

Light Cycle Oil (LCO)

Material Safety Data Sheet

Company

Houston Refining
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P.O. Box 2583
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MSDS No. AP2050

Revision Date 11/01/06

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

Emergency Overview

Physical State Liquid
Color Transparent, slightly yellow to amber. **Odor** Characteristic, kerosene-like

WARNING! Combustible liquid; vapor may cause flash fire!
Mist or vapor may irritate the eyes, mucous membranes, and respiratory tract!
Liquid contact may cause minimal to mild eye and/or moderate to severe skin irritation and inflammation!
Contains 4- to 6-membered condensed-ring (polynuclear) aromatic hydrocarbons (PNAs)! Based upon laboratory animal studies, may cause skin cancer following extended contact!
May be harmful if inhaled or absorbed through the skin!
Overexposures may cause central nervous system (CNS) depression and/or other target organ effects!
May be harmful or fatal if ingested!
Aspiration into the lungs can cause pulmonary edema and lipid or chemical pneumonia!
Based upon animal testing, may adversely affect reproduction!
Spills may create a slipping hazard!
If used as fuel, its engine exhaust may cause upper respiratory tract irritation and reversible pulmonary effects!
Long-term exposure to fuel exhaust particulates may cause cancer!

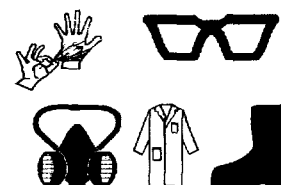
Hazard Rankings

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

* = Chronic Health Hazard

Protective Equipment

Minimum Requirements
See Section 8 for Details



SECTION 1: IDENTIFICATION

Trade Name Light Cycle Oil (LCO)

Product Number 1031610316

CAS Number 64741-59-9

Product Family Petroleum Hydrocarbon Middle Distillate

Synonyms LCO, FCCU LCO, FCCU Light Cycle Oil, Fluid Catalytic Cracker Unit Light Cycle Oil, Catalytic-cracked Light Gas Oil; Middle Distillate Cutter Oil, Untreated Diesel Fuel Blending Component, Light Catalytic Cracked Distillate (Petroleum), C9-C25 Petroleum Hydrocarbons.

Business Contact

Product Safety 800-700-0946

24 Hour Emergency Contact

CHEMTREC 800-424-9300

CANUTEC-Canada 613-996-8666

LYONDELL 800-245-4532

SECTION 2: COMPOSITION

Component Name(s)	CAS Registry No.	Concentration (%)
1) Light Catalytic Cracked Distillate (Petroleum)	64741-59-9	100
2) Nonanes	Mixture	1-10
3) Trimethylbenzene (mixed isomers)	25551-13-7	0.5-1.5
4) Ethylmethylbenzenes (Ethyltoluenes)	25550-14-5	1-3
5) C10-C12 Alkanes, Isoparaffins, Cycloalkanes, and Naphthenes	Mixture	25-35
6) Naphthalene	91-20-3	1-3
7) C10-C11 Alkylbenzenes	70693-06-0	5-15
8) C10-C16 Alkene Hydrocarbons	68876-80-2	5-10
9) Biphenyl (Diphenyl)	92-52-4	1-5
10) C12-C23 Aromatic Hydrocarbons	Mixture	5-15
11) Polynuclear Aromatic Hydrocarbons (4- to 6-member condensed-ring type)	68487-58-6	0.1-1
12) C13-C25 Alkanes, Isoparaffins, Cycloalkanes, and Naphthenes	Mixture	15-35
13) C17-C24 Alkene Hydrocarbons	68459-78-9	1-10

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 Breathing high concentrations of vapor may cause respiratory irritation, euphoria, excitation or giddiness, headache, nausea, vomiting, abdominal pain, loss of appetite, fatigue, muscular weakness, staggering gait, and central nervous system (CNS) depression. CNS effects include dizziness, drowsiness, disorientation, vertigo, memory loss, visual disturbances, difficulty with breathing, convulsions, unconsciousness, paralysis, coma, and even death, depending upon level of exposure concentration and/or duration. Vapors can reduce the oxygen content in air. Approximately 20,000 ppm (or 2 vol %) in air is fatal to humans in 5 to 10 minutes. Sudden death from cardiac arrest (heart attack) may result from exposure to 5,000 ppm for only 5 minutes. Oxygen deprivation is possible if working in confined spaces.

