain flammable/explosive vapors. Under fire conditions, may emit irritant/toxic gas and/or fumes. Closed containers may explode when exposed to extreme heat (fire). The hazardous combustion products that may be generated include: Carbon Dioxide, Carbon Monoxide, and toxic organic acids.

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. Benzene is considered a severe explosion hazard. 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: Remove ignition sources and ventilate enclosed places. Clean-up personnel should wear a respirator and appropriate chemical/thermal protective clothing dictated by the magnitude of the spill or leak. If necessary (for larger quantities), contain spill with sand or earth to prevent entry into sewers and waterways. This product is a US EPA defined ignitable hazardous waste**.** Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable federal, state, and local regulations

6(b) Methods and Materials for Containment and Clean Up: Absorb as much of the spill as possible with dry sand, earth, or other suitable material. Remaining benzene must be flushed with large amounts of water. Do not flush into sewer or other confined space due to explosion hazards. Reportable spills must be reported to the National Response Center (1-800-424-8802). 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: Ground/Bond container and receiving equipment**.** Use explosion-proof electrical/ventilating/ lighting/ equipment**.** Use only non-sparking tools. Obtain special instructions before use. Take precautionary measures against static discharge. Do not handle until all safety precautions have been read and understood. Use only outdoors or in well ventilated areas. Do not breathe gas / mist / vapor / spray. Do not eat, drink or smoke when using this product. Wash thoroughly after handling. Avoid direct contact on skin, eyes or on clothing. Handle and use in accordance with OSHA 29 CFR1910.106 or local codes. Observe proper industrial hygiene practices. Comply with the OSHA Benzene Standard, 29CFR1910.1028, and all other applicable regulatory standards. Emergency safety showers and eye wash stations should be present.

7(b) Conditions for Safe Storage, including any Incompatibilities: Keep away from heat/sparks/open flames/hot surfaces – No smoking. Keep cool. Keep container tightly closed. Store locked up. Use only outdoors or in a well-ventilated area. Store in a well-ventilated place. Control all ignition sources (including smoking). When transporting, use electrically ground storage and transport piping. Store in areas/buildings designed to comply with OSHA 1910.106. Protect from physical damage.

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]
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
Toluene	200 ppm "C" 300 ppm "Peak" 500 ppm (10 min)	50 ppm	100 ppm "STEL" 150 ppm	500 ppm
Styrene, monomer	100 ppm "C" 200 ppm "P" 600 ppm (5-min any 3 hours)	20 ppm "STEL" 40 ppm	50 ppm "STEL" 100 ppm	700 ppm

Section 8 - Exposure Controls / Personal Protection (continued)

8(a) Occupational Exposure Limits (OELs) (continued):

Ingredients	OSHA PEL [1]	ACGIH TLV [2]	NIOSH REL [3]	IDLH [4]
Naphthalene	10 ppm	10 ppm, skin	10 ppm "STEL" 15 ppm	250 ppm
Indene	NE	5.0 ppm	10 ppm	NE
Carbon Disulfide	20 ppm "C" 30 ppm "P" 100 ppm (30-min per 8-hr shift)	1.0 ppm	1.0 ppm "STEL" 10 ppm	500 ppm
Thiophene	NE	NE	NE	NE
m-,o-, p-Xylene	100 ppm	100 ppm "STEL" 150 ppm	100 ppm "STEL" 150 ppm	900 ppm

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.

8(b) Appropriate Engineering Controls: Use controls as appropriate to minimize fire risk and inhalation of vapors or mists as well as any byproducts of combustion. Provide general or local exhaust ventilation systems to minimize airborne concentrations. Local exhaust is necessary for use in enclosed or confined spaces. Provide sufficient general/local exhaust ventilation in pattern/volume to control inhalation exposures below current exposure limits and areas below flammable vapor concentrations.

