NOVA Chemicals®

Material Safety Data Sheet

Material Name: **Pyrolysis Fuel Oil - Joffre**

MSDS ID: NOVA-0036

Section 1 - Product and Company Identification

Synonyms: PFO, Heavy Fuel Oils, Olefins Manufacturing Tower Bottoms
Chemical Name: Fuel Oil, Pyrolysis
Chemical Family: Hydrocarbons
Material Use: Petrochemical feedstocks, fuels
Chemical Formula: Not available; complex mixture

NOVA Chemicals
P.O. Box 2518, Station M
Calgary, Alberta, Canada T2P 5C6

Product Information: 1-412-490-4063
MSDS Information Email:
msdsemail@novachem.com

EMERGENCY Telephone Numbers:
North America (Canada and US):
1-800-561-6682, 1-403-314-8767 (NOVA Chemicals) (24 hours)
1-800-424-9300 (CHEMTREC-USA) (24 hours)
1-613-996-6666 (Canutec-Canada) (24 hours)

Section 2 – Hazards Identification

HMIS Ratings: Health: 2* **Fire:** 2 **Physical Hazard:** 0 **Personal Protection:** chemical goggles, gloves, respirator, coveralls

*Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe * = Chronic hazard*

NFPA Ratings: Health: 2 **Fire:** 2 **Reactivity:** 0

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

Emergency Overview

WARNING! FLAMMABLE. TOXIC. This product is a dark coloured, oily liquid with a pungent odour and is insoluble in water. This product is flammable and burns readily when heated to high temperatures. Liquid can float on or near water surface and may disperse and/or spread fire. This product may be harmful and possibly fatal by inhalation and if it is swallowed. This product is irritating to the eyes and irritating and harmful to the skin. Excessive inhalation of this material may result in central nervous system effects including headache, sleepiness, dizziness, nausea and loss of coordination. Ingestion may cause vomiting, nausea and abdominal pain as well as central nervous system effects and possible kidney and liver damage and blood disorders. Small amounts of this product, if aspirated into the lungs, may cause mild to severe pulmonary injury. May cause cancer. Prevent entry into ditches, drains, sewers, and waterways.

Potential Health Effects: Eye

This product is irritating to the eyes.

Potential Health Effects: Skin

Prolonged and/or repeated skin contact with this product may cause irritation/dermatitis and possible chemical blistering. Product contains component(s) that may be absorbed through the skin. Prolonged contact with this product may cause allergic skin sensitization reactions and possibly skin cancer.

Potential Health Effects: Ingestion

This product is harmful if swallowed. Ingestion of this product may result in vomiting, nausea, abdominal pain and central nervous system effects including headache, sleepiness, dizziness, nausea, loss of coordination and, in extreme conditions, coma and possibly death. Ingestion may cause kidney damage, liver damage and blood disorders.

Potential Health Effects: Inhalation

This product may be harmful by inhalation. Excessive inhalation of this product may result in heartbeat irregularities and central nervous system effects including headache, sleepiness, dizziness, nausea, loss of coordination and, in extreme conditions, coma and possibly death. Excessive inhalation of this material may also cause damage to blood systems, optical neuritis and, over time, kidney and liver damage and blood disorders. Based on animal testing, a component of this product (xylene), if present, is considered to be a developmental toxicant in Canada (birth defects). Small amounts of this product, if aspirated into the lungs, may cause mild to severe pulmonary injury.

Section 3 – Composition/Information on Ingredients

CAS #	Component	Percent by Wt.
69013-21-4	Fuel oil, pyrolysis	100
	The above listed product contains the following components: *	
Not Available	Asphaltenes	20-30
Not Available	Polycyclic aromatic hydrocarbons	15-25
Not Available	Diaromatics	10-20
91-20-3	Naphthalene	5-10
91-20-3	Naphthalene	10-15
95-13-6	Indene	2-5
95-13-6	Indene	5-10
77-73-6	Dicyclopentadiene	1-5
77-73-6	Dicyclopentadiene	5-10
71-43-2	Benzene	0.1-1
71-43-2	Benzene	1-5
1120-21-4	Undecane	1-2
100-42-5	Styrene	0.1-2
92-52-4	1,1 Biphenyl	0.1-1
108-88-3	Toluene	< 0.1-1
100-41-4	Ethylbenzene	< 0.1-1
78-79-5	Isoprene	< 0.1-1

Additional Information

Typically, greater than 95% of this mixture are compounds that are C10 or higher.
* Laboratory analysis has also identified variable amounts of trace components including: n-decane (< 0.1-1 wt%, CAS # 124-18-5) and mixed xylenes (< 0.1-1 wt%, CAS # 1330-20-7).

The actual components and weight % concentrations vary based on operating conditions.

This product is hazardous under 29 CFR 1910.1200 (Hazard Communication).
This material is a controlled product under Canadian WHMIS regulations.
This product is regulated as a hazardous material / dangerous goods for transportation.

See Section 8 for applicable exposure limits. See Section 11 for applicable toxicity data.

Section 4 - First Aid Measures

First Aid: Eyes

Remove contact lenses, if it can be done safely. Immediately flush eyes with water for at least 15 minutes, while holding eyelids open. Seek medical attention if symptoms develop or persist.

First Aid: Skin

Remove contaminated clothing and shoes. Wash immediately with soap and water. Seek medical attention if symptoms develop or persist. Completely decontaminate clothing, shoes and other protective equipment before reuse or discard.

First Aid: Inhalation

Move affected individual to non-contaminated air. Loosen tight clothing such as a collar, tie, belt or waistband to facilitate breathing. Seek immediate medical attention if the individual is not breathing, is unconscious or if any other symptoms persist. WARNING: Contact through mouth-to-mouth resuscitation may pose a secondary risk to the rescuer. Avoid mouth-to-mouth contact by using a mouth shield or guard to perform artificial respiration.

First Aid: Ingestion

DO NOT INDUCE VOMITING. Loosen tight clothing such as a collar, tie, belt or waistband. Seek immediate medical attention.

First Aid: Notes to Physician

For more detailed medical emergency support information, call 1-800-561-6682 or 1-403-314-8767 (24 hours, NOVA Chemicals Emergency Response). Ensure thorough eye and skin decontamination. Treat unconsciousness, nausea, hypotension, seizures and cardiac arrhythmias in the conventional manner. Aspiration of this product during induced emesis can result in lung injury. If evacuation of stomach contents is considered necessary, use the method least likely to cause aspiration, such as gastric lavage after protecting the airway. Observe hospitalized patients for delayed chemical pneumonia, acute tubular necrosis, encephalopathy and

dysrhythmias. Monitor for urinary phenol within 72 hours of acute exposure.

Section 5 - Fire Fighting Measures

See Section 9: Physical Properties for flammability limits, flash point and auto-ignition information.

General Fire Hazards

This product is flammable and burns readily when heated to high temperatures. Vapours are heavier than air and may travel along the ground to some distant source of ignition and flash back. Consider initial downwind evacuation for at least 300 metres (984 feet). If tank is involved in a fire, ISOLATE for 800 metres (1/2 mile) in all directions.

Explosion Hazards

Heated vapours may form explosive mixture with air. Keep containers away from source of heat or fire. Containers may explode when involved in a fire.

Hazardous Combustion Products

Upon combustion, this product emits carbon monoxide, carbon dioxide, low molecular weight hydrocarbons, acidic gases, nitrogen oxides and sulphur oxides.

Extinguishing Media

Dry chemical, foam, carbon dioxide, and water spray or fog. Use water to cool fire-exposed containers and to protect personnel. Water spray may be an ineffective extinguishing medium, and may actually spread flames. Prevent runoff from entering drains, ditches, sewers or other confined or underground spaces.