Eye Contact Animal test results on similar materials suggest that this product can cause minimal to mild eye irritation upon short-term exposure. Symptoms include stinging, watering, redness, and swelling.

Skin Contact Animal test results on similar materials suggest that this product can cause moderate to severe 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 severe dermatitis and/or more serious skin disorders. Chronic symptoms may include drying, swelling, scaling, blistering, cracking, and/or severe tissue damage.

Ingestion If swallowed, this material may irritate the mucous membranes of the mouth, throat, esophagus, and stomach. It can be readily absorbed by the stomach and intestinal tract. Ingestion can produce a burning sensation of the mouth and esophagus and central nervous system depression. Symptoms of CNS depression may include nausea, vomiting, dizziness, staggering gait, drowsiness, shallow rapid pulse, diarrhea, restlessness, sedation, inadequate respiratory function, and heart irregularities. Higher doses may cause loss of consciousness and delirium prior to the onset of convulsions, coma, and death (see "Inhalation" above). A lethal dose may be as low as one-half ounce for a child and one ounce for an adult human.

Due to its light viscosity, there is a danger of aspiration into the lungs during vomiting. Aspiration of a small amount of liquid can result in severe lung damage or death. Progressive CNS depression, respiratory insufficiency, and ventricular fibrillation may also result in death.

Chronic Health Effects Summary Chronic effects of ingestion and subsequent aspiration into the lungs may cause pneumatocele (lung cavity) formation and chronic lung dysfunction.

Light cycle oil (petroleum) has been shown to produce skin tumors on laboratory animals following repeated applications. All tumors appeared at the site of application on the test animals. Toxic effects are unlikely to occur if good personal hygiene is practiced.

Based upon animal testing, the **C9 aromatic hydrocarbon components (trimethylbenzenes and ethylmethylbenzenes)** are presumed to cause fetal toxicity and/or decreased fetal and newborn weights if overexposure occurs during a woman's early gestation period.

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Naphthalene is considered to be a toxic substance as defined by both human exposure and laboratory testing results. And, based upon animal testing, it might be considered carcinogenic.

Biphenyl (Diphenyl) may cause liver and/or nerve damage. (See Section 11.)

Conditions Aggravated by Exposure Personnel with pre-existing central nervous system (CNS) disease, neurological conditions, impaired liver or kidney function, skin disorders, or chronic respiratory diseases, and women attempting to conceive should avoid exposure.

Target Organs This substance is toxic to lungs, nervous systems, brain, mucous membranes, skin, eyes, and possibly, the blood, liver, kidneys, and reproductive system.

Carcinogenic Potential Because this material is a **high-boiling fraction of catalytically cracked oils** and contains **polynuclear aromatic hydrocarbon (PNA) compounds** at above 0.1%, it is considered carcinogenic by IARC and OSHA (See Section 11.)

OSHA Health Hazard Classification				OSHA Physical Hazard Classification			
Irritant	<input checked="" type="checkbox"/>	Toxic	<input checked="" type="checkbox"/>	Combustible	<input checked="" type="checkbox"/>	Explosive	<input type="checkbox"/>
Sensitizer	<input type="checkbox"/>	Highly Toxic	<input type="checkbox"/>	Flammable	<input type="checkbox"/>	Oxidizer	<input type="checkbox"/>
Corrosive	<input type="checkbox"/>	Carcinogenic	<input checked="" type="checkbox"/>	Compressed Gas	<input type="checkbox"/>	Organic Peroxide	<input type="checkbox"/>
						Pyrophoric	<input type="checkbox"/>
						Water-reactive	<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 victim to fresh air. If victim 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** 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** 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 or give anything by mouth. 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 overexposure can produce toxic effects. Monitor for respiratory distress. If cough or difficulty in breathing develops, evaluate for upper respiratory tract inflammation, bronchitis, and pneumonitis. 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.

