



MATERIAL SAFETY DATA SHEET

No. 5 Fuel Oil

VALERO MARKETING & SUPPLY COMPANY
and Affiliates
P.O. Box 696000
San Antonio, TX 78269-6000

Emergency Phone Numbers

24 Hour Emergency: 866-565-5220
Chemtrec Emergency: 800-424-9300

General Assistance

General Assistance: 210-345-4593

BRAND NAMES: Valero, Diamond Shamrock, Shamrock, Ultramar, Beacon, Total

Section 1. Chemical Product and Company Identification

Common / Trade name : No. 5 Fuel Oil

Synonym : Residual Fuel Oil, Resid, Residue, Heavy Fuel Oil

SYNONYMS/COMMON NAMES: This Material Safety Data Sheet applies to the listed products and synonym descriptions for Hazard Communication purposes only. Technical specifications vary greatly depending on the product and are not reflected in this document. Consult specification sheets for technical information. This product contains ingredients that are considered to be hazardous as defined by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Material uses : No. 5 fuel oil is a complex blend of hydrocarbons derived from various refinery streams, usually residues, and can contain hydrogen sulfide. Typical streams include atmospheric tower bottoms, vacuum tower bottoms, catalytically cracked gas oil, slurry oil, acid soluble oil and cutter stock. The composition is complex and varies with the source of crude oil. This product is intended for use as a refinery feedstock, fuel, or for use in engineered processes. Use in other applications may result in higher exposures and require additional controls, such as local exhaust ventilation and personal protective equipment.

MSDS # : 207

CAS # : Mixture

Section 2. Composition, information on ingredients

<u>Name</u>	<u>CAS number</u>	<u>Concentration (%)</u>
Fuel Oil, residual	68476-33-5	0 - 100
Residues (petroleum),light vacuum	68512-62-9	0 - 100
Clarified oils (petroleum),catalytic cracked	64741-62-4	0 - 100
Clarified oils (petroleum),hydrodesulfurized catalytic cracked	68333-26-6	0 - 100
Distillates (petroleum),heavy catalytic cracked	64741-61-3	0 - 100
Distillates, petroleum residues vacuum	68955-27-1	0 - 100
Polycyclic Aromatic Hydrocarbons	130498-29-2	0 - 10
Asphaltenes (petroleum)	91995-23-2	0 - 5
Naphthalene	91-20-3	0 - 3
Sulfur	7704-34-9	0 - 1
Hydrogen Sulfide	7783-06-4	0 - 1

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Section 3. Hazards Identification

Danger! Untreated Product May Contain or Release Hydrogen Sulfide. H₂S is a highly toxic, highly flammable gas which can be fatal if inhaled at certain concentrations. Exhaust Fumes Have Been Reported to be an Occupational hazard due to NIOSH-reported potential carcinogenic properties. May cause irritation to eyes, skin and respiratory system. Avoid liquid, mist and vapor contact. Harmful or fatal if swallowed. Aspiration hazard, can enter lungs and cause damage. May cause irritation or be harmful if inhaled or absorbed through the skin. Avoid prolonged or repeated skin contact. Contains polycyclic aromatic compounds which have been shown to cause anemia, disorders of the liver, bone marrow and lymphoid tissues in rats following dermal application. Combustible Liquid. Vapors may explode. May cause irritation to eyes, skin and respiratory system. Avoid liquid, mist and vapor contact. Harmful or fatal if swallowed. Aspiration hazard, can enter lungs and cause damage. May cause irritation or be harmful if inhaled or absorbed through the skin. CAUTION: This product is normally shipped hot and may cause burns to skin or eyes.

Physical state : Liquid. (Thick, oily liquid.)

Emergency overview : Danger!

MAY BE FATAL IF INHALED.

HARMFUL IF SWALLOWED.

CAUSES SKIN IRRITATION.

CONTAINS MATERIAL WHICH CAUSES DAMAGE TO THE FOLLOWING ORGANS:
BLOOD, KIDNEYS, LIVER, SKIN, CENTRAL NERVOUS SYSTEM, EYE, LENS OR CORNEA.

SUSPECT CANCER HAZARD.

CONTAINS MATERIAL WHICH MAY CAUSE CANCER.

MAY BE HARMFUL IF ABSORBED THROUGH SKIN.