Fire Fighting Equipment/Instructions

Reference 2008 Emergency Response Guidebook, Guide No. 128 for additional details and instructions. Position upwind. Keep unnecessary personnel away. Move containers from fire area if you can do so without risk. Fight fire from maximum distance or use unmanned holders or monitor nozzles. Immediately withdraw in case of fire and container venting or heat discolouration of a container. Fire fighters should wear full-face, self-contained breathing apparatus and thermal protective clothing. Avoid inhaling any smoke and combustion materials. Remove and clean or destroy any contaminated clothing. Cool containers with flooding quantities of water until well after the fire is out. Control runoff waters to prevent entry into sewers, drains, ditches, underground or confined spaces and waterways.

Section 6 - Accidental Release Measures

Evacuation Procedures

Isolate area. Keep unnecessary personnel away. Alert stand-by emergency and fire fighting personnel. Monitor surrounding area for buildup of flammable concentrations in air.

Small Spills

Eliminate ignition sources. Spill or leak area should be isolated. Keep upwind and out of low areas. Stop discharge if safe to do so. Contain discharge by booming on water or diking on ground. Absorb/adsorb residual materials and clean up with non-sparking tools. Prevent entry into sewers, drains, ditches, underground or confined spaces, water intakes and waterways. Shovel product with non-sparking tools into appropriate container for disposal.

Large Spills

Consider downwind evacuation for 300 metres (984 feet). Eliminate ignition sources. Keep upwind and out of low areas. Stop discharge if safe to do so. Contain discharge by booming on water or diking on ground. A vapour suppressing foam may be used to reduce vapours. Remove pooled liquid material with approved, non-sparking pumps, skimmers or vacuum equipment. Absorb/adsorb residues with DRY earth, sand or other non-combustible material. Soil remediation may be required. Prevent entry into sewers, drains, ditches, underground or confined spaces, water intakes and waterways.

Special Procedures

Contact local police/emergency services and appropriate emergency telephone numbers provided in Section 1. Ensure that statutory and regulatory reporting requirements in the applicable jurisdiction are met. Wear appropriate protective equipment and clothing during cleanup. Individuals without appropriate protective equipment should be excluded from area of spill until cleanup has been completed.

See Section 8 for recommended Personal Protective Equipment and Section 13 for waste disposal considerations.

Section 7 - Handling and Storage

Handling Procedures

Keep locked up or secured. Handle in fully grounded, properly designed and approved equipment systems that

are suitable for flammable liquids. Use with adequate ventilation. Do not ingest or inhale. Keep away from heat and ignition sources. No smoking or open flames permitted in storage, use or handling areas. Dissipate static electricity during transfer by grounding and bonding containers and equipment. Take special precautions when cold cutting or breaking into lines, or when cleaning and disposing of empty containers. Parts and equipment should be steam cleaned prior to maintenance procedures. Do not breathe gas, fumes, vapour or spray. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately. Avoid contact with skin and eyes. Keep away from incompatible materials such as oxidizing agents and acids. Oil-contaminated clothing must be removed and cleaned prior to reuse. After handling, always wash hands thoroughly with soap and water.

Recommended maximum temperature for storage and loading is below the flash point.

Storage Procedures

Storage area should be clearly identified, well-illuminated, clear of obstruction and accessible only to trained and authorized personnel. Adequate security must be provided so that unauthorized personnel do not have access to product. Store in grounded, properly designed and approved vessels and away from incompatible materials. Store and use away from heat, sparks, open flame, or any other ignition source. Store according to applicable regulations for flammable materials for storage tanks, containers, piping, buildings, rooms, cabinets, allowable quantities and minimum storage distances. Use non-sparking ventilation systems, approved explosion-proof equipment, and intrinsically safe electrical systems. Have appropriate extinguishing capability in storage area (e g. portable fire extinguishers (dry chemical, foam or carbon dioxide)) and flammable gas detectors. Water spray is ineffective for extinguishing fires. Prevent soil contamination. Keep absorbents for leaks and spills readily available. Equip storage tank vents with a flame arrestor. Inspect vents during winter conditions for vapour ice buildup. Storage tanks should be above ground and diked to hold entire contents.

See Section 8: Exposure Controls/Personal Protection for appropriate Personal Protective Equipment. See Section 10 for information on Incompatibilities.

Section 8 - Exposure Controls / Personal Protection

Exposure Guidelines

A: General Product Information

Refer to published exposure limits - use effective control measures and PPE to maintain worker exposure to concentrations that are below these limits. Ensure that eyewash stations and safety showers are in close proximity to the workstation location.

B: Component Exposure Limits

ACGIH, OSHA, NIOSH, EPA, Alberta, and Ontario exposure limit lists have been checked for major components listed with CAS registry numbers. Other exposure limits may apply, check with proper authorities.

*Note: The Vacated OSHA Permissible Exposure Limits (PELs) are those provided in the 1989 update to OSHA's Air Contaminants Standard 29 CFR 1910.1000. These limits were vacated by the U.S. Court of Appeals, Eleventh Circuit but may be enforceable in some states.

Asphaltenes / Polycyclic aromatic hydrocarbons (CAS # Not Available)

ACGIH:	0.2 mg/m3 TWA (as benzene soluble aerosol) (related to Coal tar pitch volatiles)
OSHA (Vacated)*:	0.2 mg/m3 TWA (benzene soluble fraction) (related to Coal tar pitch volatiles)
OSHA (Final):	0.2 mg/m3 TWA (benzene soluble fraction) (related to Coal tar pitch volatiles)
NIOSH:	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (related to Coal tar pitch volatiles) 80 mg/m3 IDLH (related to Coal tar pitch volatiles)
Alberta:	0.2 mg/m3 TWA (as benzene solubles) (related to Coal tar pitch volatiles (PPAH, Particulate polycyclic aromatic hydrocarbons))
Ontario:	0.2 mg/m3 TWA (as benzene soluble aerosol) (related to Coal tar pitch volatiles)

Naphthalene (91-20-3)

ACGIH:	10 ppm TWA; 52 mg/m3 TWA; 15 ppm STEL; 79 mg/m3 STEL Skin - potential significant contribution to overall exposure by the cutaneous route
OSHA (Vacated)*:	10 ppm TWA; 50 mg/m3 TWA; 15 ppm STEL; 75 mg/m3 STEL
OSHA (Final):	10 ppm TWA; 50 mg/m3 TWA
NIOSH:	10 ppm TWA; 50 mg/m3 TWA; 15 ppm STEL; 75 mg/m3 STEL 250 ppm IDLH
Alberta:	10 ppm TWA; 52 mg/m3 TWA; 15 ppm STEL; 79 mg/m3 STEL Substance may be readily absorbed through intact skin
Ontario:	10 ppm TWA; 15 ppm STEL Skin – Danger of cutaneous absorption

Indene (95-13-6)

ACGIH:	5 ppm TWA; 24 mg/ m3 TWA
OSHA (Vacated)*:	10 ppm TWA; 45 mg/m3 TWA
NIOSH:	10 ppm TWA; 45 mg/m3 TWA
Alberta:	10 ppm TWA; 48 mg/m3 TWA
Ontario:	5 ppm TWA

Dicyclopentadiene (77-73-6)

ACGIH:	5 ppm TWA; 27 mg/m3 TWA
OSHA (Vacated)*:	5 ppm TWA; 30 mg/m3 TWA
NIOSH:	5 ppm TWA; 30 mg/m3 TWA
Alberta:	5 ppm TWA; 27 mg/m3 TWA
Ontario:	5 ppm TWA

Benzene (71-43-2)

ACGIH:	0.5 ppm TWA; 1.6 mg/m3 TWA; 2.5 ppm STEL; 8 mg/m3 STEL; BEI Skin - potential significant contribution to overall exposure by the cutaneous route
OSHA (Vacated)*:	0.5 ppm Action Level; 1 ppm TWA; 5 ppm STEL (Cancer hazard, Flammable - see 29 CFR 1910.1028)
OSHA (Final):	1 ppm TWA; 10 ppm TWA (applies to industry segments exempt from the benzene standard at 29 CFR 1910.1028); 5 ppm STEL (see 29 CFR 1910.1028); 25 ppm Ceiling (applies to industry segments exempt from the 1 ppm TWA and 5 ppm STEL of the benzene standard)
NIOSH:	0.1 ppm TWA; 0.32 mg/m3 TWA; 1 ppm STEL; 3.2 mg/m3 STEL 500 ppm IDLH
Alberta:	0.5 ppm TWA; 1.6 mg/m3 TWA; 2.5 ppm STEL; 8 mg/m3 STEL Substance may be readily absorbed through intact skin
Ontario:	0.5 ppm TWA; 2.5 ppm STEL Skin - Danger of cutaneous absorption