8(c) Individual Protection Measures:

- **Respiratory Protection:** Do not breathe dusts/fume/gas/mist/vapor/spray. 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-mask negative-pressure, air-purifying respirator equipped with organic vapor cartridge is acceptable for concentrations up to 10 times the exposure limit. Full-face negative-pressure air purifying respirator equipped with organic vapor cartridges is acceptable for concentrations up to 50 times the exposure limit. Protection by air purifying both 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**: Wear appropriate personal protective clothing to prevent skin contact. Chemical resistance data for barrier metals used should be determined based on use. Polyvinyl alcohol and Viton® protective garments have been suggested by the American Conference of Governmental Industrial Hygienist (ACGIH) Guidelines for the Selection of Chemical Protective Clothing for protection against materials of this chemical class. As required, industrial resistant flexible-type gloves (Viton®, neoprene, silver shield or equal). Wear industrial-type work clothing and safety footwear. A face-shield should be used, when appropriate, to prevent contact of eyes and face. Full body covering should be used to prevent skin contact depending on work conditions.
- **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.): Yellow Liquid

9(b) Odor: Sweet odor

9(c) Odor Threshold: NA

9(d) pH: NA

9(e) Melting Point/Freezing Point: ND

9(f) Initial Boiling Point and Boiling Range: 175.3°F/79.6°C

9(g) Flash Point: Minimum Flashpoint 59.9 ºF/15.5 ºC (closed cup)

9(j) Upper/lower Flammability or Explosive Limits: ND

9(k) Vapor Pressure: 75 mm HG (Benzene)

9(l) Vapor Density (Air = 1): 2.7 (Benzene)

9(m) Relative Density: 0.87 [Specific Gravity (H2O=1 at 20°C/60°F)]

9(n) Solubility(ies): Water Soluble

9(o) Partition Coefficient n-octanol/water: ND

9(p) Auto-ignition Temperature: ND

Section 9 - Physical and Chemical Properties (continued)

9(h) Evaporation Rate: ND

9(i) Flammability (solid, gas): ND

NA - Not Applicable

ND - Not Determined for product as a whole

9(q) Decomposition Temperature: ND

9(r) Viscosity: ND

Section 10 - Stability and Reactivity

10(a) Reactivity: Not Determined (ND)

10(b) Chemical Stability: Light Oil is stable under normal storage and handling conditions.

10(c) Possibility of Hazardous Reaction: None Known

10(d) Conditions to Avoid: Exposure to heat, sparks or flames.

10(e) Incompatible Materials: Strong oxidizing agents, many Fluorides, Chlorides, and Perchlorates, Nitric acid, and Chromic anhydride.

10(f) Hazardous Decomposition Products: Carbon monoxide and Carbon dioxide

Section 11 - Toxicological Information

11(a-e) Information on Toxicological Effects: The following toxicity data has been determined for **Light Oil** 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)	NR*	3		**Danger**	Toxic if inhaled.
Skin Irritation (covers Categories 1A, 1B, and 2)	2	2[b]		**Warning**	Causes skin irritation.
Eye Damage/Irritation (covers Categories 1, 2A and 2B)	2	2A[c]		**Warning**	Causes serious eye irritation.
Skin/Dermal Sensitization (covers Category 1)	1	1[d]		**Warning**	May cause an allergic skin reaction.
Aspiration Hazard (Category 1)	1	1[e]		**Danger**	May be fatal if swallowed and enters airways.
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)	2	2[i]		**Warning**	May cause central nervous system depression, respiratory irritation drowsiness or dizziness and damage to lungs, liver and blood cells.
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 olfactory system. 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.

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.

Section 11 - Toxicological Information (continued)

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

a. No LC_{50} or LD_{50} has been established for **Light Oil**. The following data has been determined for the components:

- **Benzene:** LD_{50} (rat) 3.8 (2.9-4.8) and 5.6 (4.0-7.8) ml/kg young and old resp.
  LD_{50} (rabbits): > 9.4 ml/kg (abraded skin)
  LC_{50} (female rat) > 13700 ppm
- **Carbon disulfide:** Rat LC_{50} = 10.35 mg/L (REACH)
  Mouse 2 hr LC_{50} = 10 mg/L (IUCLID)
- **Indene:** Rat LD_{50} = 481 mg/kg (REACH**)**
- **Naphthalene:** Mouse LD_{50} = 397 – 827 mg/kg (REACH)
  Rat LD_{50} > 2500 mg/kg (REACH and IUCLID)
  Rat LC_{50} > 77.7 ppm (> 0.4 mg/L) (REACH and Toxnet)
- **Styrene:** Rat LC_{50} > 2.13 mg/L (REACH)
- **Toluene**: LD50 (rat) > 5000 mg/kg (REACH)
  LD50 (Rabbit) > 5000 mg/kg (REACH)
  LC50 (rat) > 20 mg/L (REACH) LD50 (rat) i.p. =1332 mg/kg (IUCLID)
- **Thiophene:** Mouse LD_{50} = 420 mg/kg)
  Guinea Pig LD_{50} >20 ml/kg
  Mouse ip LD_{50} =100 mg/k
- **Xylene:** Rabbit LD_{50} > 5000 mg/kg (REACH)
  Rat 4 hr LC_{50} = 6700 ppm

b. No Skin (Dermal) Irritation data available for **Light Oil** as a mixture or its individual components.

