

Heavy Cycle Oil (HCO)

Material Safety Data Sheet

Company

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MSDS No. AP0881

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IMPORTANT: Read this MSDS before handling or disposing of this product and pass this information on to employees, customers and users of this product.

Hazard Rankings		
	HMIS	NFPA
Health Hazard	* 3	1
Fire Hazard	2	2
Reactivity	0	0

* = Chronic Health Hazard

Emergency Overview

Physical State Viscous liquid
Color Dark yellow to brown. **Odor** Slight burnt or cracked hydrocarbon

WARNING! Combustible liquid; vapor may cause flash fire.
 Vapors and fumes may be hazardous or fatal!
 Long-term heated storage (100° to 150°F) might evolve hydrogen sulfide, a flammable, toxic, sensitizing, and potentially deadly gas!
 When heated, may cause thermal burns on contact! If hot product contacts water, a violent eruption of steam and vapor may occur!
 Mist or vapor may severely irritate the eyes and respiratory tract!
 Liquid contact may cause minimal eye and/or mild to moderate skin irritation and inflammation!
 Contains 4- to 6-membered condensed-ring (polynuclear) aromatic hydrocarbons (PNAs), and possibly carbozoles!
 May cause skin cancer following extended and/or repeated contact!
 May be harmful to target organs and/or adversely affect reproduction if absorbed through the skin! Wash thoroughly after handling.
 Spills may create a slipping hazard!

Protective Equipment

Minimum Requirements
 See Section 8 for Details

This recommendation reflects minimum PPE when product is at elevated temperatures

SECTION 1: IDENTIFICATION

Trade Name Heavy Cycle Oil (HCO)

Product Number 1044310443

CAS Number 64741-61-3

Product Family Petroleum Hydrocarbon Gas Oil

Synonyms Heavy Cycle Oil from a Fluid Catalytic Cracker Unit; FCCU Heavy Cycle Oil; 732 Unit HCO; Heavy Catalytic Cracked Distillate (Petroleum), Catalytic Cracked Heavy Gas Oil; FCCU Heavy Distillate; Heat Medium Oil; Coker Unit Feed Component; Heavy Fuel Oil Blending Component; Unfinished No. 5 Fuel, No 5 Fuel Oil Blending Component; C15-C35 Petroleum Hydrocarbons.

SECTION 2: COMPOSITION

Component Name(s)	CAS Registry No.	Concentration (%)
1) Heavy Catalytic Cracked Distillate (Petroleum)	64741-54-4	100
2) C15-C36 Saturated Hydrocarbons and Naphthenes	Mixture	75-95
3) Polynuclear Aromatic Hydrocarbons (4- to 6-member condensed-ring type)	68487-58-6	5-25
4) Chrysene (Benzo[a]phenanthrene)	218-01-9	0.08-0.15
5) 5-Methylchrysene	3697-24-3	0.08-0.15
6) Hydrogen sulfide	7783-06-4	0.0001-0.01

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. Eye Contact. Absorption. Inhalation.