Styrene (100-42-5)

ACGIH:	20 ppm TWA; 85 mg/m3 TWA; 40 ppm STEL; 170 mg/m3 STEL; BEI
OSHA (Vacated)*:	50 ppm TWA; 215 mg/m3 TWA; 100 ppm STEL; 425 mg/m3 STEL
OSHA (Final):	100 ppm TWA; 200 ppm Ceiling
NIOSH:	50 ppm TWA; 215 mg/m3 TWA; 100 ppm STEL; 425 mg/m3 STEL 700 ppm IDLH
Alberta:	20 ppm TWA; 85 mg/m3 TWA; 40 ppm STEL; 170 mg/m3 STEL
Ontario:	35 ppm TWA; 100 ppm STEL

1,1 Biphenyl (92-52-4)

ACGIH:	0.2 ppm TWA; 1.3 mg/m3 TWA
OSHA (Vacated)*:	0.2 ppm TWA; 1 mg/m3 TWA
OSHA (Final):	0.2 ppm TWA; 1 mg/m3 TWA
NIOSH:	0.2 ppm TWA; 1 mg/m3 TWA 100 mg/m3 IDLH
Alberta:	0.2 ppm TWA; 1.3 mg/m3 TWA
Ontario:	0.2 ppm TWA

Toluene (108-88-3)

ACGIH:	20 ppm TWA; 75 mg/m3 TWA; BEI
OSHA (Vacated)*:	100 ppm TWA; 375 mg/m3 TWA; 150 ppm STEL; 560 mg/m3 STEL
OSHA (Final):	200 ppm TWA; 300 ppm Ceiling
NIOSH:	100 ppm TWA; 375 mg/m3 TWA; 150 ppm STEL; 560 mg/m3 STEL 500 ppm IDLH
Alberta:	50 ppm TWA; 188 mg/m3 TWA Substance may be readily absorbed through intact skin
Ontario:	20 ppm TWA; BEI

Ethylbenzene (100-41-4)

ACGIH:	20 ppm TWA; 87 mg/m3 TWA; 125 ppm STEL; 543 mg/m3 STEL; BEI
OSHA (Vacated)*:	100 ppm TWA; 435 mg/m3 TWA; 125 ppm STEL; 545 mg/m3 STEL
OSHA (Final):	100 ppm TWA; 435 mg/m3 TWA
NIOSH:	100 ppm TWA; 435 mg/m3 TWA; 125 ppm STEL; 545 mg/m3 STEL 800 ppm IDLH (10% LEL)
Alberta:	100 ppm TWA; 434 mg/m3 TWA; 125 ppm STEL; 543 mg/m3 STEL
Ontario:	100 ppm TWA; 125 ppm STEL

Isoprene (78-79-5)

While no peer-reviewed workplace exposure limit has been established for isoprene, based on the current literature, adoption of an internal Isoprene 8 hr. TWA exposure limit of 10 ppm or 28 mg/m3 is recommended.

Xylenes (1330-20-7)

ACGIH:	100 ppm TWA; 434 mg/m3 TWA; 150 ppm STEL; 651 mg/m3 STEL; BEI
OSHA (Vacated)*:	100 ppm TWA; 435 mg/m3 TWA; 150 ppm STEL; 655 mg/m3 STEL
OSHA (Final):	100 ppm TWA; 435 mg/m3 TWA
NIOSH:	100 ppm TWA; 435 mg/m3 TWA; 150 ppm STEL; 655 mg/m3 STEL 900 ppm IDLH (related to m-xylene or o-xylene or p-xylene)
Alberta:	100 ppm TWA; 434 mg/m3 TWA; 150 ppm STEL; 651 mg/m3 STEL
Ontario:	100 ppm TWA; 150 ppm STEL (as o-, m and p isomers); BEI

ENGINEERING CONTROLS

Engineering methods to reduce hazardous exposure are preferred controls. Methods include mechanical ventilation (dilution and local exhaust) process or personal enclosure, remote and automated operation, control of process conditions, leak detection and repair systems and other process modifications. Ensure all exhaust ventilation systems are discharged to outdoors, away from air intakes and ignition sources. Supply sufficient replacement air to make up for air removed by exhaust systems. Administrative (procedure) controls and use of personal protective equipment may also be required.

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment: Eyes/Face

Wear safety glasses; chemical goggles are recommended if splashing is possible or to prevent eye irritation from heated vapours or mists.

Personal Protective Equipment: Skin/Hands/Feet

Use chemically resistant gloves when handling product. Wear chemical-resistant safety footwear with good traction to prevent slipping. Work clothing that sufficiently prevents skin contact should be worn, such as coveralls and/or long sleeves and pants. If splashing or contact with liquid material is possible, consider the need for an impervious overcoat. Fire resistant (i.e., Nomex) or natural fibre clothing (i.e., cotton or wool) is recommended. Synthetic clothing can generate static electricity and is not recommended where a flammable vapour release may occur. Static Dissipative (SD) rated footwear is recommended.

Personal Protective Equipment: Respiratory

If engineering controls and ventilation are not sufficient to prevent buildup of aerosols or vapours, appropriate NIOSH approved air-purifying respirators or self-contained breathing apparatus (SCBA) appropriate for exposure potential should be used. Air supplied breathing apparatus must be used when oxygen concentrations are low or if airborne concentrations exceed the limits of the air-purifying respirators.

Personal Protective Equipment: General

Personal protective equipment (PPE) should not be considered a long-term solution to exposure control. Employer programs to properly select, fit, maintain and train employees to use equipment must accompany PPE. Consult a competent industrial hygiene resource, the PPE manufacturer's recommendation and/or applicable regulations to determine hazard potential and ensure adequate protection.

Section 9 - Physical & Chemical Properties

Physical State and Appearance:	Liquid, oily	**Colour:**	Dark
Odour:	Pungent, disagreeable	**Odour Threshold:**	<1 ppm (various components)
pH:	Not applicable	**Vapour Pressure:**	Low; estimated as <1 mm Hg at 20°C (68°F)
Vapour Density @ 0ºC (Air=1):	Estimated as >2, based on components	**Boiling Point:**	Range: 147°C to 522°C (296.6°F to 971.6°F)
Melting Point:	Range: -36°C to -57°C (-32.8°F to -70.6°F)	**Solubility (H2O):**	Insoluble
Specific Gravity (Water=1):	1.007 at 15°C (60°F)	**Evaporation Rate (n-Butyl Acetate=1):**	Not available
Viscosity:	3 to 3.7 cSt at 50°C (122°F)	**Percent Volatile:**	Not available
Octanol/H2O Coeff.:	Not available	**Auto Ignition:**	Not available
Flash Point:	Range: 50°C to 80°C (122°F to 176°F); typical is ≥ 60°C (140°F)	**Flash Point Method:**	Pensky-Martens, closed cup
Upper Flammable Limit (UFL):	5.9% (v/v (naphthalene)	**Lower Flammable Limit (LFL):**	0.9 % (v/v (naphthalene)
Flammability Classification:	Flammable		

Section 10 - Stability & Reactivity Information

Chemical Stability

This product is a stable material.

Chemical Stability: Conditions to Avoid

Fire and explosion hazards are serious when this product is exposed to heat or flame. Keep away from heat, sparks or open flame.

Incompatibility

Reactive with oxidizing agents.

Possibility of Hazardous Reactions or Hazardous Polymerization

Hazardous polymerization not likely to occur.

Corrosivity

Not corrosive to the common metals.