- **Benzene and Indene:** Irritating to the skin.
- **Toluene:** Toluene is irritating to rabbit skin (REACH and IUCLID).
- **Styrene:** Rabbit - Moderate erythema and slight necrosis. Blistering and hair loss. (REACH) Rabbit slightly to moderately irritating.
- **Carbon Disulfide:** Highly irritating in rabbits, causes human irritation.
- **Xylene:** Moderately irritating.

c. No Eye Irritation data available for **Light Oil** as a mixture. The following Eye Irritation information was found for the components:

- **Benzene and Indene:** Irritating to the eyes.
- **Toluene:** Slight irritation (REACH and IUCLID) Severe eye irritant in humans (NLM HSD).
- **Styrene:** Rabbit – moderate conjunctival irritation with perceptible necrosis of the lens. (REACH) Rabbit moderately irritating (IUCLID).
- **Carbon Disulfide** - Highly irritating in rabbits.

d. No Skin (Dermal)/Respiratory Sensitization data available **for Light Oil** as a mixture. The following Skin (Dermal) Sensitization information was found for the components:

- **Indene:** Sensitizer in humans. Dermal sensitizer (RTECS).

e. No Aspiration Hazard data available for **Light Oil** as a mixture. The following Aspiration Hazard information was found for the components:

- **Benzene:** Respiratory aspiration hazard.
- **Toluene:** May be fatal if enters respiratory tract.
- **Indene:** Results in chemical pneumonitis, edema and hemorrhage.

f. No Germ Cell Mutagenicity data available for **Light Oil** as a mixture. The following Mutagenicity and Genotoxicity information was found for the components:

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

g. Carcinogenicity: IARC, NTP, and OSHA do not list **Light Oil** as carcinogens. The following Carcinogenicity information was found for the components:

- **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
- **Toluene:** IARC-3, unclassifiable as to carcinogenicity in humans; ACGIH TLV-A4, not classifiable as a human carcinogen; EPA-II, inadequate information to assess carcinogenic potential
- **Xylene:** IARC-3, unclassifiable as to carcinogenicity in humans; ACGIH TLV-A4, not classifiable as a human carcinogen; EPA-I, data are inadequate for assessment of human carcinogenic potential
- **Naphthalene:** IARC-2B, possibly carcinogenic to humans; ACGIH TLV-A3, confirmed animal carcinogen with unknown relevance to humans; NTP-R, reasonably anticipated to be a human carcinogen (RAHC); EPA-CBD, cannot be determined & EPA-C, possible human carcinogen
- **Styrene (monomer):** IARC-2A, probably carcinogenic to humans; NTP-R, reasonably anticipated to be a human carcinogen (RAHC); ACGIH TLV-A3, confirmed animal carcinogen with unknown relevance to humans
- **Carbon Disulfide:** ACGIH TLV-A4, not classifiable as a human carcinogen

h. No Toxic Reproduction data available for **Light Oil** as a mixture. The following Toxic Reproductive information was found for the components:

- **Benzene**: Both reproductive and teratogenicity positive results found.
- **Toluene:** Low incidence of malformations at doses causing maternal toxicity.
- **Carbon Disulfide:** Results of studies suggest a direct effect on Testes with dose related decrease in plasma testosterone.

i. No Specific Target Organ Toxicity (STOT) following a Single Exposure data available for **Light Oil** as a mixture. The following STOT following a Single Exposure data was found for the components:

- **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.
- **Carbon Disulfide**: Mood changes, dizziness.
- **Indene:** Respiratory irritation.
- **Naphthalene:** Eye and skin irritation (OSHA).
- **Toluene:** Headache, dizziness and impaired performance.
- **Styrene:** Eyes, skin, respiratory system.

Section 11 - Toxicological Information (continued)

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

j. No Specific Target Organ Toxicity (STOT) following Repeated Exposure data was available **for Light Oil** as a whole. The following STOT following Repeated Exposure data was found for the components:

- **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.
- **Toluene:** Ataxia, hypothermia, leucocyte decrease in female rats and increase liver and kidney weights.
- **Naphthalene:** Olfactory lesions and effects on nasal turbinates, cataracts, jaundice, kidney and liver damage (OSHA).
- **Styrene:** Respiratory system, CNS, liver and reproductive system damage.
- **Indene:** Liver, kidney, spleen.
- **Carbon Disulfide**: Neurotoxicity, chronic effects on heart, liver, kidney, ocular changes and skin (OSHA).

