No. 6 Fuel Oil
Material Safety Data Sheet

CITGO Petroleum Corporation
P.O. Box 4689
Houston, TX 77210

MSDS No. 17100
Revision Date 2/16/2006

IMPORTANT: This MSDS is prepared in accordance with 29 CFR 1910.1200. Read this MSDS before transporting, handling, storing or disposing of this product and forward this information to employees, customers and users of this product.

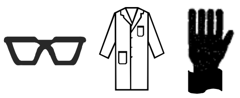
Hazard Rankings

	HMIS	NFPA
Health Hazard	* 2	2
Fire Hazard	1	1
Reactivity	0	0

*** = Chronic Health Hazard**

Protective Equipment

Minimum Recommended
See Section 8 for Details



Emergency Overview

Physical State	Liquid.		
Color	Brown to black.	**Odor**	Rotten eggs. (Hydrogen sulfide odor).

WARNING:
Hydrogen Sulfide Gas can accumulate during long-term heated storage of this material.
Hot product can cause burns.
If burned by hot product, cool affected area immediately with cool water.
Suspect cancer hazard.
Mist or vapor can irritate the respiratory tract.
Liquid contact can cause eye or skin irritation.
Overexposure can cause central nervous system (CNS) depression and/or other target organ effects.
Spills may create a slipping hazard.

SECTION 1. PRODUCT IDENTIFICATION

Trade Name	No. 6 Fuel Oil	**Technical Contact**	(800) 248-4684
Product Number	17100	**Medical Emergency**	(832) 486-4700
CAS Number	68476-33-5	**CHEMTREC Emergency (United States Only)**	(800) 424-9300
Product Family	Fuel.		
Synonyms	Delayed Coker Unit Feedstock; Residual Fuel Oil; Utility Fuel Oil; Long Resid; Cut Resid; Coker Unit Feed; No. 6 Grade Fuel Oil; Heavy Fuel Oil; Bunker Fuel; Bunker C		

SECTION 2. COMPOSITION

This product may be composed, in whole or in part, of any of the following refinery streams:

Clarified oils, petroleum, catalytic cracked [CAS No.: 64741-62-4]
Hydrodesulfurized middle distillate (petroleum) [CAS No.: 64742-80-9]
Distillates, petroleum, hydrodesulfurized light catalytic cracked [CAS No.: 68333-25-5]
Straight-run middle distillate (petroleum) [CAS No.: 64741-44-2]
Distillates, petroleum, light catalytic cracked [CAS No.: 64741-59-9]
Residues, petroleum, atmospheric [CAS No.: 64741-45-3]
Residues, petroleum, vacuum [CAS No.: 64741-56-6]

This product contains the following chemicals as components of the refinery streams listed above:

Component Name(s)	CAS Registry No.	Concentration (%)

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Polynuclear Aromatic Hydrocarbons (4- to 6- member condensed rings)	Mixture	>5
Hydrogen sulfide	7783-06-4	<0.1

SECTION 3. HAZARDS IDENTIFICATION

Also see Emergency Overview and Hazard Ratings on the top of Page 1 of this MSDS.

Major Route(s) of Entry Skin contact. Inhalation.

Signs and Symptoms of Acute Exposure

Inhalation Hydrogen sulfide gas can evolve when this product is stored or handled at elevated temperatures. H2S can cause irritation and/or systemic effects. Mist or vapor can irritate the throat and lungs. Breathing this material may cause central nervous system depression with symptoms including nausea, headache, dizziness, fatigue, drowsiness, or unconsciousness.

Eye Contact Hot material can cause burns to the eye. This material can cause eye irritation with tearing, redness, or a stinging or burning feeling. Effects may become more serious with repeated or prolonged contact.

Skin Contact Hot material can cause burns to the skin. May cause skin irritation with redness, an itching or burning feeling, and swelling of the skin. Effects may become more serious with repeated or prolonged contact. Skin contact may cause harmful effects in other parts of the body.

Ingestion Swallowing large amounts of this material may cause stomach or intestinal upset with pain, nausea, vomiting, and/or diarrhea. Swallowing this material may cause effects similar to those described in the inhalation section (see "inhalation" above).