Hazardous Decomposition

Upon decomposition, this product emits carbon monoxide, carbon dioxide, low molecular weight hydrocarbons, acidic gases, nitrogen oxides, and sulphur oxides.

Section 11 - Toxicological Information

A: Acute Toxicity - General Product Information

Similar products were tested under the EPA's High Production Volume (HPV) Chemical Challenge Program. Pyrolysis Fuel Oil was included in the HPV test plan for ACC's Olefins Panel Fuel Oils category. Product is not acutely toxic by the oral, dermal or inhalation routes of exposure. Product is irritating to the eyes and skin and may cause rashes or chemical blistering. Inhalation of vapours or ingestion has CNS effects. Aspiration into the lungs may cause chemical pneumonitis. The following additional information has been found for its components:

Naphthalene - Can irritate the skin, eyes, nose, and throat. Contact may cause corneal damage. Inhalation of high concentrations may result in central nervous system (CNS) depression, causing headache, fatigue, confusion, nausea, vomiting, and unconsciousness. Ingestion can cause nausea, vomiting, diarrhoea, liver damage, kidney damage, and haemolytic anemia, which may lead to methemoglobinemia.

Indene - Contact can irritate the skin and eyes. Inhalation can irritate the mucous membranes causing coughing and wheezing.

Dicyclopentadiene (DCPD) - Contact can irritate the eyes and skin. Inhalation can irritate the nose, throat, and lungs, causing coughing, wheezing, and/or shortness of breath. DCPD is toxic to the central nervous system (CNS) and exposure may cause CNS depression, causing headache, dizziness, nausea, vomiting, loss of coordination and unconsciousness.

Benzene - May cause corneal injury to the eye. It is also a skin irritant that may be absorbed through the skin in harmful amounts. Inhalation of benzene can irritate the respiratory tract and may result in central nervous system (CNS) depression and possible death due to respiratory failure. Ingestion and subsequent aspiration into the lungs may cause chemical pneumonitis.

Undecane - Contact can irritate eyes and skin. Inhalation can irritate the nose and throat and lung that could result in pulmonary edema (lung damage). In general, decanes have very low oral toxicity although ingestion is not a typical route of occupational exposure.

Styrene - Contact can irritate the eyes and skin. Vapours irritate the eyes and respiratory system and at high concentrations may result in central nervous system (CNS) depression, causing headache, dizziness, nausea, loss of coordination, and unconsciousness.

1,1-Biphenyl (Diphenyl) - Can be irritating to the nose, throat and upper respiratory system. Inhalation may result in headache, nausea, vomiting and bronchitis. Diphenyl may be slightly irritating to the skin. Absorption of diphenyl solutions through the skin may cause toxic effects like those caused by inhalation or ingestion. Hot melted diphenyl can cause thermal burns.

Toluene - Contact can irritate the skin and eyes. Toluene can be absorbed through intact skin. Inhalation can irritate the nose and throat, causing coughing and wheezing. Inhalation of high concentrations may result in central nervous system (CNS) depression, causing trouble concentrating, headache, dizziness, nausea, loss of coordination, unconsciousness, and in extreme conditions coma and possibly death. Ingestion and subsequent aspiration into the lungs may cause chemical pneumonitis.

Ethylbenzene - Causes severe eye, nose, and throat irritation. It is also a skin irritant that may be absorbed through the skin in harmful amounts. Inhalation may result in central nervous system depression, causing headache, dizziness, nausea, loss of coordination, unconsciousness, and at high concentrations, difficulty breathing and possibly death. Ingestion and subsequent aspiration into the lungs may cause chemical pneumonitis.

Isoprene - Contact can irritate the skin and eyes. Inhalation can irritate the mucous membranes causing coughing and wheezing. Inhalation of high concentrations may result in central nervous system (CNS) depression, causing headache, nausea, vomiting, dizziness, loss of coordination, and unconsciousness.

Xylenes, mixed - Vapours can irritate the eyes. Contact with unprotected skin or eyes produces erythema and slight necrosis. Xylene can be absorbed through intact skin. Inhalation can irritate the nose and throat causing cough and difficulty breathing. Inhalation of high concentrations may result in central nervous system (CNS) depression, causing headache, dizziness, nausea, vomiting, loss of coordination, confusion, unconsciousness, and in extreme conditions coma and possibly death. Ingestion and subsequent aspiration into the lungs may cause chemical pneumonitis.

B: Acute Toxicity - LD50/LC50

Naphthalene (91-20-3)
Inhalation LC50 Rat: >340 mg/m3/1H; Oral LD50 Rat: 490 mg/kg; Dermal LD50 Rat: 2500 mg/kg;
Dermal LD50 Rabbit: >20 g/kg

Indene (95-13-6)
Inhalation LC50 Rat: 1400 mg/m3/4H

Dicyclopentadiene (77-73-6)
Inhalation LC50 Rat: 500 ppm/4H; Oral LD50 Rat: 346.5 mg/kg; Dermal LD50 Rat: >2000 mg/kg;
Dermal LD50 Rabbit: 4380 mg/kg

Benzene (71-43-2)
Inhalation LC50 Rat: 13,050 ppm/4H; Oral LD50 Rat: 690 mg/kg; Dermal LD50 Rabbit: >8260 mg/kg

Undecane (1120-21-4)
Inhalation LC50 Rat: >442 ppm/8H

Styrene (100-42-5)
Inhalation LC50 Rat: 24 mg/m3/4H; Inhalation LC50 Mouse: 2160 mg/m3/2H; Oral LD50 Rat: 1000 mg/kg

1,1 Biphenyl (92-52-4)
Oral LD50 Mouse: 1900 mg/kg; Oral LD50 Rat: 2140 mg/kg; Dermal LD50 Rabbit: >5010 mg/kg

Toluene (108-88-3)
Inhalation LC50 Rat: 12.5 mg/L/4H; Inhalation LC50 Rat: >26,700 ppm/1H; Oral LD50 Rat: 636 mg/kg;

Dermal LD50 Rabbit: 8390 mg/kg; Dermal LD50 Rat 12,124 mg/kg
Ethylbenzene (100-41-4)
Inhalation LC50 Rat: 17.2 mg/L/4H; Oral LD50 Rat: 3500 mg/kg; Dermal LD50 Rabbit: 15,354 mg/kg
Isoprene (78-79-5)
Inhalation LC50 Rat: 180 mg/m3/4H; Oral LD50 Rat: 2043 mg/kg; Dermal LD50 Rat >1 mL/kg
Decane (124-18-5)
Inhalation LC50 Mouse: 72,300 mg/m3/2H
Xylenes (1330-20-7)
Inhalation LC50 Rat: 5000 ppm/4Hh; Inhalation LC50 Rat: 47,635 mg/L/4H; Oral LD50 Rat: 4300 mg/kg;
Dermal LD50 Rabbit: >1700 mg/kg

C: Chronic Toxicity - General Product Information

Similar products were tested under the EPA's High Production Volume (HPV) Chemical Challenge Program. Pyrolysis Fuel Oil was included in the HPV test plan for ACC's Olefins Panel Fuel Oils category. Possible chronic toxic effects to CNS. Key target organs for toxic effect are skin, eyes, blood and upper respiratory system. Based on available data, Fuel Oils Category streams are unlikely to induce teratogenic, reproductive or developmental toxicity. The following additional information has been found for its components:

Naphthalene - Prolonged and repeated exposure can cause cataracts and allergic skin reactions. If allergy develops, very low repeated exposure can cause itching and a skin rash. Chronic exposure may result in jaundice, optical neuritis, aplastic anemia, liver damage, kidney damage, and haemolytic anemia, which may lead to methemoglobinemia. Naphthalene has been shown to cause nasal and lung cancer in animal tests and has been classified by IARC as Group 2B (possibly carcinogenic to humans). NTP has listed naphthalene as "Reasonably Anticipated to be a Carcinogen". Naphthalene was not mutagenic in the Ames Salmonella microsome assay.