Signs and Symptoms of Acute Exposure

Inhalation	May be harmful or fatal if inhaled! Inhalation of the vapor or spray mist may cause severe nose, throat, respiratory tract, and lung irritation, depending on the concentration and duration of exposure. Symptoms are characterized by coughing, choking, or shortness of breath and may cause transient central nervous system (CNS) depression. The National Institute for Occupational Safety and Health has determined that atmospheres containing 100 ppm or more of hydrogen sulfide (H ₂ S) are immediately dangerous to life and health. Concentrations of H ₂ S at or below 250 ppm may cause respiratory tract irritation and pulmonary edema. H ₂ S concentrations between 250 ppm and 500 ppm may result in headache, nausea, disorientation, irregular heartbeat, and/or low blood pressure. At greater than 500 ppm, H ₂ S causes sudden collapse, unconsciousness, and respiratory paralysis leading to convulsions, coma, and/or death. (See Section 11.)
Eye Contact	Upon direct contact, hot material may cause severe thermal burns. Animal test results on similar unheated materials suggest that this product may cause minimal eye irritation upon short-term exposure. Symptoms include stinging, watering, and redness. H ₂ S vapors may cause moderate to severe eye irritation and photophobia (sensitivity to light).
Skin Contact	Skin contact with hot material may result in severe thermal burns. Animal test results on similar materials suggest that this material can cause moderate skin irritation. Short-term contact symptoms include redness, itching, and burning of the skin. This material may also be absorbed through the skin and produce CNS depression effects (see "Inhalation" above). If the skin is damaged, absorption increases. Prolonged and/or repeated contact may cause moderate dermatitis and/or more serious skin disorders. Chronic symptoms may include drying, swelling, scaling, blistering, cracking, and/or severe tissue damage. Based upon a similar product's animal test results, a mild allergic skin response may be expected on some sensitive individuals following repeated exposures.
Ingestion	Contact with hot material may cause thermal burns. If swallowed, no significant adverse health effects are anticipated, however, this material can cause a laxative effect. Ingestion of large quantities can cause intestinal obstruction.
Chronic Health Effects Summary	Heavy aromatic oils similar to this material have been shown to be mutagenic, induce skin tumors, and cause adverse effects in the liver, kidneys, thymus, adrenal glands, bone marrow, testes, and embryo/fetus of laboratory animals following prolonged and repeated application. It is considered to be potentially teratogenic. This heavy catalytic cracked distillate is also a heavy residual oil distillate similar to those shown to produce skin tumors and adverse effects in the liver and kidneys of laboratory animals following prolonged and repeated applications. All tumors appeared at the site of application. Toxic effects are unlikely to occur if good personal hygiene is practiced. Subchronic exposure to low levels of hydrogen sulfide can produce eye irritation and corneal opacity, bronchitis, pulmonary edema, excessive salivation, nausea, diarrhea, CNS depression, and cardiac irregularities. Whether or not there is a chronic toxicity of H ₂ S distinct from its acute and subchronic effects is debatable. However, headaches, bronchitis, a grey-green line on the gums, eye disorders, cardiac arrhythmias, and neurological symptoms including psychological disorders have been reported due to prolonged and/or repeated exposures. (See Section 11.)
Conditions Aggravated by Exposure	Personnel with pre-existing nervous system disease, cardiac or neurological conditions, skin disorders, chronic respiratory diseases, impaired lung, liver, kidney, thymus, or bone marrow function, anemia, red blood cell abnormalities, or immune system deficiencies should avoid exposure.
Target Organs	This substance is toxic to respiratory tract and lungs, central nervous system, heart, mucous membranes, skin, eyes, and possibly, the liver, kidneys, thymus, adrenal glands, blood, bone marrow, immune system, testes, and unborn embryo/fetus.
Carcinogenic Potential	This material contains numerous 4- to 6-membered condensed-ring (polynuclear) aromatic hydrocarbons (PNAs) at concentrations at or above 0.1%. Some of these compounds has been determined to be carcinogenic by OSHA, IARC, and NTP.

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OSHA Health Hazard Classification				OSHA Physical Hazard Classification					
Irritant	<input checked="" type="checkbox"/>	Toxic	<input type="checkbox"/>	Combustible	<input checked="" type="checkbox"/>	Explosive	<input type="checkbox"/>	Pyrophoric	<input type="checkbox"/>
Sensitizer	<input checked="" type="checkbox"/>	Highly Toxic	<input type="checkbox"/>	Flammable	<input type="checkbox"/>	Oxidizer	<input type="checkbox"/>	Water-reactive	<input type="checkbox"/>
Corrosive	<input type="checkbox"/>	Carcinogenic	<input checked="" type="checkbox"/>	Compressed Gas	<input type="checkbox"/>	Organic Peroxide	<input type="checkbox"/>	Unstable	<input type="checkbox"/>

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 Immediately move exposed individual to fresh air. Monitor for respiratory distress and loosen any tight clothing such as a collar, tie, belt, or waistband. If the individual is not breathing, immediately begin rescue breathing. If heart has stopped, immediately begin cardiopulmonary resuscitation (CPR). If breathing is difficult, 100 percent humidified oxygen should be administered by a qualified individual. Seek medical attention immediately.

Eye Contact If hot material is splashed into eyes, irrigate with large amounts of room-temperature water. Seek medical attention immediately. If ambient temperature material is splashed into eyes, check for and remove contact lenses. If irritation or redness develops, flush eyes with cool, clean, low-pressure water for at least 15 minutes. Hold eyelids apart to ensure complete irrigation of the eye and eyelid tissue. Do not use eye ointment. Seek medical attention immediately.

Skin Contact If burned by hot material, cool skin by quenching with large amounts of cool water. Do not remove material from the skin. Seek medical attention immediately. For contact at ambient temperatures, remove contaminated shoes and clothing. Wipe off excess material. Wash exposed skin with soap and water. If tissue appears damaged or if irritation or pain persist, apply a clean dressing and seek medical attention. Do not use ointments. Thoroughly clean contaminated clothing before reuse. Discard contaminated leather goods.

Ingestion Do not induce vomiting or give anything by mouth. Rinse out mouth with water. 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. Do not leave victim unattended. Allow small quantities to pass through system. If large amounts are swallowed or irritation or discomfort occurs, seek medical attention immediately.