Chronic Health Effects Summary This material, or a component of this material is a suspect cancer hazard and may cause cancer in humans. This material (or a component) may cause harm to the fetus including birth defects based on tests with laboratory animals. This material (or a component) is a mammalian somatic cell mutagen. See Toxicological Information (Section 11)

Conditions Aggravated by Exposure Disorders of the following organs or organ systems that may be aggravated by significant exposure to this material or its components include: Skin, Respiratory System

Target Organs May cause damage to the following organs: blood, kidneys, liver, spleen, upper respiratory tract, immune system, skin, central nervous system (CNS), eye, lens or cornea.
Contains material which may cause damage to the following organs: lungs, mucous membranes, bladder

Carcinogenic Potential IARC has determined that residual (heavy) fuel oils are possibly carcinogenic to humans (Group 2B).

OSHA Hazard Classification is indicated by an "X" in the box adjacent to the hazard title. If no "X" is present, the product does not exhibit the hazard as defined in the OSHA Hazard Communication Standard (29 CFR 1910.1200).

OSHA Health Hazard Classification				OSHA Physical Hazard Classification					
Irritant	☒	**Sensitizer**	☐	**Combustible**	☐	**Explosive**	☐	**Pyrophoric**	☐
Toxic	☐	**Highly Toxic**	☐	**Flammable**	☐	**Oxidizer**	☐	**Water-reactive**	☐
Corrosive	☐	**Carcinogenic**	☒	**Compressed Gas**	☐	**Organic Peroxide**	☐	**Unstable**	☐

SECTION 4. FIRST AID MEASURES

Take proper precautions to ensure your own health and safety before attempting rescue or providing first aid. For more specific information, refer to Exposure Controls and Personal Protection in Section 8 of this MSDS.

Inhalation	Move victim to fresh air. If victim is not breathing, immediately begin rescue breathing. If breathing is difficult, 100 percent humidified oxygen should be administered by a qualified individual. Seek medical attention immediately. Keep the affected individual warm and at rest.
Eye Contact	Check for and remove contact lenses. Flush eyes with cool, clean, low-pressure water while occasionally lifting and lowering eyelids. Seek medical attention if excessive tearing, redness, or pain persists.
Skin Contact	Remove contaminated shoes and clothing. Flush affected area with large amounts of water. If skin surface is damaged, apply a clean dressing and seek medical attention. Do not use ointments. If skin surface is not damaged, clean affected area thoroughly with mild soap and water. Seek medical attention if tissue appears damaged or if pain or irritation persists.
Ingestion	Do not induce vomiting. If spontaneous vomiting is about to occur, place victim's head below knees. If victim is drowsy or unconscious, place on the left side with head down. Never give anything by mouth to a person who is not fully conscious. Do not leave victim unattended. Seek medical attention immediately.
Notes to Physician	INHALATION: Inhalation overexposure can produce toxic effects. Treat intoxications as hydrogen sulfide exposures. Monitor for respiratory distress. If cough or difficulty in breathing develops, evaluate for upper respiratory tract inflammation, bronchitis, and pneumonitis. Administer supplemental oxygen with assisted ventilation, as required. Treat symptomatically.

SECTION 5. FIRE FIGHTING MEASURES

NFPA Flammability Classification	NFPA Class-IIIB combustible material.		
Flash Point	Closed cup: >94°C (>200°F). (Estimated)		
Lower Flammable Limit	No data.	**Upper Flammable Limit**	No data.
Autoignition Temperature	Not determined.		
Hazardous Combustion Products	Carbon dioxide, carbon monoxide, smoke, fumes, unburned hydrocarbons and oxides of sulfur and/or nitrogen.		
Special Properties	This material will release vapors when heated above the flash point temperature that can ignite when exposed to a source of ignition. In enclosed spaces, vapors can ignite with explosive force. Mists or sprays may burn at temperatures below the flash point.		
Extinguishing Media	SMALL FIRE: Use dry chemicals, carbon dioxide, foam, or inert gas (nitrogen). Carbon dioxide and inert gas can displace oxygen. Use caution when applying carbon dioxide or inert gas in confined spaces. LARGE FIRE: Use foam, water fog, or water spray. Water fog and spray are effective in cooling containers and adjacent structures. However, water can cause frothing and/or may not extinguish the fire. Water can be used to cool the external walls of vessels to prevent excessive pressure, autoignition or explosion. DO NOT use a solid stream of water directly on the fire as the water may spread the fire to a larger area.		
Protection of Fire Fighters	Firefighters must use full bunker gear including NIOSH-approved positive pressure self-contained breathing apparatus to protect against potential hazardous combustion or decomposition products and oxygen deficiencies. Withdraw immediately from the area if there is a rising sound from a venting safety device or discoloration of vessels, tanks, or pipelines.		

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SECTION 6. ACCIDENTAL RELEASE MEASURES

Take proper precautions to ensure your own health and safety before attempting spill control or clean-up. For more specific information, refer to the Emergency Overview on Page 1, Exposure Controls and Personal Protection in Section 8 and Disposal Considerations in Section 13 of this MSDS.