If ingested, this material presents a significant aspiration/lipoid or chemical pneumonitis hazard. As a result, induction of emesis is not recommended. Administer an aqueous slurry of activated charcoal followed by a cathartic such as magnesium citrate or sorbitol. Also, treatment may involve careful gastric lavage if performed soon after ingestion or in patients who are comatose or at risk of convulsing. Protect the airway by cuffed endotracheal intubation or by placement of the body in a Trendelenburg and left lateral decubitus position. Obtain chest X-ray and liver function tests. Monitor for cardiac function, respiratory distress and arterial blood gases in severe exposure cases.

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SECTION 5: FIRE FIGHTING MEASURES

NFPA Flammability Classification	OSHA/NFPA Class-III Combustible Liquid Moderately combustible ¹		
Flash Point Method	CLOSED CUP: 65° to 93°C (150° to 200°F) (Setaflash [ASTM D-92])		
Lower Flammable Limit	AP 0.7 %	Upper Flammable Limit	AP 5.0 %
Autoignition Temperature	232° to 257°C (450° to 495°F)		
Hazardous Combustion Products	Burning or excessive heating may produce smoke, carbon monoxide, carbon dioxide, and possibly other harmful gases/vapors		
Special Properties	<p>Combustible Liquid¹ This material releases vapors at or approaching the 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.</p> <p>A static electrical charge can accumulate as a result of transfer flow or agitation. Discharge (static spark) can ignite vapors, especially in cold, dry weather conditions. Special slow load and monitoring procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when this material is loaded into tanks previously containing gasoline or other low flash point products. To reduce this hazard, receiving containers should always be grounded and the loading nozzle must be kept in contact with the container during the entire filling process. Do not fill any portable container in or on a vehicle without proper bonding.</p>		
Extinguishing Media	<p>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.</p>		
Fire Fighting Protective Clothing	<p>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.</p>		

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 Liquid¹ Release causes an immediate fire or explosion hazard. Evacuate all non-essential personnel from immediate area and establish a "regulated zone" with site control and security. A vapor-suppressing foam may be used to reduce vapors. Eliminate all ignition sources. All equipment used when handling this material must be grounded. Stop the leak if it can be done without risk. Do not touch or walk through spilled material. Remove spillage immediately from hard, smooth walking areas. 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. Water mist or spray may be used to reduce or disperse vapors, but, it may not prevent ignition in closed spaces. This material will float on water and its run-off may create an explosion or fire hazard. 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 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 can 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.

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 store in a cool, dry, well-ventilated place, plainly labeled, and out of closed vehicles. Keep away from all ignition sources! Ground all equipment containing this material. Containers should be able to withstand pressures expected from warming and cooling in storage. This combustible liquid should be stored in a separate safety cabinet or room. All electrical equipment in areas where this material is stored or handled should be installed in accordance with applicable requirements of the N F P A.'s National Electrical Code (NEC).

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.

**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

Avoid skin contact and use gloves (disposable 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).

Light Cycle Oil (LCO)

General Comments Warning! Use of this hydrocarbon fuel in spaces without adequate ventilation may result in generation of hazardous levels of combustion products and inadequate oxygen levels for breathing. Odor is an inadequate warning for hazardous conditions