Notes to Physician Inhalation overexposure can produce toxic effects. Nitrite as an antidote for acute hydrogen sulfide intoxication may only be effective within the first few minutes after the exposure. Conditions thereafter may actually slow sulfide removal from the body's tissues. Cardiac and arterial blood gas monitoring, 100 percent oxygen supplementation, chest x-ray, and supportive care for CNS complications are indicated for asphyxiated patients. If only cough or difficulty in breathing develop, evaluate for upper respiratory tract inflammation, bronchitis, and pneumonitis using pulmonary function tests and chest x-rays. Vigorous anti-inflammatory/steroid treatment may be required at first evidence of upper airway or pulmonary edema. Administer 100 percent humidified supplemental oxygen with assisted ventilation, as required.

This material may affect the hematopoietic system or cause hepatotoxicity and/or nephrotoxicity. A complete blood count, liver function tests, renal function tests and urinalysis are suggested for significant exposures. In addition, monitoring arterial blood gases is suggested for significant exposures.

SECTION 5: FIRE FIGHTING MEASURES

NFPA Flammability Classification OSHA/NFPA Class-III Liquid. Moderately combustible!

Flash Point Method CLOSED CUP: 75° to 80°C (167° to 178°F) (Setiflash Open Cup [ASTM D-92]).

Lower Flammable Limit 1.0 to 4.0% **Upper Flammable Limit** 7 to 44%

Autoignition Temperature 260° to 343°C (500° to 650°F)

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**Hazardous
Combustion Products**

Burning or excessive heating may produce carbon monoxide, carbon dioxide, and possibly smoke, fumes, unburned hydrocarbons, and oxides of sulfur and nitrogen.

Special Properties

This "Combustible Liquid" releases vapors at or approaching its flash point temperature. When mixed with air in certain proportions and exposed to an ignition source, its vapor can cause a flash fire. Mists or sprays may be flammable at temperatures below the flash point. Use only with adequate ventilation. Vapors are heavier than air and may travel long distances along the ground to an ignition source and flash back. May create vapor/air explosion hazard in confined spaces such as sewers. If container is not properly cooled, it can rupture in the heat of a fire.

If stored under heat for extended periods or significantly agitated, this material might evolve or release **hydrogen sulfide, a flammable gas**, which can raise and widen this material's actual flammability limits and significantly lower its autoignition temperature. (See Section 7.)

Extinguishing Media

SMALL FIRE: Use dry chemicals, carbon dioxide (CO₂), foam, water fog, or inert gas (nitrogen). **LARGE FIRE:** Use foam, water fog, or waterspray. Water fog and spray are effective in cooling containers and adjacent structures but might cause frothing and/or may not achieve extinguishment. A water jet may be used to cool the vessel's external walls to prevent pressure build-up, autoignition, or explosion. NEVER use a water jet directly on the fire because it 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. Evacuate area and fight the fire from a maximum distance or use unmanned hose holders or monitor nozzles. Cover pooling liquid with foam. Containers can build pressure if exposed to radiant heat; cool adjacent containers with flooding quantities of water until well after the fire is out. Withdraw immediately from the area if there is a rising sound from venting safety devices or discoloration of vessels, tanks, or pipelines. Be aware that burning liquid will float on water. Notify appropriate authorities if liquid(s) enter sewers/waterways.

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.

Combustible Liquid. Evacuate non-essential personnel and remove all ignition sources. Carefully contain spill and stop source of spill if it can be done without risk. Do not touch or walk through spilled material. Cleanup crews must wear proper heat-resistant protective clothing. Remove spillage immediately from hard, smooth walking areas. Allow material to cool. Water mist or spray may be used to reduce heat or disperse vapors; but, it may not prevent ignition in closed spaces. This material will normally float on water. Prevent its entry into waterways, sewers, basements, or confined areas. Absorb or cover with dry earth, sand, or other non-combustible material and transfer to appropriate waste containers. Use clean, non-sparking tools to collect absorbed material.

For large spills, secure the area and control access. Dike far ahead of a liquid spill to ensure complete collection. Verify that responders are properly HAZWOPER-trained and wearing appropriate respiratory equipment and fire-resistant protective clothing during cleanup operations. In an urban area, cleanup spill as soon as possible; in natural environments, cleanup on advice from specialists. Pick up free liquid/semi-solid for recycle and/or disposal if it can be accomplished safely with explosion-proof equipment. Collect any excess material with absorbent pads, sand, or other inert non-combustible absorbent materials. Place into appropriate waste containers for later disposal. Comply with all laws and regulations.