Do not touch damaged containers or spilled material unless wearing appropriate protective equipment. Slipping hazard; do not walk through spilled material. Stop leak if you can do so without risk. For small spills, absorb or cover with dry earth, sand, or other inert non-combustible absorbent material and place into waste containers for later disposal. Contain large spills to maximize product recovery or disposal. Prevent entry into waterways or sewers. In urban area, cleanup spill as soon as possible. In natural environments, seek cleanup advice from specialists to minimize physical habitat damage. This material will float on water. Absorbent pads and similar materials can be used. Comply with all laws and regulations.

SECTION 7. HANDLING AND STORAGE

Handling

Avoid contact with oxidizing agents. Avoid repeated or prolonged skin contact or inhalation. Use only with adequate ventilation and personal protection. Wash thoroughly after handling. Prevent contact with food or tobacco products. Do not take internally. Empty containers may contain product residues that can ignite with explosive force. Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to flames, sparks, heat or other potential ignition sources. Consult appropriate federal, state and local authorities before reusing, reconditioning, reclaiming, recycling or disposing of empty containers and/or waste residues of this product.

Storage

Keep container closed. Store in a cool, dry, well-ventilated area. Do not store with strong oxidizing agents. Do not store at elevated temperatures. Avoid storing product in direct sunlight for extended periods of time. Consult appropriate federal, state and local authorities before reusing, reconditioning, reclaiming, recycling or disposing of empty containers or waste residues of this product.

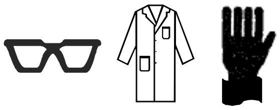
SECTION 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Engineering Controls

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of mists and/or vapors below the recommended exposure limits (see below). An eye wash station and safety shower should be located near the work-station.

Personal Protective Equipment

Personal protective equipment should be selected based upon the conditions under which this material is used. A hazard assessment of the work area for PPE requirements should be conducted by a qualified professional pursuant to OSHA regulations. The following pictograms represent the minimum requirements for personal protective equipment. For certain operations, additional PPE may be required.



Eye Protection

Safety glasses equipped with side shields are recommended as minimum protection in industrial settings. Chemical goggles should be worn during transfer operations or when there is a likelihood of misting, splashing, or spraying of this material. A suitable emergency eye wash water and safety shower should be located near the work station.

Hand Protection

Use gloves constructed of chemical resistant materials such as heavy nitrile rubber. Use heat-protective gloves when handling product at elevated temperatures.

Body Protection	Use clean, chemical-resistant, full-body protective clothing. If significant contact occurs, remove oil-contaminated clothing immediately and promptly shower. Wash skin thoroughly with soap and water to remove hydrocarbon residues. Launder contaminated clothing before reuse or discard. Discard contaminated leather goods and boots. Wear heat protective boots and protective clothing when handling material at elevated temperatures.
Respiratory Protection	For known vapor concentrations above the occupational exposure guidelines (see below), use a NIOSH-approved organic vapor respirator if adequate protection is provided. Protection factors vary depending upon the type of respirator used. Respirators should be used in accordance with OSHA requirements (29 CFR 1910.134). For airborne vapor concentrations that exceed the recommended protection factors for organic vapor respirators, use a full-face, positive-pressure, supplied air respirator. Due to fire and explosion hazards, do not enter atmospheres containing concentrations greater than 10% of the lower flammable limit of this product.
General Comments	Warning! Use of this material in spaces without adequate ventilation may result in generation of hazardous levels of combustion products and/or inadequate oxygen levels for breathing. Odor is an inadequate warning for hazardous conditions.

Occupational Exposure Guidelines

Substance	**Applicable Workplace Exposure Levels**
Oil Mist, Mineral	**ACGIH (United States).** TWA: 5 mg/m^3 8 hour(s). STEL: 10 mg/m^3 15 minute(s). **OSHA (United States).** TWA: 5 mg/m^3 8 hour(s).
Hydrogen sulfide	**ACGIH TLV (United States).** TWA: 10 ppm 8 hour(s). STEL: 15 ppm 15 minute(s). **OSHA (United States).** CEIL: 20 ppm 8 hour(s). STEL: 50 ppm 15 minute(s). Form: *10 minute peak; once per 8 hour shift

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES (TYPICAL)

Physical State	Liquid.	**Color**	Brown to black.	**Odor**	Rotten eggs. (Hydrogen sulfide odor).
Specific Gravity	0.95 to 1.03 (Water = 1) (Estimated.)	**pH**	Not applicable.	**Vapor Density**	>1 (Air = 1)

Boiling Range	260 to 590°C (500 to 1094°F)	**Melting/Freezing Point**	Not determined.
Vapor Pressure	Not determined.	**Volatility**	Negligible volatility.
Solubility in Water	Very slightly soluble in cold water. (<0.1 % w/w)	**Viscosity (cSt @ 40°C)**	Not determined.
Flash Point	Closed cup: >94°C (>200°F). (Estimated)		
Additional Properties	No additional information.		