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:

- **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.
- **Toluene:** Excessive exposures may cause irritation to eyes, nose, throat, lungs, and respiratory tract. Central nervous system effects may occur. Excessive exposures may result in headaches, nausea dizziness, loss of balance and coordination, unconsciousness, and coma as well as respiratory failure and/or death.
- **Naphthalene:** Excessive exposures may cause irritation to eyes, nose, throat and lungs, and respiratory tract. Central nervous system effects may occur. Excessive exposures may also result in dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure and death.
- **Styrene, Monomer:** Excessive inhalation may cause respiratory swelling and pneumonitis. Excessive exposures may cause narcotic effects including headache, dizziness, weakness, unconsciousness, and possible death.
- **Indene:** Data or studies as to human potential overexposure have not been reported in the literature. However, by analogy between chemical structure and toxicological effects of related monoaromatic hydrocarbons (not specified), excessive inhalation of indene vapors can be expected to cause irritation to the mucous membrane and lungs, skin irritation, pneumonitis, pulmonary edema and hemorrhage.
- **Carbon Disulfide:** Excessive quantities of carbon disulfide may be fatal if ingested or inhaled. Serious health hazard, affecting the central nervous system. Carbon disulfide is readily absorbed through the skin. Sufficient material may be absorbed through the skin to be fatal. Excessive exposures may cause reproductive damage, including impairing fertility. Skin irritant.
- **Xylene:** Excessive exposures may cause irritation to eyes, nose, throat, lungs, and respiratory tract. Central nervous system effects may occur. May result in headaches, nausea, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure and death. Repeated excessive exposures may cause liver and/or kidney effects or damage.

Delayed (chronic) Effects by Component:

- **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 over exposure the disease states may progress to pancytopenia resulting from bone marrow aplasia. Evidence has linked benzene in the etiology of leukemia.
- **Toluene:** Chronic overexposure has been associated with headache, lassitude, and nausea, loss of coordination, memory loss, and loss of appetite along with enlargement of the liver, a moderate decrease in red blood cells, and reduction in white blood cells, as well as palpitations, weakness, and impaired reaction time may occur. The neurological effects of chronic overexposure to high levels of toluene gradually progress to an irreversible state. Besides effects on behavior and intelligence, degeneration of the optic nerve and nerve deafness have also been reported. Dermatitis from repeated contact with the skin may also occur. Overexposure to toluene may cause risk of harm to the unborn child.
- **Naphthalene**: Chronic exposure of workers to naphthalene has been reported to cause cataracts and retinal hemorrhage. Exposure may also result in headache, loss of appetite, and nausea. Kidney damage has also been reported in connection with chronic naphthalene exposure.
- **Styrene, Monomer:** Chronic excessive exposures may cause significant reduction in color discrimination and/or color perception.
- **Indene:** The substance may be toxic to kidneys, liver, spleen, upper respiratory tract, skin and eyes. Repeated or prolonged overexposure to the substance can produce target organs damage.
- **Carbon Disulfide:** Chronic overexposure to carbon disulfide has resulted primarily in neurological and cardiovascular effects, gastrointestinal and immune insufficiency problems as well as possible risk of impaired fertility and harm to the unborn child have also been reported.
- **Xylene:** Chronic inhalation can cause headache, loss of appetite, nervousness and pale skin. Repeated or prolonged skin contact may cause a skin rash. Repeated exposure of the eyes to high concentrations of vapor may cause reversible eye damage. Repeated exposure can damage bone marrow, causing low blood cell count. May damage the liver and kidneys.

Section 12 - Ecological Information

12(a) Ecotoxicity (aquatic & terrestrial): No Data Available for **Light Oil** as sold/shipped. However, individual components of the product when processed have been found to be toxic to the environment.

- **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).
- **Toluene**: LC50 Pimephales promelas (fathead minnow) 34.27 mg/l 96 hr (95% Confidence Limits= 22.83-45.86 mg/l) /Conditions of bioassay not specified/ LC50 Daphnia magna, (water flea) 313 mg/l 48 hr /Conditions of bioassay not specified.
- **Naphthalene**: LC50 Pimephales promelas (fathead minnow) 6.08 (5.74-6.44) mg/l 72 & 96 hr, /flow-through bioassay; LC50 Oncorhynchus gorbuscha (pink salmon) 1.4 mg/L/96 hr Conditions of bioassay not specified.
- **Carbon Disulfide**: LC_{50}: 135,000/96H; Fish-*Western mosquitofish.*
- **Xylene**: LC_{50}: 75,000 µg/L/24H; Fish-*Goldfish.*

12(b) Persistence & Degradability: Vapor-phase benzene and toluene are degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 13 days and 3 days for benzene and toluene respectively.