SECTION 7: HANDLING AND STORAGE**Handling**

A spill or leak may cause an immediate fire/explosion hazard. Keep containers closed and do not handle or store near heat, sparks, or any other potential ignition sources. Bond and ground all equipment before transferring this material from one container to another. Do not contact with oxidizable materials. Do not breathe vapor. Use only with adequate ventilation/personal protection. Never siphon by mouth. Avoid contact with eyes, skin, and clothing. Prevent contact with food, chewing, or smoking materials. Do not take internally.

When performing repairs and maintenance on contaminated equipment, keep unnecessary persons away from the area. Eliminate all potential ignition sources. Drain and purge equipment, as necessary, to remove material residues. Use gloves constructed of impervious materials and protective clothing if direct contact is anticipated. Provide ventilation to maintain exposure potential below applicable exposure limits. Promptly remove contaminated clothing. Wash exposed skin thoroughly with soap and water after handling.

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Empty containers may contain material residues which can ignite with explosive force. Misuse of empty containers can be dangerous if used to store toxic, flammable, or reactive materials. Cutting or welding of empty containers can cause fire, explosion, or release of toxic fumes from residues. Do not pressurize or expose empty containers to open flame, sparks, or heat. Keep container closed and drum bungs in place. All label warnings and precautions must be observed. Return empty drums to a qualified reconditioner. Consult appropriate federal, state and local authorities before reusing, reconditioning, reclaiming, recycling, or disposing of empty containers and/or waste residues of this material.

Storage

Store and transport in accordance with all applicable laws. Keep containers tightly closed and properly labeled. Keep away from all ignition sources! Do not store with strong oxidizing agents. Hydrogen sulfide vapors may be evolved from long-term heated storage and/or agitated transport. H₂S is corrosive to most metals. It can cause steel pipe to become blistered, pitted, and brittle. Metal components used for storage should be resistant to sulfide stress cracking. (See appropriate API and NACE standards.) Where H₂S is routinely stored, install monitoring equipment or system with alarms.

SECTION 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION**Engineering Controls**

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapor and/or mists below the pertinent exposure limits (see below). All electrical equipment should comply with the NFPA NEC Standards. Ensure that an emergency eye wash station and safety shower are near the work-station location.

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.

This recommendation reflects minimum PPE when product is at elevated temperatures.

**Eye Protection**

Safety glasses with side shields are recommended as a minimum protection. During transfer operations or when there is a likelihood of misting, splashing, or spraying, chemical goggles and face shield should be worn. Suitable eye wash water should be readily available.

Hand Protection

When handling hot materials or those that might produce thermal burns, use long-cuffed leather or heat-resistant gloves over chemically-resistant gloves. When product is at ambient temperatures, use disposable gloves (PVC, neoprene, nitrile, vinyl, or PVC/NBR). Before eating, drinking, smoking, use of toilet facilities, or leaving work, wash hands with plenty of mild soap and water. DO NOT use gasoline, kerosene, other solvents, or harsh abrasive skin cleaners.

Body Protection

Avoid skin contact. It is recommended that fire-retardant garments (e.g. Nomex™) be worn while working with flammable and combustible liquids. If splashing or spraying is expected, chemical-resistant protective clothing (Tyvek®, nitrile, or neoprene) should be worn. This might include long-sleeves, apron, slicker suit, boots, and additional facial protection. If general contact occurs, IMMEDIATELY remove soaked clothing and take a shower. Contaminated leather goods should be removed promptly and discarded.

Respiratory Protection

For unknown vapor concentrations use a positive-pressure, pressure-demand, self-contained breathing apparatus (SCBA). 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. Respirator use should follow OSHA requirements (29 CFR 1910.134) or equivalent standard (e.g. ANSI Z88.2).

General Comments

WARNING! Do not use this material as a fuel without adequate ventilation. Inadequate ventilation can result in hazardous levels of combustion products and inadequate oxygen levels for breathing. Odor is not adequate to warn of hazardous conditions.

The standards for "coal tar pitch volatiles, as benzene solubles" are based upon coal coking, not upon petroleum-derived oils. However, in 29 CFR 1910.1200.1002, OSHA has defined "coal tar pitch volatiles" to include the fused polycyclic hydrocarbons which volatilize from the distillation residues of coal, petroleum (excluding asphalt), wood and other organic matter. Accordingly, the coal tar pitch volatile standard may apply to the aerosol form of this material. The "hydrogen sulfide" standards apply only to vapors evolved from long-term heated storage and/or transport.