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SECTION 10. STABILITY AND REACTIVITY

Chemical Stability	Stable.	**Hazardous Polymerization**	Not expected to occur.
Conditions to Avoid	Keep away from heat, sparks and flame.		
Materials Incompatibility	Strong oxidizers.		
Hazardous Decomposition Products	Combustion gases may contain CO, CO2, oxides of sulfur and, depending upon the conditions, hydrogen sulfide.		

SECTION 11. TOXICOLOGICAL INFORMATION

For other health-related information, refer to the Emergency Overview on Page 1 and the Hazards Identification in Section 3 of this MSDS.

Toxicity Data

Polynuclear Aromatic Hydrocarbons (4- to 6- member condensed rings)

ORAL (LD50): Acute: >5000 mg/kg [Rat].
DERMAL (LD50): Acute: >2000 mg/kg [Rabbit].

Cancer is the most significant toxicity endpoint for PNAs. Certain PNA compounds are weak carcinogens which only become potent carcinogens after undergoing metabolism. Chronic or repeated exposure increases the likelihood of tumor initiation as well as the potential for metabolism of a PNA procarcinogen into a carcinogen. Increased incidence of tumors of the skin, bladder, lung and gastrointestinal tract have been described in individuals exposed to elevated concentrations of certain PNAs.

PNA compounds have been associated with photosensitivity and eye irritation. Inhalation exposures to PNA compounds have been associated with respiratory tract irritation, cough and bronchitis. Dermal exposures may cause precancerous lesions, erythema, dermal burns, photosensitivity, acneiform lesions and irritation. Oral exposure to some PNAs have been associated with precancerous growths of the mouth (leukoplakia). Also, mild nephrotoxicity, indicated by increased kidney size, congestion and renal cortical hemorrhages, plus elevated liver function tests and histopathologic abnormalities have occurred in rats following chronic ingestion.

Hydrogen sulfide

INHALATION (LC50): Acute: 444 ppm 1 hour(s) [Rat]. 673 ppm 1 hour(s) [Mouse].
Hydrogen Sulfide (H_2S) has an unpleasant odor that diminishes with increased concentrations. Eye irritation can occur at concentrations above four ppm. Olfactory fatigue occurs rapidly at concentrations above 50. Accordingly, odor is not a reliable warning property. Symptoms increase with exposures above 50 ppm. Respiratory effects including irritation with possible pulmonary edema can occur with exposure above 50 ppm. At concentrations above 500 ppm, an immediate loss of consciousness, depressed respiration and death can occur. NIOSH has determined that H_2S concentrations above 100 ppm are immediately dangerous to life and health.

Gas Oil:
Oils similar to this material have been shown to cause adverse effects in the liver and kidneys of laboratory rodents, and an increase in the incidence of fetal resorptions in pregnant laboratory rodents following prolonged and repeated exposure. Long-term repeated (lifetime) skin exposure to similar materials has been reported to result in an increase in skin tumors in laboratory rodents. The International Agency for Research on Cancer (IARC) has concluded that this category of untreated and mildly-treated oils are carcinogenic to humans.(Group 1).

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SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity	Extensive ecological toxicity study has been conducted for this product. The resultant water-accomodated fraction (WAF) is approximately 5 ppm under normal atmospheric conditions. The product is not readily toxic to algae, crustaceans, or fish.
Environmental Fate	This product is estimated to have a slow to moderate rate of biodegradation. Polynuclear aromatic hydrocarbons similar to certain components of this product can bioaccumulate in tissues of various aquatic organisms.

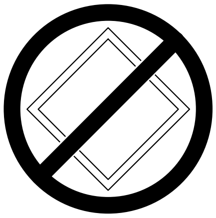
SECTION 13. DISPOSAL CONSIDERATIONS

Hazard characteristic and regulatory waste stream classification can change with product use. Accordingly, it is the responsibility of the user to determine the proper storage, transportation, treatment and/or disposal methodologies for spent materials and residues at the time of disposition.