Indene - Prolonged and repeated contact may cause allergic skin sensitization. If an allergy develops, very low future exposure can cause itching and a skin rash. Chronic exposure may damage the liver and kidneys.

Dicyclopentadiene (DCPD) - Prolonged and repeated exposure may damage the liver and the adrenal glands. Signs of intoxication in animals include excessive salivation, anorexia, and loss of coordination. At higher test doses, effects include convulsions, gastrointestinal disturbance, and haemorrhage of the lungs and intestines. Testing indicates that DCPD is not a skin sensitizer.

Benzene - Prolonged and/or repeated exposure can cause drying and scaling of the skin. Long-term exposure has been associated with certain types of leukemia in humans. IARC and OSHA consider benzene to be a human carcinogen. EPA has classified benzene as a Group A, known human carcinogen. Chronic exposure to benzene has been reported to cause bone marrow abnormalities and adverse blood effects including anemia. Progressive deterioration of hematopoietic function expressed as a decrease in absolute lymphocyte count is the most sensitive indicator of benzene exposure. Benzene may cause fetotoxicity and teratogenicity. Chromosomal aberrations have been noted in animal tests.

Undecane - No chronic effects in humans have been reported. Based on results from animal studies, irritation and dermatitis (inflammation, reddening and swelling) may result from prolonged or repeated contact.

Styrene - Chronic exposure at high concentration may result in CNS depression and may have an effect on hearing. It also may result in neurological defects known as "styrene sickness". Prolonged skin contact may produce irritation and defatting dermatitis. Styrene has been classified by IARC as Group 2B (possibly carcinogenic to humans) based on "limited evidence" in humans, "limited evidence" in animals, and "other relevant data". The National Toxicology Program (NTP) classified styrene as "reasonably anticipated to be a human carcinogen". Styrene has been shown to be mutagenic in several *in vitro* assays.

1,1-Biphenyl (Diphenyl) - Long-term exposure to diphenyl can result in degenerative liver disease and central and peripheral nervous system injury. Heavily exposed workers reported central and peripheral nervous system symptoms, such as headaches, fatigue, nausea, indigestion, abdominal pain, numbness in the arms and legs, and tremors. Repeated or prolonged skin contact can cause dermatitis.

Toluene - Prolonged and repeated contact may cause defatting dermatitis with drying and cracking, itching, and a skin rash. Repeated toluene exposure has been associated with central nervous system effects, loss of appetite, enlargement of the liver, kidney effects, blood effects, as well as cardiac effects. The chronic neurotoxic effects on the central nervous system may progress to an irreversible state. Intentional misuse of toluene has resulted in reproductive effects including physical and developmental abnormalities, such as low birth weight and microencephaly, and has been referred to as "Fetal Toluene Syndrome".
Ethylbenzene - Prolonged and repeated exposure may be harmful to the central nervous system (CNS), upper respiratory tract, and/or may cause liver disorders. It may also cause drying, scaling, and blistering of the skin. Ethylbenzene has been classified by IARC as Group 2B (possibly carcinogenic to humans) based on the National Toxicology Program's two year study of very high exposure levels on rats and mice (NTP, 1999).

Isoprene - Prolonged and repeated exposure can irritate the lungs and may cause bronchitis with cough, phlegm, and/or shortness of breath. Repeated exposure to high concentrations may affect the blood cells. Isoprene has been classified by IARC as Group 2B (possibly carcinogenic to humans).

Xylenes, mixed - Prolonged and repeated skin contact can cause defatting dermatitis with drying and cracking. Chronic inhalation has been associated with central nervous system effects, loss of appetite, nausea, ringing in the ears, irritability, thirst, anemia, mucosal bleeding, enlarged liver, and hyperplasia. Xylene can damage the liver and kidneys. In chronic occupational exposure, xylene (usually mixed with other solvents) has produced irreversible damage to the central nervous system and may be ototoxic (damages hearing or increases sensitivity to noise), probably from a neurotoxic mechanism. Xylene is classified as a developmental toxicant in Canada.

D: Chronic Toxicity - Carcinogenic Effects

ACGIH, EPA, IARC, OSHA, and NTP carcinogen lists have been checked for selected similar materials or those components with CAS registry numbers.

Asphaltenes / Polycyclic aromatic hydrocarbons (CAS # Not Available)

ACGIH: A1 - Confirmed Human Carcinogen (as benzene soluble aerosol) (related to Coal tar pitch volatiles)
NTP: Known Carcinogen (related to Coal tar pitches)
Reasonably Anticipated To Be A Carcinogen (related to Polycyclic aromatic hydrocarbons (PAH))
IARC: Supplement 7 [1987], Monograph 35 [1985] (related to Coal tar pitches) (Group 1 (carcinogenic to humans))

Naphthalene (91-20-3)

ACGIH: A4 - Not Classifiable as a Human Carcinogen
EPA: Classification: possible human carcinogen.
NTP: Reasonably Anticipated To Be A Carcinogen
IARC: Monograph 82 [2002] (Group 2B (possibly carcinogenic to humans))

Benzene (71-43-2)

ACGIH: A1 - Confirmed Human Carcinogen
OSHA: 0.5 ppm Action Level; 1 ppm TWA; 5 ppm STEL (Cancer hazard, Flammable - see 29 CFR 1910.1028)
EPA: Classification: known human carcinogen for all routes of exposure.
NTP: Known Carcinogen
IARC: Monograph 100F [in prep], Supplement 7 [1987], Monograph 29 [1982] (Group 1 (carcinogenic to humans))

Styrene (100-42-5)

ACGIH: A4 - Not Classifiable as a Human Carcinogen
NTP: Reasonably Anticipated To Be A Human Carcinogen
IARC: Monograph 82 [2002], Monograph 60 [1994] (Group 2B (possibly carcinogenic to humans))

1,1 Biphenyl (92-52-4)

EPA: Classification: not classifiable as to human carcinogenicity.
IARC: Supplement 7 [1987] (listed under Polychlorinated biphenyls) (Group 2A (probably carcinogenic to humans))

Toluene (108-88-3)

ACGIH: A4 - Not Classifiable as a Human Carcinogen
EPA: Classification: under the Guidelines for Carcinogen Risk Assessment (U.S. EPA, 2005), there is inadequate information to assess the carcinogenic potential of toluene.
IARC: Monograph 71 [1999], Monograph 47 [1989] (Group 3 (not classifiable))

Ethylbenzene (100-41-4)
ACGIH: A3 - Confirmed animal carcinogen with unknown relevance to humans
EPA: Classification: not classifiable as to human carcinogenicity.
IARC: Monograph 77 [2000] (Group 2B (possibly carcinogenic to humans))

Isoprene (78-79-5)
NTP: Reasonably Anticipated To Be A Carcinogen
IARC: Monograph 71 [1999], Monograph 60 [1994] (Group 2B (possibly carcinogenic to humans))

Xylenes (1330-20-7)
ACGIH: A4 - Not Classifiable as a Human Carcinogen
EPA: Classification: not classified as a carcinogen.
IARC: Monograph 71 [1999], Monograph 47 [1989] (Group 3 (not classifiable))

Section 12 - Ecological Information

Ecotoxicity

A: General Product Information

Similar products were tested under the EPA's High Production Volume (HPV) Chemical Challenge Program. Pyrolysis Fuel Oil was included in the HPV test plan for ACC's Olefins Panel Fuel Oils category. Product is largely insoluble in water, and has low to moderate volatility based on its components. Aquatic toxicity testing results suggest that product will exhibit a moderate order of toxicity. Product is sticky and will adhere to soil, sediment and plants, birds and water mammals.