COMBUSTIBLE LIQUID AND VAPOR.

VAPOR MAY CAUSE FIRE.

Do not ingest. Do not get in eyes or on skin or clothing. Avoid breathing vapor or mist. Keep away from heat, sparks and flame. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Risk of cancer depends on duration and level of exposure.

Routes of entry : Dermal contact. Eye contact. Inhalation. Ingestion.

Potential acute health effects

Eyes : Corrosive to eyes. May cause severe irritation, redness, tearing, blurred vision and conjunctivitis.

Skin : Prolonged or repeated contact may cause moderate irritation, defatting (cracking), redness, itching, inflammation, dermatitis and possible secondary infection. High pressure skin injections are SERIOUS MEDICAL EMERGENCIES. Injury may not appear serious at first. Within a few hours, tissues will become swollen, discolored and extremely painful.

Inhalation : Nasal and respiratory tract irritation, central nervous system effects including excitation, euphoria, contracted eye pupils, dizziness, drowsiness, blurred vision, fatigue, nausea, headache, loss of reflexes, tremors, convulsions, seizures, loss of consciousness, coma, respiratory arrest and sudden death could occur as a result of long term and/or high concentration exposure to vapors. May also cause anemia and irregular heart rhythm. Repeated or prolonged exposure may cause behavioral changes. NIOSH Current Intelligence Bulletin 50 reports a potential occupational carcinogenic hazard exists due to human exposure to diesel exhaust.

Ingestion : Toxic if swallowed. May cause burns to mouth, throat and stomach. This product may be harmful or fatal if swallowed. This product may cause nausea, vomiting, diarrhea and restlessness. DO NOT INDUCE VOMITING. Aspiration into the lungs can cause severe chemical pneumonitis or pulmonary edema/hemorrhage, which can be fatal. May cause gastrointestinal disturbances. Symptoms may include irritation, depression, vomiting and diarrhea. May cause harmful central nervous system effects, similar to those listed under "inhalation".

- Medical conditions aggravated by over-exposure** : Repeated or prolonged contact with spray or mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray or mist may produce respiratory tract irritation, leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.
- Over-exposure signs/symptoms** : Nasal and respiratory tract irritation, central nervous system effects including excitation, euphoria, contracted eye pupils, dizziness, drowsiness, blurred vision, fatigue, nausea, headache, loss of reflexes, tremors, convulsions, seizures, loss of consciousness, coma, respiratory arrest or sudden death could occur as a result of long term and/or high concentration exposure to vapors. May also cause anemia and irregular heart rhythm.

See toxicological information (section 11)

Section 4. First Aid Measures

- Eye contact** : This product is normally stored and shipped hot (110°F to 250 °F) and thermal burns are a risk. Flush immediately with large amounts of water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Seek medical advice if pain or redness continues.
- Skin contact** : This product is normally stored and shipped hot (110°F to 250 °F) and thermal burns are a risk. In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention. Wash exposed area thoroughly with soap and water. Remove contaminated clothing promptly and launder before reuse. Contaminated leather goods should be discarded. If irritation persists or symptoms described in the MSDS develop, seek medical attention. High pressure skin injections are SERIOUS MEDICAL EMERGENCIES. Get immediate medical attention.
- Inhalation** : If inhaled, remove to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention.
- Ingestion** : This product may be harmful or fatal if swallowed. This product may cause nausea, vomiting, diarrhea and restlessness. DO NOT INDUCE VOMITING. Aspiration into the lungs can cause severe chemical pneumonitis or pulmonary edema/hemorrhage, which can be fatal. May cause gastrointestinal disturbances. Symptoms may include irritation, depression, vomiting and diarrhea. May cause harmful central nervous system effects, similar to those listed under "inhalation".
- Notes to physician** : In case of ingestion, gastric lavage with activated charcoal can be used promptly to prevent absorption. Consideration should be given to the use of an intratracheal tube, to prevent aspiration. Irregular heart beat may occur, use of adrenalin is not advisable. Individuals intoxicated by the product should be hospitalized immediately, with acute and continuing attention to neurological and cardiopulmonary function. Positive pressure ventilation may be necessary. After the initial episode, individuals should be monitored for changes in blood variables and the delayed appearance of pulmonary edema and chemical pneumonitis. Such patients should be monitored for several days or weeks for delayed effects, including bone marrow toxicity, hepatic and renal impairment. Individuals with chronic pulmonary disease will be more seriously impaired, and recovery from inhalation exposure may be complicated. In case of skin injection, prompt debridement of the wound is necessary to minimize necrosis and tissue loss.