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Occupational Exposure Guidelines

Substance	Applicable Workplace Exposure Levels
1) Hydrogen sulfide	TWA: 10 STEL: 15 (ppm) from ACGIH (TLV) TWA: 5 (ppm) from ACGIH (TLV) [Proposed]
2) Oil mist, mineral	TWA: 10 STEL: 15 CEIL: 20 (ppm) from (PEL) OSHA [Proposed] TWA: 5 STEL: 10 (mg/M ³) from ACGIH (TLV) TWA: 5 (mg/M ³) from OSHA (PEL)
3) Coal tar pitch volatiles, as benzene solubles ("A1" Confirmed Human Carcinogen)	TWA: 0.2 (mg/M ³) from ACGIH (TLV) TWA: 0.2 (mg/M ³) from OSHA (PEL) [Proposed]
4) Oil mist, mineral, sum total of 15 PAHs listed as carcinogens by US NTP	TWA: 0.005 (mg/M ³) from ACGIH (TLV) [Proposed]
5) Chrysene (Benzo[a]phenanthrene)	"A3" Animal Carcinogen from ACGIH

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Viscous liquid	Color	Dark yellow to brown	Odor	Slight burnt or cracked hydrocarbon.
Specific Gravity	0.985 to 0.995 at 60°F (Water = 1)	pH	Not applicable	Vapor Density	> 10 (Air = 1 at 70°F)
Boiling Point/Range	260° to 500°C (500° to 932°F) (ASTM D-86)	Melting/Freezing Point	< 24°C (< 75°F) (ASTM D-97)		
Vapor Pressure	< 0.1 mm of Hg at 21°C (70°F).	Viscosity (cSt @ 40°C)	42.7 to 53.5 (ASTM D-445)		
Solubility in Water	Negligible in cold water (LT 0.001%).	Volatile Characteristics	Negligible; no Volatile Organic Compounds (VOCs) present at 450°F.		

Additional Properties Average Calculated Density at 60°F = 8.247 lbs./gal. (ASTM D-2161);
Saybolt Viscosity = 200 to 250 SUS at 100°F (38.7°C) (ASTM D-2161);
90% Boiling Point Temperature = 850° to 905°F (455° to 485°C) (ASTM D-86);
Sulfur Content = 0.5 to 1.5 Wt.% (ASTM D-2622);
Evaporation Rate = < 0.005 when n-Butyl acetate = 1.0.

SECTION 10: STABILITY AND REACTIVITY

Chemical Stability	Stable.	Hazardous Polymerization	Not expected to occur.
Conditions to Avoid	Keep away from extreme heat, strong acids, and strong oxidizing conditions.		
Materials Incompatibility	Strong acids, alkalis, and oxidizers such as liquid chlorine and oxygen. Hydrogen sulfide is dangerously reactive with strong oxidizers (nitric acid, chlorine, fluorine, etc.), some metals, metal oxides, and metal powders. H ₂ S is corrosive to some metals and alloys, especially those containing copper and/or tungsten.		
Hazardous Decomposition Products	Composition suggests that sulfur and nitrogen compounds might be generated; but, no degradation data is available.		

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	Heavy Catalytic Cracked Distillate (Petroleum):
	GAS (LC ₅₀): Acute: >3.6 mg/L (Rat screen level).
	ORAL (LD ₅₀): Acute: 21.2 ml/kg (Rat).
	DERMAL (LD ₅₀): Acute: >2,000 mg/kg (Rabbit screen level).
	DRAIZE EYE: Acute: Non-irritating to minimal eye irritant (Rabbit)
	DRAIZE DERMAL: Acute: Moderate skin irritant (Rabbit).
	BUEHLER DERMAL: Acute: Non-sensitizing (Guinea Pig).
	I/P DERMAL: Acute: Tumor initiator & possibly promoter activity (Mouse).
	27-Week DERMAL: Chronic: 20 mg/kg 3x/week (Mouse) - Significant increase in contact-point skin tumors (on 81% of the animals) with 13-week mean latency and decreased survivability (30% mortality).

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A TSCA Section 8(e) notification from the American Petroleum Institute states that a long-term mouse skin painting study using **heavy catalytic cracked distillate** showed it to be severely irritating and tumorigenic. It also produced 59% mortality before sacrifice which occurred on day 193 due to poor health of the surviving animals.

The International Agency for Research on Cancer (IARC) has specifically evaluated **aromatic oils, including high-boiling fractions of catalytically cracked oils**, and determined them to be carcinogenic to experimental animals, and potentially humans. Also, the National Toxicology Program (NTP), U.S. Environmental Protection Agency (EPA), and American Conference of Governmental Industrial Hygienists (ACGIH) have independently classified various polynuclear aromatic hydrocarbon (PNA) compounds present in this product as "confirmed human (A1), suspected human (A2), or animal carcinogens (A3)".