B: Component Analysis - Ecotoxicity - Aquatic/Terrestrial Toxicity

Fuel oil, pyrolysis (69013-21-4)
96 Hr LC50 Oncorhynchus mykiss: 1.0 to 4.0 mg/L; 96 Hr EC50 Pseudokirchneriella subcapitata: 0.9 to 1.6 mg/L;
48 Hr EC50 Daphnia magna: 1.2 to 2.7 mg/L

Naphthalene (91-20-3)

Test and Species	Results and Conditions
96 Hr LC50 Pimephales promelas	5.74-6.44 mg/L [flow-through]
96 Hr LC50 Oncorhynchus mykiss	1.6 mg/L [flow-through]
96 Hr LC50 Oncorhynchus mykiss	0.91-2.82 mg/L [static]
96 Hr LC50 Pimephales promelas	1.99 mg/L [static]
96 Hr LC50 Lepomis macrochirus	31.0265 mg/L [static]
72 Hr EC50 Skeletonema costatum	0.4 mg/L
48 Hr LC50 Daphnia magna	2.16 mg/L
48 Hr EC50 Daphnia magna	1.96 mg/L [flow-through]
48 Hr EC50 Daphnia magna	1.09-3.4 mg/L [static]

Dicyclopentadiene (77-73-6)

Test and Species	Results and Conditions
96 Hr LC50 Lepomis macrochirus	11.5-17.6 mg/L [static]
96 Hr LC50 Lepomis macrochirus	23 mg/L
96 Hr LC50 Oncorhynchus mykiss	13-19.5 mg/L [static]
96 Hr LC50 Pimephales promelas	10-14.2 mg/L [static]
96 Hr EC50 Pseudokirchneriella subcapitata	>100 mg/L
48 Hr EC50 Daphnia magna	11 mg/L

Benzene (71-43-2)

Test and Species	Results and Conditions
96 Hr LC50 Pimephales promelas	10.7-14.7 mg/L [flow-through]
96 Hr LC50 Oncorhynchus mykiss	5.3 mg/L [flow-through]
96 Hr LC50 Lepomis macrochirus	22.49 mg/L [static]
96 Hr LC50 Poecilia reticulata	28.6 mg/L [static]
96 Hr LC50 Pimephales promelas	22,330-41,160 µg/L [static]
96 Hr LC50 Lepomis macrochirus	70,000-142,000 µg/L [static]
72 Hr EC50 Pseudokirchneriella subcapitata	29 mg/L
48 Hr EC50 Daphnia magna	8.76-15.6 mg/L [static]
48 Hr EC50 Daphnia magna	10 mg/L

Styrene (100-42-5)

Test and Species	Results and Conditions
96 Hr LC50 Pimephales promelas	3.24-4.99 mg/L [flow-through]
96 Hr LC50 Lepomis macrochirus	19.03-33.53 mg/L [static]
96 Hr LC50 Pimephales promelas	6.75-14.5 mg/L [static]
96 Hr LC50 Poecilia reticulata	58.75-95.32 mg/L [static]
72 Hr EC50 Pseudokirchneriella subcapitata	1.4 mg/L
96 Hr EC50 Pseudokirchneriella subcapitata	0.72 mg/L
72 Hr EC50 Pseudokirchneriella subcapitata	0.46-4.3 mg/L [static]
96 Hr EC50 Pseudokirchneriella subcapitata	0.15-3.2 mg/L [static]
48 Hr EC50 Daphnia magna	3.3-7.4 mg/L

1,1 Biphenyl (92-52-4)

Test and Species	Results and Conditions
96 Hr LC50 Pimephales promelas	1.65-2.29 mg/L [flow-through]
96 Hr LC50 Pimephales promelas	1.17-1.81 mg/L [static]
96 Hr LC50 Lepomis macrochirus	4.3-5.1 mg/L [static]
96 Hr LC50 Oncorhynchus mykiss	1.4-1.6 mg/L [static]
3 Hr EC50 Chlamydomonas angulosa	1.28 mg/L
48 Hr EC50 Daphnia magna	0.63-0.85 mg/L [static] (<24 hours old)

Toluene (108-88-3)

Test and Species	Results and Conditions
96 Hr LC50 Pimephales promelas	15.22-19.05 mg/L [flow-through] (1 day old)
96 Hr LC50 Pimephales promelas	12.6 mg/L [static]
96 Hr LC50 Oncorhynchus mykiss	5.89-7.81 mg/L [flow-through]
96 Hr LC50 Oncorhynchus mykiss	14.1-17.16 mg/L [static]
96 Hr LC50 Oncorhynchus mykiss	5.8 mg/L [semi-static]
96 Hr LC50 Lepomis macrochirus	11.0-15.0 mg/L [static]
96 Hr LC50 Oryzias latipes	54 mg/L [static]
96 Hr LC50 Poecilia reticulata	28.2 mg/L [semi-static]
96 Hr LC50 Poecilia reticulata	50.87-70.34 mg/L [static]
96 Hr EC50 Pseudokirchneriella subcapitata	>433 mg/L
72 Hr EC50 Pseudokirchneriella subcapitata	12.5 mg/L [static]
48 Hr EC50 Daphnia magna	5.46-9.83 mg/L [Static]
48 Hr EC50 Daphnia magna	11.5 mg/L

Ethylbenzene (100-41-4)

Test and Species	Results and Conditions
72 Hr EC50 Pseudokirchneriella subcapitata	4.6 mg/L
96 Hr EC50 Pseudokirchneriella subcapitata	>438 mg/L
72 Hr EC50 Pseudokirchneriella subcapitata	2.6-11.3 mg/L [static]
96 Hr EC50 Pseudokirchneriella subcapitata	1.7-7.6 mg/L [static]
48 Hr EC50 Daphnia magna	1.8-2.4 mg/L

Isoprene (78-79-5)

Test and Species	Results and Conditions
96 Hr LC50 Lepomis macrochirus	32.5-50.15 mg/L [static]
96 Hr LC50 Pimephales promelas	58.75-95.32 mg/L [static]
96 Hr LC50 Poecilia reticulata	188.77-305.14 mg/L [static]
96 Hr EC50 Scenedesmus quadricauda	>1000 mg/L
48 Hr EC50 Daphnia magna	140 mg/L

Decane (124-18-5)

Test and Species	Results and Conditions
24 Hr EC50 Chlorella vulgaris	0.043 mg/L
48 Hr EC50 Daphnia magna	0.029 mg/L

Xylenes (1330-20-7)

Test and Species	Results and Conditions
96 Hr LC50 Pimephales promelas	13.4 mg/L [flow-through]
96 Hr LC50 Oncorhynchus mykiss	2.661-4.093 mg/L [static]
96 Hr LC50 Oncorhynchus mykiss	13.5-17.3 mg/L
96 Hr LC50 Lepomis macrochirus	13.1-16.5 mg/L [flow-through]
96 Hr LC50 Lepomis macrochirus	19 mg/L
96 Hr LC50 Lepomis macrochirus	7.711-9.591 mg/L [static]
96 Hr LC50 Pimephales promelas	23.53-29.97 mg/L [static]
96 Hr LC50 Cyprinus carpio	780 mg/L [semi-static]
96 Hr LC50 Cyprinus carpio	>780 mg/L
96 Hr LC50 Poecilia reticulata	30.26-40.75 mg/L [static]
48 Hr EC50 water flea	3.82 mg/L
48 Hr LC50 Gammarus lacustris	0.6 mg/L

Environmental Fate/Mobility

Results of distribution modeling show that constituents of streams in the Fuel Oils Category will partition largely between the air, water, and soil compartments, with a negligible amount partitioning to sediment. Volatilization to the air can contribute to the loss of some constituents from aqueous and terrestrial habitats. It is not anticipated to bioconcentrate.

Persistence/Degradability

Streams in this category are subject to biodegradative processes. Two category streams, Heavy Pyrolysis Fuel Oil and Pyrolysis C10+ Fuel Oil, and one analog stream, 1,1'-biphenyl, exhibited a range, 7 to 57% biodegradation under standard testing procedures after 28 days. The remaining streams that were not tested are expected to demonstrate a similar range of biodegradability.

Bioaccumulation/Accumulation

This product will accumulate on the surface of plants, waterfowls and mammals, resulting in serious injury and possible death. Contains some polycyclic aromatic compounds which are known to persist and bioaccumulate.