Section 5. Fire Fighting Measures

- Flammability of the product** : Combustible.
- Auto-ignition temperature** : >315.59°C (600.1°F)
- Flash point** : Closed cup: >60°C (140°F).
- Flammable limits** : Lower: 0.9% Upper: 7%
- Products of combustion** : These products are carbon oxides (CO, CO₂), nitrogen and sulfur oxides (NO_x, SO_x), particulate matter, VOC's.
- Fire hazards in the presence of various substances** : Flammable in the presence of open flames, sparks and static discharge.

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- Explosion hazards in the presence of various substances** : Explosive in the presence of open flames, sparks and static discharge.
- Fire-fighting media and instructions** : Combustible Liquid. Use dry chemical, foam or carbon dioxide to extinguish the fire. Consult foam manufacturer for appropriate media, application rates and water/foam ratio. Water can be used to cool fire- exposed containers, structures and to protect personnel. If a leak or spill has not ignited, ventilate area and use water spray to disperse gas or vapor and to protect personnel attempting to stop a leak. Use water to flush spills away from sources of ignition. Do not flush down public sewers.
- Collect contaminated fire-fighting water separately. It must not enter the sewage system. Dike area of fire to prevent runoff. Decontaminate emergency personnel and equipment with soap and water.
- Combustible liquid and vapor. Vapor may cause flash fire. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.
- Special remarks on fire hazards** : No additional remark.
- Special remarks on explosion hazards** : No additional remark.

Section 6. Accidental Release Measures

- Personal precautions** : Immediately contact emergency personnel. Eliminate all ignition sources. Keep unnecessary personnel away. Use suitable protective equipment (section 8). Do not touch or walk through spilled material. Tanks, vessels or other confined spaces which have contained product should be freed of vapors before entering. The container should be checked to ensure a safe atmosphere before entry. Empty containers may contain toxic, flammable/combustible or explosive residues or vapors. Do not cut, grind, drill, weld or reuse empty containers that contained this product. Do not transfer this product to another container unless the container receiving the product is labeled with proper DOT shipping name, hazard class and other information that describes the product and its hazards.
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. If facility or operation has an "oil or hazardous substance contingency plan", activate its procedures. Stay upwind and away from spill. Wear appropriate protective equipment including respiratory protection as conditions warrant. Do not enter or stay in area unless monitoring indicates that it is safe to do so. Isolate hazard area and restrict entry to emergency crew. Extremely flammable. Review Fire Fighting Measures section before proceeding with clean up. Keep all sources of ignition (flames, smoking, flares, etc.) and hot surfaces away from release. Contain spill in smallest possible area. Recover as much product as possible (e.g., by vacuuming). Stop leak if it can be done without risk. Use water spray to disperse vapors. Spilled material may be absorbed by an appropriate absorbent, and then handled in accordance with environmental regulations. Prevent spilled material from entering sewers, storm drains, other unauthorized treatment or drainage systems and natural waterways. Contact fire authorities and appropriate federal, state and local agencies. If spill of any amount is made into or upon navigable waters, the contiguous zone, or adjoining shorelines, contact the National Response Center at 800-424- 8802. For highway or railway spills, contact Chemtrec at 800-424-9300.
- Methods for cleaning up** : If emergency personnel are unavailable, contain spilled material. For small spills, add absorbent (soil may be used in the absence of other suitable materials) and use a non-sparking or explosion-proof means to transfer material to a sealable, appropriate container for disposal. For large spills, dike spilled material or otherwise contain it to ensure runoff does not reach a waterway. Place spilled material in an appropriate container for disposal.