Maximize material recovery for reuse or recycling. If spill is introduced into a wastewater treatment system, chemical and biological oxygen demand will likely increase slowly. Spill material is biodegradable if gradually exposed to microorganisms, preferably in an aerobic environment with plenty of agitation. Potential treatment and disposal methods include land farming and incineration. Conditions of use may cause this material to become a "hazardous waste", as defined by federal or state regulations. It is the responsibility of the user to determine if the material is a "hazardous waste" at the time of disposal. Transportation, treatment, storage, and disposal of waste material must be conducted in accordance with RCRA regulations (see 40 CFR 260 through 40 CFR 271). State and/or local regulations may be more restrictive. Contact your regional US EPA office for guidance concerning case specific disposal issues.

SECTION 14. TRANSPORT INFORMATION

The shipping description below may not represent requirements for all modes of transportation, shipping methods or locations outside of the United States.

US DOT Status	Not a DOT controlled material (United States).		
Proper Shipping Name	Not applicable.		
Hazard Class	Not applicable	**Packing Group**	Not applicable.
		UN/NA Number	Not available.
Reportable Quantity	A Reportable Quantity (RQ) has not been established for this material.		
Placard(s)		**Emergency Response Guide No.**	Not applicable.
		MARPOL III Status	Not a DOT "Marine Pollutant" per 49 CFR 171.8.

SECTION 15. REGULATORY INFORMATION

TSCA Inventory	This product and/or its components are listed on the Toxic Substances Control Act (TSCA) inventory.
SARA 302/304 Emergency Planning and Notification	The Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III requires facilities subject to Subparts 302 and 304 to submit emergency planning and notification information based on Threshold Planning Quantities (TPQs) and Reportable Quantities (RQs) for "Extremely Hazardous Substances" listed in 40 CFR 302.4 and 40 CFR 355. No components were identified.
SARA 311/312 Hazard Identification	The Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III requires facilities subject to this subpart to submit aggregate information on chemicals by "Hazard Category" as defined in 40 CFR 370.2. This material would be classified under the following hazard categories: Acute (Immediate) Health Hazard, Chronic (Delayed) Health Hazard
SARA 313 Toxic Chemical Notification and Release Reporting	This product contains the following components in concentrations above *de minimis* levels that are listed as toxic chemicals in 40 CFR Part 372 pursuant to the requirements of Section 313 of SARA: Polynuclear Aromatic Hydrocarbons (4- to 6- member condensed rings) [CAS No.: 68487-58-6] Concentration: 5%
CERCLA	The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) requires notification of the National Response Center concerning release of quantities of "hazardous substances" equal to or greater than the reportable quantities (RQ's) listed in 40 CFR 302.4. As defined by CERCLA, the term "hazardous substance" does not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically designated in 40 CFR 302.4. Chemical substances present in this product or refinery stream that may be subject to this statute are: Hydrogen sulfide [CAS No.: 7783-06-4] RQ = 100 lbs. (45.36 kg) Concentration: <0.1%
Clean Water Act (CWA)	This material is classified as an oil under Section 311 of the Clean Water Act (CWA) and the Oil Pollution Act of 1990 (OPA). Discharges or spills which produce a visible sheen on waters of the United States, their adjoining shorelines, or into conduits leading to surface waters must be reported to the EPA's National Response Center at (800) 424-8802.
California Proposition 65	This material may contain the following components which are known to the State of California to cause cancer, birth defects or other reproductive harm, and may be subject to the requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5): Polynuclear Aromatic Hydrocarbons (4- to 6- member condensed rings): >5%
New Jersey Right-to-Know Label	For New Jersey R-T-K labeling requirements, refer to components listed in Section 2.
Additional Remarks	No additional regulatory remarks.

SECTION 16. OTHER INFORMATION

Refer to the top of Page 1 for the HMIS and NFPA Hazard Ratings for this product.

REVISION INFORMATION

Version Number	2.0
Revision Date	2/16/2006

ABBREVIATIONS

AP: Approximately EQ: Equal >: Greater Than <: Less Than NA: Not Applicable ND: No Data NE: Not Establishe

ACGIH: American Conference of Governmental Industrial Hygienists AIHA: American Industrial Hygiene Associatior

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IARC: International Agency for Research on Cancer
NIOSH: National Institute of Occupational Safety and Health
NPCA: National Paint and Coating Manufacturers Association
NFPA: National Fire Protection Association
NTP: National Toxicology Program
OSHA: Occupational Safety and Health Administration
HMIS: Hazardous Materials Information System
EPA: US Environmental Protection Agency

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