Section 13 - Disposal Considerations

U.S./Canadian Waste Information

A: General Product Information

This product is known to be a hazardous waste according to US and Canadian regulations. The use, mixing or processing of this product may alter its properties or hazards. Contact federal, provincial/state and local authorities in order to generate or ship a waste material associated with this product to ensure materials are handled appropriately and meet all criteria for disposal of hazardous waste. DO NOT ATTEMPT TO DISPOSE OF BY UNCONTROLLED IGNITION. Since emptied containers retain product residue, follow safe handling/label warnings even after container is emptied.

See Section 7: Handling and Storage and Section 8: Exposure Controls/Personal Protection for additional handling information that may be applicable for safe handling and the protection of employees.

Waste generator is advised to carefully consider hazardous properties and control measures needed for other materials that may be found in the waste.

B: Component Waste Numbers

Naphthalene (91-20-3)

RCRA: waste number U165

Benzene (71-43-2)

RCRA: waste number U019 (Ignitable waste, Toxic waste); 0.5 mg/L regulatory level

Toluene (108-88-3)

RCRA: waste number U220

Xylenes (1330-20-7)

RCRA: waste number U239 (Ignitable waste, Toxic waste)

Section 14 - Transportation Information

US DOT Information

Shipping Name: Flammable liquids, n.o.s. (Pyrolysis Fuel Oil)
UN/NA #: UN1993 **Hazard Class:** 3 **Packing Group:** III
Required Label(s): Flammable Liquid
Additional Info.: NOTE: The Reportable quantity for benzene is 10 lbs. (4.54). The Reportable Quantity for naphthalene and 1,1 biphenyl is 100 lbs. (45.4 kg). The Reportable Quantity for styrene is 1000 lbs. (454 kg). 2008 Emergency Response Guidebook, Guide No. 128

Canadian TDG Information

Shipping Name: FLAMMABLE LIQUID, N.O.S. (Pyrolysis Fuel Oil)
UN #: UN1993 **Hazard Class:** 3 **Packing Group:** III
Required Label(s): Flammable Liquid
Additional Info.: 2008 Emergency Response Guidebook, Guide No. 128

International Air Transport Association (IATA) and International Civil Aviation Organization (ICAO) Information

Shipping Name: Due to the range in possible flash point values, the person intending to offer this material for transport by air is advised to consult with their dangerous goods resources prior to preparation of this product for shipment.

International Maritime Dangerous Goods (IMDG) Code

Shipping Name: Due to the range in possible flash point values, the person intending to offer this material for transport by marine is advised to consult with their dangerous goods resources prior to preparation of this product for shipment.
Additional Info.: F-E, S-E
Marine Pollutant: No

Section 15 - Regulatory Information

A: International Regulations

Component Analysis - International Inventory Status

Component	CAS #	US - TSCA	CANADA - DSL	EU - EINECS
Fuel oil, pyrolysis	69013-21-4	Yes	Yes	Yes
Naphthalene	91-20-3	Yes	Yes	Yes
Indene	95-13-6	Yes	Yes	Yes
Dicyclopentadiene	77-73-6	Yes	Yes	Yes
Benzene	71-43-2	Yes	Yes	Yes
Undecane	1120-21-4	Yes	Yes	Yes
Styrene	100-42-5	Yes	Yes	Yes
1,1 Biphenyl	92-52-4	Yes	Yes	Yes
Toluene	108-88-3	Yes	Yes	Yes
Ethylbenzene	100-41-4	Yes	Yes	Yes
Isoprene	78-79-5	Yes	Yes	Yes
Decane	124-18-5	Yes	Yes	Yes
Xylenes	1330-20-7	Yes	Yes	Yes

B: USA Federal & State Regulations

Ongoing occupational hygiene, medical surveillance programs, site emission or spill reporting may be required by Federal or State regulations. Check for applicable regulations.

USA OSHA Hazard Communication Class

This product is hazardous under 29 CFR 1910.1200 (Hazard Communication). HCS Classes:
HCS CLASS: Flammable liquid having a flash point between than 37.8°C (100°F) and 93.9°C (200°F)
HCS CLASS: MAY CAUSE CANCER
HCS CLASS: Irritating substance.
HCS CLASS: Sensitizing substance
HCS CLASS: Target organ effects.

USA Right-to-Know - Federal

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4).

Naphthalene (91-20-3)
SARA 313: 0.1 % de minimis concentration
CERCLA: 100 lb final RQ; 45.4 kg final RQ

Dicyclopentadiene (77-73-6)
SARA 313: 1.0 % de minimis concentration

Benzene (71-43-2)
SARA 313: 0.1 % de minimis concentration
CERCLA: 10 lb final RQ

Styrene (100-42-5)
SARA 313: 0.1 % de minimis concentration
CERCLA: 1000 lb final RQ; 454 kg final RQ

1,1 Biphenyl (92-52-4)
SARA 313: 1.0 % de minimis concentration
CERCLA: 100 lb final RQ; 45.4 kg final RQ

Ethylbenzene (100-41-4)
SARA 313: 0.1 % de minimis concentration
CERCLA: 1000 lb final RQ; 454 kg final RQ

Isoprene (78-79-5)
SARA 313: 0.1 % de minimis concentration
CERCLA: 100 lb final RQ; 45.4 kg final RQ

Toluene (108-88-3)
SARA 313: 1.0 % de minimis concentration
CERCLA: 1000 lb final RQ; 454 kg final RQ

Xylenes (1330-20-7)
SARA 313: 1.0 % de minimis concentration
CERCLA: 100 lb final RQ; 45.4 kg final RQ

USA Right-to-Know - State

The following components appear on one or more of the following state hazardous substances lists. Some components (including those present only in trace quantities, and therefore not listed in this document) may be included on the Right-To-Know lists of other U.S. states. The reader is therefore cautioned to contact his or her NOVA Chemicals' representative or NOVA Chemicals' Product Integrity group for further U.S. State Right-To-Know information.

Component	CAS #	NJ	PA
Asphaltenes / Polycyclic aromatic hydrocarbons (¹related to Coal tar pitch) (²related to Particulate polycyclic aromatic hydrocarbons)	Not available	Yes¹	Yes²
Naphthalene	91-20-3	Yes	Yes
Indene	95-13-6	Yes	Yes
Dicyclopentadiene	77-73-6	Yes	Yes
Benzene	71-43-2	Yes	Yes
Undecane	1120-21-4	Yes	No
Styrene	100-42-5	Yes	Yes
1,1 Biphenyl	92-52-4	Yes	Yes
Toluene	108-88-3	Yes	Yes
Ethylbenzene	100-41-4	Yes	Yes
Isoprene	78-79-5	Yes	Yes
Decane	124-18-5	Yes	Yes
Xylenes	1330-20-7	Yes	Yes

The following statement(s) are provided under the California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65):
WARNING! This product contains a chemical known to the state of California to cause cancer.
WARNING! This product contains a chemical known to the state of California to cause reproductive / developmental effects.

C: Canadian Regulations - Federal and Provincial

Canadian Environmental Protection Act (CEPA): All components of this product are on the Domestic Substances List (DSL) or are exempt and are acceptable for use under the provisions of CEPA.

WHMIS Ingredient Disclosure List (IDL)

The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List (IDL):

Component	CAS #	Minimum Concentration
Naphthalene	91-20-3	1 %
Indene	95-13-6	1 %
Dicyclopentadiene	77-73-6	1 %
Benzene	71-43-2	0.1 %
Styrene	100-42-5	0.1 %
1,1-Biphenyl	92-52-4	1 %
Toluene	108-88-3	1 %
Ethylbenzene	100-41-4	0.1 %
Isoprene	78-79-5	1 %

WHMIS Classification

Workplace Hazardous Materials Information System (WHMIS): This product has been classified in accordance with the hazard criteria of the CPR (Controlled Products Regulations) and the MSDS contains all the information required by the CPR.

WHMIS CLASS B3: Combustible liquid with a flashpoint between 37.8°C and 93.3°C (100°F-200°F).