Section 7. Handling and Storage

- Handling** : Do not ingest. Do not get in eyes, on skin or on clothing. Keep container closed. Use only with adequate ventilation. Avoid breathing vapor or mist. Keep away from heat, sparks and flame. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Wash thoroughly after handling. Use only in well ventilated locations. Keep away from heat, spark and flames. In case of fire, use water spray, foam, dry chemical or carbon dioxide as described in the Fire Fighting Measures section of the MSDS. Do not pressurize, cut, weld, braze, solder, drill on or near this container. "Empty" container contains residue (liquid and/or vapor) and may explode in heat of a fire. Use good personal hygiene practices. After handling this product, wash hands before eating, drinking, or using toilet facilities. Keep out of reach of children. Failure to use caution may cause serious injury or illness. Never siphon by mouth. For use as a motor fuel only. Do not use as a cleaning solvent or for other non-motor fuel uses. Wash thoroughly after handling. To prevent ingestion and exposure - Do not siphon by mouth to transfer product between containers. Use good personal hygiene practices. After handling this product, wash hands before eating, drinking, or using toilet facilities.
- Storage** : Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8. Exposure controls, personal protection

- Engineering controls** : Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective occupational exposure limits. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protection

- Eyes** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.
- Skin** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Flame Retardant Clothing is recommended.
- Respiratory** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
- Hands** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
- Personal protective equipment (Pictograms)** : Consult your supervisor or S.O.P. for special handling direction.



- Personal protection in case of a large spill** : Splash goggles. Full suit. Vapor respirator. Boots. Gloves. Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product. Suggested protective clothing might not be adequate. Consult a specialist before handling this product.

Component

Exposure limits

Polycyclic Aromatic Hydrocarbons

OSHA PEL (United States, 6/1993).TWA: 0.2 mg/m³ 8 hour/hours. Form: Benzene soluble**ACGIH TLV (United States, 3/2004).**TWA: 0.2 mg/m³ 8 hour/hours. Form: Benzene-soluble

Naphthalene

NIOSH REL (United States, 6/2001).

STEL: 15 ppm 15 minute/minutes. Form: All forms

TWA: 10 ppm 10 hour/hours. Form: All forms

OSHA PEL (United States, 6/1993).

TWA: 10 ppm 8 hour/hours. Form: All forms

ACGIH TLV (United States, 5/2004). Notes: 1996 Adoption Refers to Appendix A -- Carcinogens.

STEL: 15 ppm 15 minute/minutes. Form: All forms

TWA: 10 ppm 8 hour/hours. Form: All forms

Hydrogen Sulfide

ACGIH TLV (United States, 9/2004).

TWA: 10 ppm 8 hour/hours. Form: All forms

STEL: 15 ppm 15 minute/minutes. Form: All forms

NIOSH REL (United States, 12/2001).

CEIL: 10 ppm 10 minute/minutes. Form: All forms

OSHA PEL Z2 (United States, 8/1997).

CEIL: 20 ppm Form: All forms

AMP: 50 ppm 10 minute/minutes. Form: All forms

Consult local authorities for acceptable exposure limits.

Section 9. Physical and Chemical Properties

Physical state	: Liquid. (Thick, oily liquid.)
Color	: Black.
Odor	: Strong Petroleum Odor
Boiling point	: 176.69 to 648.89°C (350 to 1200°F)
Specific gravity	: 0.88 to 1.02 (Water = 1) (@ 60 °F)
Vapor pressure	: <0.7 kPa (<5.2 mm Hg) (at 20°C)
Vapor density	: >5 (Air = 1)
Volatility	: Negligible
Evaporation rate	: Not Available

Section 10. Stability and reactivity data

Stability and reactivity	: The product is stable.
Incompatibility with various substances	: Reactive with oxidizing agents, acids, alkalis.
Hazardous decomposition products	: These products are carbon oxides (CO, CO ₂), nitrogen and sulfur oxides (NO _x , SO _x), particulate matter, VOC's.
Hazardous polymerization	: Will not occur.

Section 11. Toxicological Information

Toxicity data

DIESEL EXHAUST FUMES have been reported to be a potential occupational carcinogen in humans by NIOSH Current Intelligence Bulletin 50.

Skin painting studies in laboratory animals with products containing **POLYCYCLIC AROMATIC COMPOUNDS** have resulted in severe irritation and systemic toxicity, including cancers. Polycyclic aromatic compounds have been shown to cause anemia, disorders of the liver, bone marrow and lymphoid tissues in rats following dermal application.