12(c) Bioaccumulative Potential: No Data Available for **Light Oil** or individual components.

12(d) Mobility (in soil): No Data Available for **Light Oil** as a whole. However, benzene and toluene have been estimated to be moderately to highly mobile in soil. Evaporation is expected to be the primary loss mechanism from water. Benzene and toluene are not expected to adsorb to sediment and suspended solids in water. Volatilization half-lives for a model river and model lake have been estimated to be 1 hr and 3.5 days, respectively for benzene and 1 hour and 4 days, respectively for toluene.

12(e) Other Adverse Effects: None Known

Additional Information:

Hazard Category: Acute 2, Chronic 2 **Signal Word:** No Signal Word

Hazard Symbol: 

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

Section 13 - Disposal Considerations

Disposal: Dispose of contents/container in accordance with local/regional/international regulations. Upon disposal, **Light Oil** may become an EPA hazardous waste due to Ignitability (D001). Also, it may be a characteristic waste due to leachable benzene content of greater than 0.5 ppm (D018) as determined by the TCLP test. Benzene has a RCRA waste number of D018 and a CERCLA reportable quantity of 10 lbs. Recycle or dispose of in accordance with federal, state and local regulations. Empty containers may retain product residue including flammable or explosive vapors. Do not cut, drill, grind or weld on or near full, partially full or empty product containers.

Container Cleaning and Disposal: Follow applicable federal, state and local regulations. Observe safe handling precautions. European Waste Catalogue (EWC): 05-06-99 (waste form pyrolytic treatment of coal-waste not otherwise specified).

Please note this information is for Light Oil 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 regulates **Light Oil** a Class 3 Hazardous Material (Flammable Liquid). All federal, state, and local laws and regulations that apply to the transport of this type of material must be adhered to.

Shipping Name: RQ, UN1136, Coal tar distillates, flammable (contains benzene, toluene) Class 3 PGII Minimum Flashpoint 15.5 ºC (closed cup) **Shipping Symbols:** NA **Hazard Class:** Flammable **UN No.:** 1136 **Packing Group:** II **DOT/ IMO Label:** 3/Flammable Liquid **Special Provisions (172.102):** IB2, T4, TP1	**Packaging Authorizations:** **a) Exceptions:** 150 **b) Non-bulk:** 202 **c) Bulk:** 242	**Quantity Limitations:** **a) Passenger Aircraft or Rail:** 5 Liters **b) Cargo Aircraft Only:** 60 Liters **Vessel Stowage Location:** B **DOT Reportable Quantities**: Refer to Section 15

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.

Section 14 - Transport Information (continued)

Regulations Concerning the International Carriage of Dangerous Goods by Road (ADR) regulates **Light Oil** a Class 3 Flammable Liquid.

Shipping Name: RQ, UN1136, Coal tar distillates, flammable (contains benzene, toluene) Class 3 PGII Minimum Flashpoint 15.5 ºC (closed cup) **Classification Code:** F1 **UN No.:** UN 1136 **Packing Group:** II **ADR Label:** 3 **Special Provisions:** NA **Limited Quantities:** LQ7	**Packaging:** **a) Packing Instructions:** P001, IBC03, LP01, R001 **b) Special Packing Provisions:** NA **c) Mixed Packing Provisions:** MP19	**Portable Tanks & Bulk Containers:** **a) Instructions:** T4 **b) Special Provisions:** TP1, TP29

International Air Transport Association (IATA) does not regulate **Light Oil** as a Class 3 Flammable Liquid.