This material contains **polycyclic aromatic hydrocarbons (PHAs or PNAs)**, some of which have been reported to cause skin cancer on humans under conditions of poor personal hygiene, prolonged/repeated contact, and exposure to sunlight. This material may also contain **alkylcarbazoles and alkylbenzocarbazoles** which if absorbed through the skin might be responsible, in whole or part, for systemic toxicity to the liver, kidneys, spleen, and/or testes based upon limited laboratory animal studies.

Catalytic Cracked Clarified Oil [a similar material]:

28-Day DERMAL	Sub-chronic	0% Mortality at 200, 10% at 400, 40% at 1,000, & 100% at 2,000 & 4,000 mg/kg/day (Rat & Rabbit) - Edema, skin ulceration, and depression. Minimal to moderate diffuse hepatocytomegaly in all animals at 400 mg/kg/day, slight skin hyperplasia and hyperkeratosis. Liver, thymus, and testes damage and increased liver-to-body weight ratios at 400 & 1,000 mg/kg/day. Studies at 2,000 and 4,000 mg/kg/day were terminated on day 11 due to early deaths.
12-Week DERMAL	Sub-chronic:	5% Mortality at 40, 35% at 200, & 100% at 400 mg/kg/day (Rat) - Hepatocellular necrosis and generalized systemic toxicity.
52-Week DERMAL:	Chronic:	5 uL/kg 2x/week (Mouse) - Significant increase in contact-point skin tumors with 22-week mean latency, increased liver and liver-to-body weight ratios, & decreased survivability (87% mortality).
104-Week DERMAL	Chronic:	0.5 uL/kg 2x/week (Mouse) - 90% of the animals had contact-point skin tumors with 72-week mean latency.
MUTAGENICITY:		Many different in-vivo and in-vitro mutagenic assays have shown "positive" responses with or without S9 metabolic activation. The only "negative" mutagenic responses were when using the Mouse Cell Transformation Assay without S9 activation, in-vitro Chinese Hamster Ovary Cell Assay, and in-vivo Mouse Bone Marrow Assay.
TERATOGENESIS:		in-vitro Ovarian Tumor Attachment Inhibition Assay: Suspect teratogen (rating 3) (Mouse) Embryonic Palatal HEPM Cell Growth Inhibition Assay: Suspect teratogen (rating 3) with and without S9 metabolic activation (Human)

A TSCA Section 8(e) notification from Mobil Oil Company states that **catalytically cracked clarified oil** was not only carcinogenic, but also produced severe dose-dependent, organ-specific (liver, kidney, and testes) damage in rats during a 90-day sub-chronic dermal assay. Mortality occurred in 5% of the animals at 30 mg/kg/day, 55% at 125, 85% at 500, and 100% at 2,000. As a result of conducting additional dermal absorption studies, Mobil Oil believes that it is likely that alkyl- and alkylbenzocarbazoles present in this oil may have been responsible, in whole or in part, for the systemic toxicity. Epidemiology studies of Mobil refinery workers have not shown any effects corresponding to those observed in animals.

Hydrogen sulfide (H₂S):

GAS	(TE ₁₀)	Acute	AP 1 ppm (Human) - Odor response threshold
GAS	(TC ₁₀)	Acute	AP 10 ppm (Human) (15 minutes) - Eye irritation
GAS	(TC ₁₀)	Acute	50 to 100 ppm (Human) (15 minutes) - Respiratory irritation.
GAS	(LC ₁₀)	Acute	600 ppm (Human) (30 minutes) - Unconsciousness, respiratory paralysis, and death.
GAS	(LC ₁₀₀)	Acute	600 to 750 ppm (Human) (15 minutes) - Unconsciousness, respiratory paralysis, and death.
GAS	(LC ₁₀)	Acute	5,700 ug/kg (Human) - Chronic pulmonary edema, coma, and death.
GAS	(LC ₁₀)	Acute:	800 ppm (Rat) (5 minutes)
GAS	(LC ₅₀)	Acute:	635 ppm (Mouse) (1 hour)
GAS	(LC ₅₀)	Acute:	445 ppm (Rat) (4 hours) - Hypermotility, diarrhea, and increased urine volume.
5-Day GAS	Sub-chronic	1,200 mg/M3 (Rat) (2 hours/day) - Decreased cholinesterase and degenerative brain changes.	

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35-Day GAS: Sub-chronic 100 ppm (Rat) (8 hours/day) - Decreased cytochrome oxidases and degenerative brain and pulmonary effects.

90-Day GAS: Sub-chronic: 80 ppm (Rat & Mouse) (6 hours/day) - Decreased brain weight and weight loss or decreased weight gain

TERATOGENESIS: Sub-chronic: 20 ppm for 24 hours on days 6 thru 22 of pregnancy (Rat) - Developmental physical effects.