Skin painting studies in laboratory animals with products similar to **BUNKER FUEL** or its major components have produced severe irritation and systemic toxicity, including cancers. Some components of the fuel, such as vacuum residuum and catalytically cracked clarified slurry oil, contain polycyclic aromatic compounds which have been shown to cause anemia, disorders of the liver, bone marrow and lymphoid tissues in rats following dermal application.

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Skin painting studies in laboratory animals with **SLURRY OIL** have produced severe irritation and systemic toxicity, including cancers. Catalytically cracked clarified oil contain polycyclic aromatic compounds which have been shown to cause anemia, disorders of the liver, bone marrow and lymphoid tissues in rats following dermal application.

Skin painting studies in laboratory animals with **VACUUM TOWER BOTTOMS** have produced severe irritation and systemic toxicity, including cancers. Vacuum residuum contains polycyclic aromatic compounds which have been shown to cause anemia, disorders of the liver, bone marrow and lymphoid tissues in rats following dermal application.

HYDROGEN SULFIDE can affect the body if it is inhaled or if it comes into contact with the eyes, skin, nose or throat. It can also affect the body if it is swallowed. It is colorless and has the odor of rotten eggs. However, its odor cannot be used as an indication of its presence since one of the first effects of H₂S exposure is the loss of the sense of smell. Inhalation of high concentrations of hydrogen sulfide, 1000 to 2000 ppm, may cause coma after a single breath and may be rapidly fatal, convulsions can also occur. Hydrogen sulfide gas is a rapidly acting systemic poison which causes respiratory paralysis with consequent asphyxia at high concentrations (500 to 1000 ppm). A case of polyneuritis and encephalopathy from one day's exposure to a concentration insufficient to cause loss of consciousness has been reported. It irritates the eyes and respiratory tract at lower concentrations (50 to 500 ppm). Pulmonary edema and bronchial pneumonia may follow prolonged exposure at concentrations exceeding 250 ppm. Exposure to concentrations of hydrogen sulfide around 50 ppm for one hour may produce rhinitis, pharyngitis, bronchitis, pneumonitis, acute conjunctivitis with pain, lacrimation and photophobia, in severe form this may progress to keratoconjunctivitis and vesiculation of the corneal epithelium. In lower concentrations, hydrogen sulfide may cause headache, fatigue, irritability, insomnia, and gastrointestinal disturbances, as well as central nervous system disturbances, causing excitation and dizziness. Repeated exposure to hydrogen sulfide results in increased susceptibility, so that eye irritation, cough and systemic effects may result from concentrations previously tolerated without any effect.

NAPHTHALENE can affect the body if it is inhaled, comes into contact with the eyes or the skin or if it is swallowed. Naphthalene vapor causes hemolysis and eye irritation, and may cause cataracts. Severe intoxication from ingestion of the solid results in characteristic manifestations of marked intravascular hemolysis and its consequences, including potentially fatal hyperkalemia. Initial symptoms include eye irritation, headache, confusion, excitement, malaise, profuse sweating, nausea, vomiting, abdominal pain, and irritation of the bladder. There may be progression to jaundice, hematuria, hemoglobinuria, renal tubular blockage, and acute renal shutdown. Hematologic features include red cell fragmentation, icterus, severe anemia with nucleated red cells, leukocytosis, and dramatic decreases in hemoglobin, hematocrit and red cell count; sometimes there is formation of Heinz bodies and methemoglobin. Individuals with a deficiency of glucose-6-phosphate dehydrogenase in erythrocytes may be more susceptible to hemolysis by naphthalene. Cataracts and ocular irritation have been produced experimentally in animals and have been described in humans. Of 21 workers exposed to high concentrations of fume or vapor for 5 years, 8 had peripheral lens opacities; in other studies, no abnormalities of the eyes have been detected in workers exposed to naphthalene for several years. The vapor causes eye irritation at 15 ppm. Eye contact with the solid may result in conjunctivitis, superficial injury to the cornea, chorioretinitis, scotoma, and diminished visual acuity. Naphthalene on the skin may cause hypersensitivity dermatitis, chronic dermatitis is rare.