WHMIS CLASS D1A: Very Toxic (Dicyclopentadiene)

WHMIS CLASS D2A: Carcinogen (Asphaltenes / Polycyclic aromatic hydrocarbons, Naphthalene, Benzene, Styrene, 1,1-Biphenyl, Ethylbenzene, Isoprene), Animal embryotoxin (Xylene), Mutagen (Benzene)

WHMIS CLASS D2B: Toxic

Other Regulations

Ongoing occupational hygiene, medical surveillance programs, site emission or spill reporting may be required by Federal or Provincial regulations. Check for applicable regulations.

Section 16 - Other Information

Label Information

WARNING! FLAMMABLE. TOXIC. This product is a dark coloured, oily liquid with a pungent odour and is insoluble in water. This product is flammable and burns readily when heated to high temperatures. Liquid can float on or near water surface and may disperse and/or spread fire. This product may be harmful and possible fatal by inhalation and if it is swallowed. This product is irritating to the eyes and irritating and harmful to the skin. Excessive inhalation of this product may result in central nervous system effects including headache, sleepiness, dizziness, nausea and loss of coordination. Ingestion may cause vomiting, nausea and abdominal pain as well as central nervous system effects and possible kidney and liver damage and blood disorders. Small amounts of this product, if aspirated into the lungs, may cause mild to severe pulmonary injury. May cause cancer. Prevent entry into ditches, drains, sewers, and waterways.

FIRST AID:

SKIN: Remove contaminated clothing and shoes. Wash immediately with soap and water. Seek medical attention if symptoms develop or persist. Completely decontaminate clothing, shoes and other protective equipment before reuse or discard.

EYES: Remove contact lenses, if it can be done safely. Immediately flush eyes with water for at least 15 minutes, while holding eyelids open. Seek medical attention if symptoms develop or persist.

INHALATION: Move affected individual to non-contaminated air. Loosen tight clothing such as a collar, tie, belt or waistband to facilitate breathing. Seek immediate medical attention if the individual is not breathing, is unconscious or if any other symptoms persist. WARNING: Contact through mouth-to-mouth resuscitation may pose a secondary risk to the rescuer. Avoid mouth-to-mouth contact by using a mouth shield or guard to perform artificial respiration.

INGESTION: DO NOT INDUCE VOMITING. Loosen tight clothing such as a collar, tie, belt or waistband. Seek immediate medical attention.

IN CASE OF A LARGE SPILL: Consider downwind evacuation for 300 metres (984 feet). Eliminate ignition sources. Keep upwind and out of low areas. Stop discharge if safe to do so. Contain discharge by booming on water or diking on ground. A vapour suppressing foam may be used to reduce vapours. Absorb/adsorb residues with DRY earth, sand or other non-combustible material. Soil remediation may be required. Prevent entry into sewers, drains, ditches, underground or confined spaces, water intakes and waterways.

References

Available on request.

Special Considerations

For additional information on equipment bonding and grounding, refer to the American Petroleum Institute (API) Recommended Practice 2003, "Protection Against Ignitions Arising out of Static, Lightning, and Stray Currents" or National Fire Protection Association (NFPA) 77, "Recommended Practice on Static Electricity".

Key/Legend

ACGIH = American Conference of Governmental Industrial Hygienists; ADR = Transport of Dangerous Goods by Road; ADR/RID = European Agreement of Dangerous Goods by Road/Rail; BOD = Biochemical Oxygen Demand; CAS = Chemical Abstracts Service; CEPA = Canadian Environmental Protection Act; CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act; CFR = Code of Federal Regulations; CPR = Controlled Products Regulations; DFG = Deutsche Forschungsgemeinschaft; DOT = Department of Transportation; DSL = Domestic Substances List; EC50 = Effective Concentration 50%; EEC = European Economic Community; EINECS = European Inventory of Existing Commercial Chemical Substances; ELINCS = European List of Notified Chemical Substances; EPA = Environmental Protection Agency; EU = European Union; FDA = Food and Drug Administration; GHS = Globally Harmonized System for the Classification and Labelling of Chemicals; HCS = Hazard Communication Standard; HMIS = Hazardous Materials Identification System; IARC = International Agency for Research on Cancer; IATA = International Air Transport Association; ICAO = International Civil Aviation Organization; IDL = Ingredient Disclosure List; IDLH = Immediately Dangerous to Life or Health; IMDG = International Maritime Dangerous Goods; IMO = International Maritime Organization; ISHL = Industrial Safety and Health Law; Kow = Octanol/water partition coefficient; LC50 = Lethal Concentration 50%; LD50 = Lethal Dose 50%; LEL = Lower Explosive Limit; LFL = Lower Flammable Limit; LLV = Level Limit Ceiling Limit (Sweden dust); MAK = Maximum Concentration Value in the Workplace; MITI = Ministry of International Trade and Industry; MSDS = Material Safety Data Sheet; NAB = Threshold Values (Indonesia); NCEC = National Chemical Emergency Centre; NDSL = Non-Domestic Substances List; NFPA = National Fire Protection Association; NIOSH = National Institute for Occupational Safety and Health; NJTSR = New Jersey Trade Secret Registry; NTP = National Toxicology Program; OEL = Occupational Exposure Limit; OSHA = Occupational Safety and Health Administration; PEL = Permissible Exposure Limit; PNOC = Particulates Not Otherwise Classified; PPE = Personal Protective Equipment; PRTR = Designated Chemical Substance Law (Japan); PSD = Short Term Exposure Limit (Indonesia); RCRA = Resource Conservation and Recovery Act; REACH = Registration, Evaluation, Authorisation and Restriction of Chemical Substances; REL = Recommended Exposure Limit; RID = Transport of Dangerous Goods by Rail; SARA = Superfund Amendments and Reauthorization Act; SCBA = Self Contained Breathing Apparatus; SDS = Safety Data Sheet; SEPA = State Environmental Protection Administration; STEL = Short Term Exposure Limit; TDG = Transportation of Dangerous Goods; TLV = Threshold Limit Value; TSCA = Toxic Substances Control Act; TWA = Time Weighted Average; UEL = Upper Explosive Limit; UFL = Upper Flammable Limit; VLA-ED = Valor límite Ambiental de Exposición Diaria (Environmental Exposure Daily Limit Value); VME = valeur limite d'exposition (Occupational Exposure Limits); WHMIS = Workplace Hazardous Materials Information Systems

MSDS Prepared by: NOVA Chemicals

MSDS Information Phone Number: 1-412-490-4063

Other Information

Notice to Reader:

ALTHOUGH THE INFORMATION CONTAINED IN THIS DOCUMENT IS PRESENTED IN GOOD FAITH, BASED ON AVAILABLE INFORMATION BELIEVED TO BE RELIABLE AT THE TIME OF PREPARATION OF THIS DOCUMENT, **NOVA CHEMICALS MAKES NO WARRANTIES OR REPRESENTATIONS WITH RESPECT TO THE INFORMATION OR THE PRODUCT/MATERIALS DESCRIBED HEREIN, AND EXPRESSLY DISCLAIMS ALL IMPLIED WARRANTIES AND CONDITIONS (INCLUDING ALL WARRANTIES AND CONDITIONS OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE). NO FREEDOM FROM INFRINGEMENT OF ANY PATENT OWNED BY NOVA CHEMICALS OR OTHERS IS TO BE INFERRED. THIS INFORMATION IS SUBJECT TO CHANGE WITHOUT NOTICE. PLEASE CONTACT NOVA CHEMICALS FOR THE MOST CURRENT VERSION OF THIS MSDS. NOVA CHEMICALS DOES NOT ASSUME RESPONSIBILITY FOR MSDS OBTAINED FROM THIRD PARTY SOURCES.**

UNLESS SPECIFICALLY AGREED OTHERWISE, NOVA CHEMICALS DOES NOT TAKE RESPONSIBILITY FOR USE, TRANSPORTATION, STORAGE, HANDLING OR DISPOSAL OF THE PRODUCTS DESCRIBED HEREIN.

This is the end of MSDS # NOVA-0036.