OTHER REPRODUCTIVE EFFECTS: One unconfirmed study mentions H₂S as causing damage to the human testes and/or male reproduction. Recent studies do not confirm this association. Other studies mention increased risk of miscarriage, abortion, and difficulties during pregnancy and labor, but these studies involved mixed chemical exposures and/or physical confounders.

Hydrogen sulfide (H₂S) causes eye and/or respiratory tract irritation at concentrations of 4 to 100 ppm in air. At low concentrations (<20 ppm), H₂S has an odor of rotten eggs. At higher concentrations (>50 ppm), H₂S odor is not apparent. NIOSH has determined that atmospheres containing 100 ppm or more H₂S are immediately dangerous to life and health. For the average human adult, exposure to H₂S concentrations above 500 ppm causes unconsciousness and death by respiratory paralysis. At concentrations between 600 and 750 ppm, death occurs within 15 minutes. The effects from repeated or prolonged exposures to low concentrations of H₂S is unclear. Headaches, bronchitis, a gray-green line on the gums, eye disorders, cardiac arrhythmias, and neurological symptoms including psychological disorders have been associated with long-term, low-level exposures to H₂S. An inhalation study using rats exposed to 100 ppm of H₂S for 8 hours per day for 5 weeks showed pulmonary effects, degenerative brain changes, and decreases in cytochrome oxidase. And, when pregnant rats were exposed to 20 ppm for 24 hours during days 6 through 22 of their pregnancy, their off-spring slowed developmental physical effects.

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity

Ecological effects testing has not been conducted on this material. If spilled, this heavy distillate, its storage tank water bottoms and sludge, and any contaminated soil or water may be hazardous to human, animal, and aquatic life. This material is estimated to have a slow rate of biodegradation. Based upon spill investigation analysis, oils containing polynuclear aromatic hydrocarbon compounds similar to this material were shown to bioaccumulate in tissues of various aquatic organisms.

Environmental Fate

This heavy residual oil is potentially toxic to freshwater and saltwater ecosystems. It will normally float on water with its lighter components gradually evaporating. In stagnant or slow-flowing waterways, this hydrocarbon oil layer can cover a large surface area. As a result, this covering layer might limit or eliminate natural atmospheric oxygen transport into the water. With time, if not removed, oxygen depletion in the waterway might be enough to cause a fish kill or create an anaerobic environment. This coating action can also be harmful or fatal to plankton, algae, aquatic life, and water birds. Additionally, potable water and boiler feed water systems should NEVER be allowed more than 5 ppm contamination from this material.

For additional ecological information concerning components of this product, users should refer to the Hazardous Substances Data Bank® and the Oil and Hazardous Materials/Technical Assistance Data System (OHM/TADS) maintained by the U.S. National Library of Medicine. (See Section 2 for components.)


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 spilled material is introduced into a wastewater treatment system, chemical and biological oxygen demand (COD and BOD) will likely increase slowly. This material is slowly biodegradable if gradually exposed to microorganisms, preferably in an aerobic environment with plenty of agitation. In sewage-seeded wastewater, at or below concentrations of 0.2 vol.% of this material, there is little or no effect on bio-oxidation and/or digestion. However, at 1 vol %, it doubles the required digestion period. Higher concentrations interfere with floc formation and sludge settling and also plug filters or exchange beds.

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 RCRA "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 Parts 260 through 271). State and/or local regulations might be even more restrictive. Contact the RCRA/Superfund Hotline at (800) 424-9346 or your regional US EPA office for guidance concerning case specific disposal issues.

SECTION 14: TRANSPORT INFORMATION

DOT Status	This material is regulated by the U.S. Department of Transportation (DOT) only when transported in bulk.		
Proper Shipping Name	Not regulated in non-bulk containers (Petroleum oil, N.O.I.B.N.), Combustible liquid for bulk container shipments.		
	This product has a flash point temperature of between 140° and 200°F (60° to 93°C), so for bulk shipments, it is classified as a DOT "Combustible liquid". However, according to 49 CFR 173.150(f)(2), certain transportation-related requirements, such as labeling, may not apply to this product when shipped in non-bulk "limited quantity" containers of less than 119 gallons capacity. However, pursuant to 49 CFR 173.150(b) and 173.150(f)(3), "limited-quantities" offered for or transported via aircraft or products which are defined as DOT "Marine Pollutants" may be subject to DOT regulation.		
Hazard Class	Not a DOT regulated material or "Combustible liquid"	Packing Group(s) UN/NA ID	Not applicable or PG III. Not applicable or NA1993
Reportable Quantity	The Reportable Quantity (RQ) substance components in this material which might require DOT HAZMAT bill-of-lading display are Chrysene (Benzo[a]phenanthrene) and Hydrogen sulfide .		
Placards	<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>A Combustible placard may not be required for this material when transported in a non-bulk container with a maximum capacity LT 450 L (LT 119 Gal)</p> </div>		Emergency Response Guide No. Not applicable or 128 HAZMAT STCC No. 49 122 12 MARPOL III Status Not a DOT "Marine Pollutant" per 49 CFR 171.8