<u>Ingredient name</u>	<u>Test</u>	<u>Result</u>	<u>Route</u>	<u>Species</u>
Clarified oils (petroleum),catalytic cracked	LD50	4300 mg/kg	Oral	Rat
Naphthalene	LD50	490 mg/kg	Oral	Rat
	LD50	316 mg/kg	Oral	Mouse
	LD50	1200 mg/kg	Oral	Guinea pig
	LD50	>2500 mg/kg	Dermal	Rat
	LDLo	100 mg/kg	Oral	child
	LDLo	400 mg/kg	Oral	Dog
Sulfur	LDLo	175 mg/kg	Oral	Rabbit
Hydrogen Sulfide	LC50	444 ppm (1 hour/hours)	Inhalation	Rat
	LC50	673 ppm (1 hour/hours)	Inhalation	Mouse

Chronic effects on humans : **CARCINOGENIC EFFECTS:** Classified 2B (Possible for humans.) by IARC [Fuel Oil, residual]. Classified A2 (Suspected for humans.) by ACGIH, 2A (Probable for human.) by IARC, 2 (Reasonably anticipated to be human carcinogens.) by NTP [Polycyclic Aromatic Hydrocarbons]. Classified 2B (Possible for humans.) by IARC [Naphthalene]. Classified A4 (Not classifiable for humans or animals.) by ACGIH [Naphthalene]. Contains material which causes damage to the following organs: blood, kidneys, liver, skin, central nervous system (CNS), eye, lens or cornea.

Other toxic effects on humans : Very hazardous in case of eye contact (corrosive). Hazardous in case of skin contact (irritant), of ingestion, of inhalation (lung irritant).

Special remarks on toxicity to animals : No additional remark.

Special remarks on chronic effects on humans : No additional remark.

Special remarks on other toxic effects on humans : No additional remark.

Specific effects

Carcinogenic effects : Contains material which may cause cancer. Risk of cancer depends on duration and level of exposure.

Target organs : Contains material which causes damage to the following organs: blood, kidneys, liver, skin, central nervous system (CNS), eye, lens or cornea.

Section 12. Ecological Information**Ecotoxicity data**

Ingredient name	Species	Period	Result
Polycyclic Aromatic Hydrocarbons	Daphnia pulex (LC50)	96 hour/hours	0.005 mg/l
	Daphnia magna (EC50)	48 hour/hours	1.6 mg/l
Naphthalene	Daphnia magna (EC50)	48 hour/hours	2.194 mg/l
	Daphnia magna (EC50)	48 hour/hours	2.55 mg/l
Sulfur	Daphnia pulex (LC50)	96 hour/hours	1 mg/l
	Oncorhynchus mykiss (LC50)	96 hour/hours	1.6 mg/l
	Oncorhynchus mykiss (LC50)	96 hour/hours	1.8 mg/l
	Daphnia magna (EC50)	48 hour/hours	>5000 mg/l
	Lepomis macrochirus (LC50)	96 hour/hours	<14 mg/l
	Lepomis macrochirus (LC50)	96 hour/hours	>180 mg/l
Hydrogen Sulfide	Oncorhynchus mykiss (LC50)	96 hour/hours	>180 mg/l
	Pimephales promelas (LC50)	96 hour/hours	0.007 mg/l
	Oncorhynchus mykiss (LC50)	96 hour/hours	0.007 mg/l
	Pimephales promelas (LC50)	96 hour/hours	0.0071 mg/l
	Lepomis macrochirus (LC50)	96 hour/hours	0.009 mg/l
	Pimephales promelas (LC50)	96 hour/hours	0.0107 mg/l
	Oncorhynchus mykiss (LC50)	96 hour/hours	0.012 mg/l

Products of degradation : These products are carbon oxides (CO, CO₂) and water.


Toxicity of the products of biodegradation : The products of degradation are less toxic than the product itself.

Section 13. Disposal Considerations


Waste disposal : The generation of waste should be avoided or minimized wherever possible. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.

Consult your local or regional authorities.

Section 14. Transport Information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	UN1993	Combustible Liquid, n.o.s. Note: If material is shipped hot, below its flash point, this material is more properly shipped as Elevated Temperature Liquid, n.o.s., DOT Class 9; Miscellaneous	3	III		Not available.

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		Hazardous Material, UN 3257, PG III				
TDG Classification	UN1993	Combustible Liquid, n.o.s.	3	III		Not available.