	Passenger & Cargo Aircraft		Cargo Aircraft Only:	Special Provisions:
	Limited Quantity (EQ)			
Shipping Name: RQ, UN1136, Coal tar distillates, flammable (contains benzene, toluene) **Class/Division:** 3 **Hazard Label (s):** Flammable Liquid **UN No.:** UN 1136 **Packing Group:** II **Excepted Quantities (EQ):** E2	**Pkg Inst:** Y305 **Max Net Qty/Pkg:** 1 Liter (L)	**Pkg Inst:** 305 **Max Net Qty/Pkg:** 5 L	**Pkg Inst:** 307 **Max Net Qty/Pkg:** 60 L	A3 **ERG Code:** 3 L

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

Light Oil (as Coal Tar Distillates, Flammable) has a Transport Dangerous Goods (TDG) classification: UN1136, Class 3, Packing Group 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; Fire Hazard

Section 313 Supplier Notification: The product, **Light Oil** 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	60-85
108-88-3	Toluene	3-25
91-20-3	Naphthalene	0-6
95-13-6	Styrene, monomer	0-3
108-38-3	m-Xylene	0-4.8
75-15-0	Carbon disulfide	0-3
106-42-3	p-Xylene	0-4.8
95-47-6	o-Xylene	0 – 1.2

State Regulations: The product, **Light Oil** 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 benzene which is known to the State of California to cause cancer and reproductive toxicity, carbon disulfide and toluene which are known to the State of California to cause reproductive toxicity, and naphthalene which is known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

Other Regulations:

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

Ingredients	WHMIS Classification
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)
Toluene	Flammable liquids - Category 2 (Flash point = 4,4°C Setaflash closed cup and boiling point = 111°C); Skin corrosion/irritation - Category 2; Specific target organ toxicity - repeated exposure - Category 2; Reproductive toxicity - Category 2 (Toxic to the development - Adverse effects on the development of the offspring); Specific target organ toxicity - single exposure (narcotic effects) - Category 3 - Narcotic effect; Aspiration hazard - Category 1 (Liquid hydrocarbon with a kinematic viscosity of 0,676 mm^2/s at 20°C)
Naphthalene	Flammable solids - Category 2 (Class 4.1 packing group III according to TDG regulation); Carcinogenicity - Category 2; Combustible dusts *

Section 15 - Regulatory Information (continued)

Other Regulations (continued):

WHMIS Classification (Canadian) (continued):

Ingredients	WHMIS Classification
Styrene, monomer	Flammable liquids - Category 3 (Flash point = 31°C Tag closed cup); Acute toxicity - inhalation - Category 4; Carcinogenicity - Category 1B; Aspiration hazard - Category 1 (Liquid hydrocarbon with a kinematic viscosity of 0,83 - 0,84 mm2/s at 20 °C)
Indene	Flammable liquids – Category 3 (Flash point = 59º Setaflash closed cup °C]; Aspiration hazard - Category 1 (Liquid hydrocarbon with a kinematic viscosity of 1,660 mm2/s at 20 °C)
Carbon disulphide	Flammable liquids – Category 2 [Flash point = 30o closed cup (non reported method) and boiling point = --46XX]; Acute toxicity - inhalation - Category 4; Specific target organ toxicity - repeated exposure - Category 1; Reproductive toxicity - Category 1B (Toxic to reproductive function, Toxic to the development); Specific target organ toxicity - single exposure (narcotic effects) - Category 3 - Narcotic effect;
Xylenes (m,o,p)	Flammable liquids – Category 3 (Flash point = 29o Setaflash closed cup °C]; Skin corrosion/irritation - Category 2; Reproductive toxicity - Category 1B (Toxic to the development); Specific target organ toxicity - single exposure (narcotic effects) - Category 3 - Narcotic effect; Aspiration hazard - Category 1 (Liquid hydrocarbon with a kinematic viscosity of 0,68 - 0,87 mm2/s at 20 °C)

* This product could belong to the hazard class "Combustible dust", based on various factors related to the combustibility and explosiveness of its dust, including composition, shape and size of the particles

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:

11/06/2020 – Update to sections 2, 8, 11, 15

07/01/2017 – Update WHMIS 2015

1/31/2014 - Format revision

7/21/2013 - Update to OSHA HAZ COM 2012

Expiration Date: 11/06/2023

5/03/2011 – Update format

7/31/10 – Update of content and format to comply with GHS

9/22/08 – Updated section 13 to eliminate incorrect RCRA code

Additional Information:

Hazardous Material Identification System (HMIS) Classification

Health Hazard	**2**
Fire Hazard	**3**
Physical Hazard	**1**

HEALTH = **2**, Moderate
FIRE = **3**, HIGH
REACTIVITY = **1**, Slight (Normally Stable)

National Fire Protection Association (NFPA)

HEALTH = **2**, Moderate
FIRE = **3**, HIGH
REACTIVITY = **1**, Slight (Normally Stable)

ABBREVIATIONS/ACRONYMS:

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