SECTION 15: REGULATORY INFORMATION

TSCA Inventory	This material and/or its components are listed on the Toxic Substance Control Act (TSCA) inventory.
SARA 302/304	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. A minor component substance of this material subject to the reporting requirements under this statute is Hydrogen sulfide [CAS No. 7783-06-4] .
SARA 311/312	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) and Chronic (Delayed) Health Hazards, and the Fire Hazard.
SARA 313	This material contains the following components in concentrations which might be present at or above de minimis levels and they are listed as "toxic chemicals" in 40 CFR Part 372 pursuant to the requirements of Section 313: Chrysene (Benzo[a]phenanthrene) [CAS No. 218-01-9] concentration: 0.08 to 0.15% 5-Methylchrysene [CAS No. 3697-24-3] concentration: 0.08 to 0.15%.
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 material subject to this statute are: Chrysene (Benzo[a]phenanthrene) [CAS No. 218-01-9] (RQ = 100 lbs. [45.36 kg]) conc.: 0.08 to 0.15% Benzo[a]anthracene [CAS No. 56-55-3] (RQ = 10 lbs. [4.536 kg]) concentration: 0.04 to 0.05% Benzo[a]pyrene [CAS No. 50-32-8] (RQ = 1 lb. [0.4536 kg]) concentration: 0.007 to 0.011% Benzo[b]fluoranthene [CAS No. 205-99-2] (RQ = 1 lb. [0.4536 kg]) concentration: 0.005 to 0.015% Benzo[k]fluoranthene [CAS No. 207-08-9] (RQ = 5000 lbs. [2270 kg]) concentration: 0.002 to 0.004% Indeno[1,2,3-c,d]pyrene [CAS No. 193-39-5] (RQ = 100 lbs. [45.36 kg]) concentration: 0.001 to 0.003% Hydrogen sulfide [CAS No. 7783-06-4] (RQ = 100 lbs. [45.36 kg]) concentration: 0.0001 to 0.01%.

Heavy Cycle Oil (HCO)

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 contains detectable concentrations of the following chemical substances which are known to the State of California to cause cancer, birth defects, or other reproductive harm; and therefore, it might be subject to requirements of California Health & Safety Code Section 25249.5: 5-Methylchrysene [CAS No. 3697-24-3] concentration: 0.08 to 0.15% Chrysene (Benzo[a]phenanthrene) [CAS No. 218-01-9] concentration: 0.08 to 0.15% Benzo[a]anthracene [CAS No. 56-55-3] concentration: 0.04 to 0.05% Benzo[a]pyrene [CAS No. 50-32-8] concentration: 0.007 to 0.011% Indeno[1,2,3-c,d]pyrene [CAS No. 193-39-5] concentration: 0.001 to 0.003% Benzo[b]fluoranthene [CAS No. 205-99-2] concentration: 0.005 to 0.015% Benzo[k]fluoranthene [CAS No. 205-82-3] concentration: 0.003 to 0.005% Benzo[k]fluoranthene [CAS No. 207-08-9] concentration: 0.002 to 0.004%.
New Jersey Right-to-Know Label	For New Jersey labeling, refer to components listed in Section 2.
Additional Regulatory Remarks	In regulations promulgated pursuant to the Clean Air Act - Section 112(r) (40 CFR 68.130), the EPA requires development, implementation, and submission of risk management plans (RMPs) for facilities that manufacture, process, use, or otherwise handle regulated substances in quantities that exceed listed thresholds. A chemical substance present in this material which is subject to this statute is: Hydrogen Sulfide.

SECTION 16: OTHER INFORMATION

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

REVISION INFORMATION	Logo and Manufacturer name change.
Version Number	4.1
Revision Date	11/01/06

ABBREVIATIONS

AP: Approximately	EQ: Equal	>: Greater Than	<: Less Than	NA: Not Applicable	ND: No Data	NE: Not Established
ACGIH: American Conference of Governmental Industrial Hygienists				AIHA: American Industrial Hygiene Association		
IARC: International Agency for Research on Cancer				NTP: National Toxicology Program		
NIOSH: National Institute of Occupational Safety and Health				OSHA: Occupational Safety and Health Administration		
NPCA: National Paint and Coating Manufacturers Association				HMIS: Hazardous Materials Information System		
NFPA: National Fire Protection Association				EPA: US Environmental Protection Agency		

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