Section 15. Regulatory Information

United States

U.S. Federal regulations

: TSCA 8(a) PAIR: Naphthalene
 TSCA 8(b) inventory: Fuel Oil, residual; Residues (petroleum),light vacuum; Clarified oils (petroleum),catalytic cracked; Clarified oils (petroleum),hydrodesulfurized catalytic cracked; Distillates (petroleum),heavy catalytic cracked; Distillates, petroleum residues vacuum; Polycyclic Aromatic Hydrocarbons; Naphthalene; Sulfur ; Hydrogen Sulfide
 SARA 302/304/311/312 extremely hazardous substances: No products were found.
 SARA 302/304 emergency planning and notification: No products were found.
 SARA 302/304/311/312 hazardous chemicals: Fuel Oil, residual; Polycyclic Aromatic Hydrocarbons; Naphthalene
 SARA 311/312 MSDS distribution - chemical inventory - hazard identification: Fuel Oil, residual: Delayed (chronic) health hazard; Polycyclic Aromatic Hydrocarbons: Immediate (acute) health hazard, Delayed (chronic) health hazard; Naphthalene: Fire hazard, Immediate (acute) health hazard, Delayed (chronic) health hazard
 Clean Water Act (CWA) 307: Polycyclic Aromatic Hydrocarbons; Naphthalene
 Clean Water Act (CWA) 311: Naphthalene
 Clean Air Act (CAA) 112 accidental release prevention: Hydrogen Sulfide
 Clean Air Act (CAA) 112 regulated flammable substances: No products were found.
 Clean Air Act (CAA) 112 regulated toxic substances: Hydrogen Sulfide

SARA 313

	<u>Product name</u>	<u>CAS number</u>	<u>Concentration</u>
Form R - Reporting requirements	: Polycyclic Aromatic Hydrocarbons	130498-29-2	0 - 10
	Naphthalene	91-20-3	0 - 3
Supplier notification	: Polycyclic Aromatic Hydrocarbons	130498-29-2	0 - 10
	Naphthalene	91-20-3	0 - 3

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

State regulations

: Connecticut hazardous material survey.: Naphthalene
 Illinois toxic substances disclosure to employee act: Naphthalene
 Illinois chemical safety act: Distillates, petroleum residues vacuum
 Rhode Island RTK hazardous substances: Distillates, petroleum residues vacuum; Naphthalene
 Pennsylvania RTK: Distillates, petroleum residues vacuum; Polycyclic Aromatic Hydrocarbons: (special hazard, environmental hazard, generic environmental hazard); Naphthalene: (environmental hazard, generic environmental hazard); Sulfur : (generic environmental hazard); Hydrogen Sulfide: (environmental hazard, generic environmental hazard)
 Florida: Distillates, petroleum residues vacuum; Naphthalene
 Minnesota: Distillates, petroleum residues vacuum
 Massachusetts RTK: Polycyclic Aromatic Hydrocarbons; Naphthalene; Sulfur ; Hydrogen Sulfide
 New Jersey: Fuel Oil, residual; Distillates, petroleum residues vacuum; Polycyclic Aromatic Hydrocarbons; Naphthalene; Sulfur ; Hydrogen Sulfide
 Louisiana RTK reporting list: Distillates, petroleum residues vacuum

WARNING: This product contains chemical/chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.: Polycyclic Aromatic Hydrocarbons; Naphthalene

WARNING: This product contains chemical/chemicals known to the state of California to cause reproductive harm (female).: No products were found.

California prop. 65 (no significant risk level): Polycyclic Aromatic Hydrocarbons

WARNING: This product contains chemical/chemicals known to the state of California to cause cancer.: Polycyclic Aromatic Hydrocarbons; Naphthalene

Canada

WHMIS (Canada)

- : Class B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).
- Class D-1B: Material causing immediate and serious toxic effects (Toxic).
- Class D-2A: Material causing other toxic effects (Very toxic).
- Class D-2B: Material causing other toxic effects (Toxic).
- CEPA DSL: Fuel Oil, residual; Residues (petroleum),light vacuum; Clarified oils (petroleum),catalytic cracked; Clarified oils (petroleum),hydrodesulfurized catalytic cracked; Distillates (petroleum),heavy catalytic cracked; Distillates, petroleum residues vacuum; Polycyclic Aromatic Hydrocarbons; Naphthalene