Occupational Exposure Guidelines

Substance	Applicable Workplace Exposure Levels
1) Diesel fuel/Kerosene ("A3" Animal Carcinogen)	TWA: 100 (mg/m ³) from ACGIH (TLV) [Proposed for 2001] - SKIN
2) Nonane, all isomers	TWA: 200 (ppm) from ACGIH (TLV) [2000] TWA 200 (ppm) from OSHA (PEL) [1989]
3) Trimethylbenzene (mixed isomers)	TWA: 25 (ppm) from ACGIH (TLV) [2000] TWA 25 (ppm) from OSHA (PEL) [1989]
4) Naphthalene ("A4" = Not Classifiable")	TWA: 10 STEL: 15 (ppm) from ACGIH (TLV) [2000] - SKIN TWA: 10 STEL: 15 (ppm) from OSHA (PEL) [1989] TWA: 10 (ppm) from OSHA (PEL) [1976]
5) Biphenyl (Diphenyl)	TWA: 0.2 (ppm) from ACGIH (TLV) [2000] TWA: 0.2 (ppm) from OSHA (PEL) [1989]
6) Coal tar pitch volatiles, as benzene solubles ("A1" Confirmed Human Carcinogen)	TWA: 0.2 (mg/m ³) from ACGIH (TLV) [2000] TWA: 0.2 (mg/m ³) from OSHA (PEL) [1989]
7) Diesel exhaust, particulate aerodynamic diameter < 1 µm ("A2" Suspected Human Carcinogen)	TWA: 0.05 (mg/m ³) from ACGIH (TLV) [Proposed for 2001]

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Liquid	Color	Transparent, slightly yellow to amber	Odor	Characteristic, kerosene-like
Specific Gravity	0.94 to 0.95 at 60°F (Water = 1)	pH	Not applicable	Vapor Density	AP 5.0 (Air = 1 at 70°F)
Boiling Point/Range	150° to 415°C (302° to 780°F) (ASTM D-2887)	Melting/Freezing Point			LT -12°C (10° F) (ASTM D-97)
Vapor Pressure	0.8 to 1.8 mm Hg at 20°C (68°F) or LT 0.1 Reid-psi at 38°C (100°F).	Viscosity (cSt @ 40°C)			3 to 7.5 (ASTM D-445)
Solubility in Water	Negligible to slightly soluble in cold water (LT 0.005 to 0.04%)	Volatile Characteristics			Volatile Organic Compounds (VOCs) Content = 30% below 400°F, 825 to 925 gm/L
Additional Properties	Alkane, Isoparaffin, and Cycloalkane Hydrocarbons Content = 40 to 80 Wt % (ASTM D-1319), C8-C23 Aromatic Hydrocarbon Content = 14 to 40 Wt % (ASTM D-1319), C9-C24 Olefinic Hydrocarbon Content = 6 to 20 Wt % (ASTM D-1319), Average Density at 60°F = 7.898 lbs./gal (ASTM D-2161), Cetane Number = 40 to 45 (ASTM D-613 or D-976); Saybolt Viscosity = 38 to 50 SUS at 100°F (ASTM D-2161); Sulfur Content = 0.5 to 1.0 Wt % (ASTM D-2622), Ash Content = 0.01 to 0.1 Wt.% (ASTM D-482), 90% Boiling Point Temperature = LT 700°F (371°C) (ASTM D-86), Dry Point Temperature = 752°F (400°C) (ASTM D-86), Evaporation Rate = LT 0.04 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, hydrogen peroxide, and oxygen		
Hazardous Decomposition Products	No substances are readily identified from composition, and, 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

Light Catalytic Cracked Distillate (Petroleum):

GAS (LC50): Acute: 4.65 to 5.4 mg/L for 4 hours [Rat].
 GAS (LC50): Acute: 3.35 mg/L for 4 hours [Rat males only]
 ORAL (LD50) Acute: 4,660 to 7,180 mg/kg [Rat males only]
 ORAL (LD50) Acute: 3,200 to 6,790 mg/kg [Rat females only] - Somnolence
 DERMAL (LD50) Acute: GT 2,000 mg/kg [Rabbit screen].
 BUEHLER DERMAL Acute: Non-sensitizing [Guinea Pig]
 I/P DERMAL: Acute: Promotion activity and possibly a tumor initiator [Mouse]
 28-Day DERMAL: Subchronic: No mortality at 200, 250, 500, and 1,000 mg/kg/day and 10% mortality at 2,000 mg/kg/day. Moderate irritation at 200 to 1,000 mg/kg/day and severe irritation at 2,000 mg/kg/day with decreased body weights and increased heart weights observed at 1,000 and 2,000 mg/kg/day

n-Nonane:

GAS (LC50) Acute: 3,200 ppm for 4 hours [Rat]
 INTRAVENOUS (LD50) Acute: 218 mg/kg [Mouse]

Trimethylbenzenes:

ORAL (LD50): Acute: 8,970 mg/kg [Rat]

Ethylmethylbenzenes (Ethyltoluenes):

GAS (LC50) Acute: 50,000 mg/m³ for 2 hours [Cat]
 GAS (LC50): Acute: 54,000 mg/m³ for 4 hours [Mouse]

Naphthalene:

ORAL (LD50) Acute: 490 mg/kg [Rat].
 ORAL (LD50) Acute: 533 mg/kg [Mouse]
 ORAL (LD50) Acute: 1,200 mg/kg [Guinea Pig]
 SUBCUTANEOUS (LD50) Acute: 969 mg/kg [Mouse].
 INTRAVENOUS (LD50): Acute: 100 mg/kg [Mouse]
 INTRAPERITONEAL (LD50) Acute: 150 mg/kg [Mouse]

Biphenyl (Diphenyl or 1,1'-Biphenyl):

GAS (TCLo) Acute: 4,400 ug/m³ for 4 hours [Human] - Flaccid paralysis of peripheral nerves without anesthesia and nausea or vomiting
 ORAL (LD50): Acute: GT 2,600 mg/kg [Cat screen]
 ORAL (LD50): Acute: 2,400 mg/kg [Rat and Rabbit]
 ORAL (LD50): Acute: 1,900 mg/kg [Mouse] - Somnolence, hypermotility, and diarrhea.
 DERMAL (LD50) Acute: GT 5,010 mg/kg [Rabbit screen]
 INTRAVENOUS (LD50) Acute: 56 mg/kg [Mouse]

Long-term skin-painting studies on mice using **light catalytic cracked distillate (petroleum)** were sponsored by the American Petroleum Institute (API). With 20 mg/kg applied 3 times per week for 52 weeks, there was a significant increase in contact-point skin tumors (on 26% of the animals) with a 40-week mean latency period, prominent increases in liver weights and liver-to-body weight ratio, and decreased female survivability. With 50 uL/kg applied 2 times per week for 104 weeks, there was a significant increase in contact-point skin tumors (on 65% of the animals) with a 79-week mean latency period, increased liver weights and liver-to-body weight ratio, and decreased survivability. **High-boiling fractions of catalytically cracked oils** have been specifically identified as carcinogens by IARC. Also, the NTP, ACGIH, and EPA have independently classified various **polynuclear aromatic hydrocarbon (PNA) compounds** present in the material as "confirmed human, suspected human, or animal carcinogens"

Light catalytic cracked distillate (petroleum) produced negative or equivocal mutagenic responses in the in-vitro rat bone marrow cell chromosome aberrations assay and the in-vitro Chinese hamster ovary (CHO) sister chromatid exchange (SCE) assay, however, the Salmonella/microsome (Ames) assay, the in-vivo mouse SCE assay, and the in-vitro mouse lymphoma assay with and without S9-activation produced positive responses. The significance of these animal study results to human health is unclear.

Laboratory data associated some **mixtures of petroleum hydrocarbons with boiling ranges between 300° and 650°F.**, commonly referred to as "**middle distillates, including the lighter portion of light cycle oil**" have caused increased incidence of skin tumors at the site of contact when applied repeatedly (twice per week) over the lifetime of the test animals (12 to 24 months). A few studies have shown that washing the animal's skin with soap and water between applications greatly reduces the carcinogenic effect of these **middle distillates**. These similar materials have also been associated with liver and kidney damage in subchronic (90-day) inhalation studies with male rats.