Section 16. Other Information

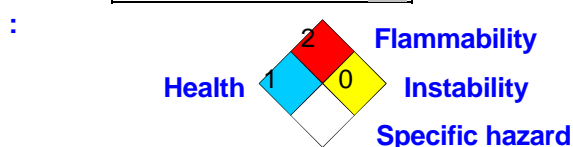
Label requirements

- : MAY BE FATAL IF INHALED.
- HARMFUL IF SWALLOWED.
- CAUSES SKIN IRRITATION.
- CONTAINS MATERIAL WHICH CAUSES DAMAGE TO THE FOLLOWING ORGANS: BLOOD, KIDNEYS, LIVER, SKIN, CENTRAL NERVOUS SYSTEM, EYE, LENS OR CORNEA.
- SUSPECT CANCER HAZARD.
- CONTAINS MATERIAL WHICH MAY CAUSE CANCER.
- MAY BE HARMFUL IF ABSORBED THROUGH SKIN.
- COMBUSTIBLE LIQUID AND VAPOR.
- VAPOR MAY CAUSE FIRE.

Hazardous Material Information System (U.S.A.)

Health	1
Fire hazard	2
Physical Hazard	0
Personal protection	

National Fire Protection Association (U.S.A.)



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Continued on next page

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Definitions of Material Safety Data Sheet Terminology

GOVERNMENT AGENCIES AND PRIVATE ASSOCIATIONS

ACGIH - American Conference of Governmental Industrial Hygienists, (private association)

DOT - United States Department of Transportation

EPA - United States Environmental Protection Agency

IARC - International Agency for Research on Cancer, (private association)

NFPA - National Fire Protection Association, (private association)

MSHA - Mine Safety and Health Administration, U.S. Department of Labor

NIOSH - National Institute of Occupational Safety and Health, U.S. Department of Health and Human Services

NTP - National Toxicology Program, (private association)

OSHA - Occupational Safety and Health Administration, U.S. Department of Labor

WHMIS - Workplace Hazardous Material Information System

CSA - Canadian Standards Association

HAZARD AND EXPOSURE INFORMATION

Acute Hazard - An adverse health effect which occurs rapidly as a result of short term exposure.

CAS # - American Chemical Society's Chemical Abstract service registry number which identifies the product and/or ingredients.

Ceiling - The concentration that should not be exceeded during any part of the working exposure

Chronic Hazard - An adverse health effect which generally occurs as a result of long term exposure or short term exposure with delayed health effects and is of long duration

Fire Hazard - A material that poses a physical hazard by being flammable, combustible, pyrophoric or an oxidizer as defined by 29 CFR 1910.1200

Hazard Class - DOT hazard classification

Hazardous Ingredients - Names of ingredients which have been identified as health hazards

IDLH - Immediately Dangerous to Life and Health, the airborne concentration below which a person can escape without respiratory protection and exposure up to 30 minutes, and not suffer debilitating or irreversible health effects. Established by NIOSH.

mg/m³ - Milligrams of contaminant per cubic meter of air, a mass to volume ratio

N/A - Not available or no relevant information found

NA - Not applicable

PEL - OSHA permissible exposure limit; an action level of one half this value may be applicable

ppm - Part per million (one volume of vapor or gas in one million volumes of air)

Pressure Hazard - A material that poses a physical hazard due to the potential of a sudden release of pressure such as explosive or a compressed gas as defined by 29 CFR 1910.1200

Reactive Hazard - A material that poses a physical hazard due to the potential to become unstable reactive, water reactive or that is an organic peroxide as defined by 29 CFR 1910.1200.

STEL - The ACGIH Short-Term Exposure Limit, a 15-minute Time-Weighted Average exposure which should not be exceeded at any time during a workday, even if the 8-hour TWA is less than the TLV.

TLV - ACGIH Threshold Limit Value, represented herein as an 8-hour TWA concentration.

8-hour TWA - The time weighted average concentration for a normal 8-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.

LD₅₀ - Single dose of a substance that, when administered by a defined route in an animal assay, is expected to cause the death of 50% of the defined animal population.

LC₅₀ - The concentration of a substance in air that, when administered by means of inhalation over a specified length of time in an animal assay, is expected to cause the death of 50% of a defined animal population.