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Rats inhaling **n-nonane** at an airborne concentration of 1,500 ppm for 7 days displayed mild tremors and loss of coordination. Inhalation of 1,600 ppm for 6 hours per day for 90 days showed animal weight loss or decreased weight gain and changes in the structure of their salivary glands. And, liver damage and an altered response to drugs were seen in rats given n-nonane for 2 to 7 days.

Trimethylbenzenes are primary skin irritants and may cause asthmatic bronchitis and/or anemia. Based upon animal reproductive/developmental studies, trimethylbenzenes may also cause fetal toxicity.

Ethylmethylbenzenes are primary skin irritants and overexposures might cause liver and/or kidney damage or increase blood cholinesterase levels. Inhalation of these and other **C9 aromatic hydrocarbons** by pregnant mice and rats during gestational days 6 through 15 resulted in decreased fetal and newborn weights.

Naphthalene is a potential irritant to eyes, skin, and lungs. Following prolonged and/or repeated exposures, naphthalene has been shown to cause eye damage (cataracts and/or optical neuritis), premature destruction of red blood cells (hemolytic and aplastic anemia), and kidney damage (jaundice), and possibly neurotoxicity. Naphthalene-induced blood disorders in humans are characterized by variability in size, shape, and number of red blood cells, anemia, and decreased hemoglobin. Also, there have been reported anemia deaths amongst children exposed to moth ball (naphthalene) saturated blankets. Peripheral lens opacities occurred in 8 of 21 workers exposed to elevated levels of naphthalene vapors for 5 years. Repeated ingestion of a naphthalene-isopropanol mixture caused tremors, restlessness, hallucinations, and extreme apprehension. Based upon animal studies, naphthalene may cause fetal toxicity or damage and decreased spleen weights in pregnant female mice.

The National Toxicology Program (NTP) recently completed a 2-year inhalation bioassay of **naphthalene**. The study was conducted in male and female F344/N rats at exposure concentrations of 0, 10, 30, and 60 ppm. No significant effects were observed at the 10 ppm levels. However, compared to chamber controls, there was a dose-related increase in tumors generated at the 30 and 60 ppm levels in both males and females. Higher incidences of respiratory epithelial adenomas, olfactory epithelial neuroblastomas, and non-neoplastic lesions of the nose were observed when compared to chamber controls. Additionally, in cytogenic tests with Chinese hamster ovary cells, naphthalene induced significant increases in sister chromatid exchanges with and without metabolic activation (S9) and chromosomal aberrations with S9. The relevance of these findings to human health is unclear.

Biphenyl (Diphenyl) inhalation overexposures have caused poisoning characterized by liver atrophy and central and/or peripheral nerve damage. Biphenyl vapors have also caused transient nausea, vomiting, flaccid paralysis, and/or bronchitis.

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity

Ecological effects testing has not been conducted on this material. If spilled, this material, its storage tank water bottoms and sludge, and any contaminated soil or water may be hazardous to human, animal, and aquatic life. Volatile **aromatic hydrocarbon components (trimethylbenzenes, ethylmethylbenzenes, and naphthalene)** may be released and possibly contribute to the creation of atmospheric smog.

Using Rainbow Trout (*Oncorhynchus mykiss*), Dungeness Crab (*Cancer magister*), and juvenile American Shad (*Squalius cephalus*), similar middle distillates and some of this material's components showed a 96-hour TLms (Median Toxic Limit) of from 5 ppm to 20 ppm in ambient saltwater. Also, 24-hour and 96-hour TLms produced results from 20 ppm to 320 ppm when using Bluegill Sunfish (*Lepomis macrochirus*), Goldfish (*Carassius auratus*), and Guppy (*Lebistes reticulatus*) in fresh water. Based upon actual spill incident investigations, similar materials have been shown to bioaccumulate in tissues of various fish from a 1 ppm to 10 ppm levels.

Environmental Fate

This material is potentially toxic to freshwater and saltwater ecosystems. It will normally float on water with its lighter components evaporating rapidly. 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. This material is biodegradable if gradually exposed to microorganisms, preferably in an aerobic environment. 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. Vapor emissions from a bio-oxidation process contaminated by this material might prove to be a health hazard.

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 containers, via vessel, or via aircraft.		
Proper Shipping Name	Combustible liquid, n.o.s. (Petroleum Distillates) or (Nonanes, Ethylmethylbenzenes or Naphthalene) in bulk containers; it may or may not be regulated in non-bulk container shipments.		
	This product has a flash point temperature of between 141° and 200°F (60.5° to 93°C). 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 packaging 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 applicable or "Combustible liquid"	Packing Group(s)	Not applicable or PG III
		UN/NA ID	Not applicable or NA1993
Reportable Quantity	The Reportable Quantity (RQ) substance components in this material which require DOT HAZMAT bill-of-lading display are Naphthalene and Xylenes .		
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. 49 141 12 MARPOL III Status Component analysis might define this product as a DOT "Marine Pollutant" per 49 CFR 171.8 (Trimethylbenzenes, Ethylmethylbenzenes, Naphthalene, and Diphenyl)

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. No component substances were identified
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 Fire Hazard, Acute (Immediate) Health Hazard, and Chronic (Delayed) Health Hazard.
SARA 313	This material contains the following components in concentrations which are at or above de minimis levels and they are listed as a toxic chemicals in 40 CFR Part 372 pursuant to the requirements of Section 313 Naphthalene [CAS No. 91-20-3] concentration: 1 to 3% Biphenyl (Diphenyl) [CAS No. 92-52-4] concentration: 1 to 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 material subject to this statute are: Xylenes [CAS No. 1330-20-7] (RQ = 100 lbs. [45.36 kg]) concentration: 0.01 to 0.3% Ethylbenzene [CAS No. 100-41-4] (RQ = 1000 lbs. [453.6 kg]) concentration: 0 to 0.06% Cumene [CAS No. 98-82-8] (RQ = 5000 lbs. [2270 kg]) concentration: 0 to 0.5% Naphthalene [CAS No. 91-20-3] (RQ = 100 lbs. [45.36 kg]) concentration: 1 to 3% Chrysene (Benzo[a]phenanthrene) [CAS No. 218-01-9] (RQ = 100 lbs. [45.36 kg]) conc.: 0.003 to 0.015%.
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, especially if used as a fuel, might contain 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 considered subject to requirements of California Health & Safety Code Section 25249.5 Diesel Engine Exhaust (following combustion) Benzo[a]anthracene [CAS No. 56-55-3] Benzo[a]phenanthrene (Chrysene) [CAS No. 218-01-9] 5-Methylchrysene [CAS No. 3697-24-3].
New Jersey Right-to-Know Label	For New Jersey labeling refer to components listed in Section 2
Additional Regulatory Remarks	Under the Federal Hazardous Substances Act, related statutes, and Consumer Product Safety Commission regulations, as defined by 16 CFR 1500.14(b)(3) and 1500.83(a)(13). This product contains "Petroleum Distillates" which may require special labeling if distributed in a manner intended or packaged in a form suitable for use in the household or by children. Precautionary label dialogue should display the following Contains Petroleum Distillates! May be harmful or fatal if swallowed! Keep Out of Reach of Children! Under Section 12(b) of TSCA. Because it may contain a detectable amount of 1,3,5-Trimethylbenzene (Mesitylene) [CAS No. 108-67-8] , this material might be subject to US EPA's one-time only per country export notification requirements In regulations promulgated pursuant to the Clean Air Act - Section 111 "Standards of Performance for New Stationary Sources" (40 CFR 60.489), the EPA classifies the following components of this material as "Volatile Organic Compounds (VOCs)" which contribute significantly to air pollution which endangers public health and welfare" Xylenes (mixed) [CAS No. 1330-20-7], Ethylbenzene [CAS No. 100-41-4], Cumene [CAS No. 98-82-8], and Biphenyl (Diphenyl) [CAS No. 92-52-4].

Light Cycle Oil (LCO)

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 30

Revision Date 11/01/06

ABBREVIATIONS

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

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 = Environmental Protection Agency

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