



MATERIAL SAFETY DATA SHEET

SC Cutback Asphalt

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 : SC Cutback Asphalt
Synonym : SC-45, SC-70, SC-250, SC-600, SC-800, SC-3000, Slow Cure Asphalt, Cutback Asphalt, Road Asphalt, Road 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 : Asphalt products are to be used as road and highway paving applications; waterproofing and sealing applications; coatings; or other engineering applications. Use in other applications may result in higher exposures and require additional engineering controls and personal protective equipment.

MSDS # : 210

CAS # : Mixture

Section 2. Hazards Identification

Danger! Product May Contain or Release Hydrogen Sulfide. H₂S is a highly toxic, highly flammable gas which can be fatal if inhaled at certain concentrations.

CAUTION: This product is normally shipped very hot (above 225°F). Contact causes burns and skin irritation. Do not mix hot asphalt with water. 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. Product is stored and shipped hot so thermal burns are a risk. Combustible Liquid. Vapors may explode.

AVOID CONTACT WITH SKIN!

Physical state : Dark brown to black liquid with a strong petroleum odor at normal use temperature above 150 °F, viscous liquid at 70 °F.

Emergency overview : Warning!
CAUSES SKIN IRRITATION.
CAUSES DAMAGE TO THE FOLLOWING ORGANS: RESPIRATORY TRACT, SKIN, EYE, LENS OR CORNEA.
POSSIBLE CANCER HAZARD - CONTAINS MATERIAL WHICH MAY CAUSE CANCER, BASED ON ANIMAL DATA.

Avoid contact with eyes, skin and clothing. Wash thoroughly after handling. Risk of cancer depends on duration and level of exposure.

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

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Potential acute health effects

- Eyes** : This product is normally stored and shipped hot (above 225 ° F) and thermal burns are a risk. At ambient temperature, may cause severe irritation, redness, tearing, blurred vision and conjunctivitis.
- Skin** : This product is normally stored and shipped hot (above 225 ° F) and thermal burns are a risk. Prolonged or repeated contact may cause moderate irritation, defatting (cracking), redness, itching, inflammation, dermatitis and possible secondary infection. Possible cancer hazard based on skin painting studies in laboratory animals. 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. See Notes to Physician section.
- 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.
- 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".
- Medical conditions aggravated by over-exposure** : Preexisting eye, skin, heart and respiratory disorders may be aggravated by exposure to this product. Skin contact may aggravate existing dermatitis.
- 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 3. Composition, information on ingredients

<u>Name</u>	<u>CAS number</u>	<u>Concentration (%)</u>
Asphalt	8052-42-4	0 - 100
Gas Oil	64741-44-2	20 - 60
Kerosene	8008-20-6	2 - 10
Naphthalene	91-20-3	0 - 3
n-Nonane	111-84-2	0 - 3
Hexane (Other Isomers)	mixture	0 - 2
n-Heptane	142-82-5	0 - 2
n-Hexane	110-54-3	0 - 2
Octane (All Isomers)	111-65-9	0 - 2
Xylene (o,m,p isomers)	1330-20-7	<0.5
Ethylbenzene	100-41-4	<0.5
Hydrogen Sulfide	7783-06-4	<0.5
Toluene	108-88-3	<0.5
Benzene	71-43-2	<0.3
Polycyclic Aromatic Hydrocarbons	130498-29-2	<0.1

Section 4. First Aid Measures

- Eye contact** : 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.

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- Skin contact** : Immediately contact physician for thermal burns. In case of skin contact with hot product, immediately immerse or drench the affected area in water to assist cooling. Get medical attention. 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** : Remove to fresh air. If breathing is difficult, ensure clear airway and administer oxygen. If not breathing, apply artificial respiration or cardiopulmonary resuscitation. Keep person warm, quiet and get medical attention.
- Ingestion** : Never give anything by mouth to an unconscious person. DO NOT induce vomiting. Aspiration of material into the lungs due to vomiting can cause chemical pneumonitis which can be fatal. Give vegetable oil or charcoal slurry to retard absorption. If spontaneous vomiting occurs, keep head below hips to prevent aspiration of liquid into lungs and monitor for breathing difficulty. SEEK IMMEDIATE MEDICAL ATTENTION. Keep person warm and quiet.
- 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.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

Section 5. Fire Fighting Measures

- Flammability of the product** : Flammable at elevated temperatures
- Auto-ignition temperature** : 204.44 to 371.11°C (400 to 700°F)
- Flash point** : Closed cup: 48.8 to 148.9°C (119.8 to 300°F).
- Flammable limits** : Lower: 1% Upper: 7%
- Products of combustion** : Combustion may produce carbon monoxide, carbon dioxide and reactive hydrocarbons (aldehydes, aromatics, etc.) compounds, nitrogen oxides, sulfur oxides, particulate matter, and hydrogen sulfide.

Fire-fighting media and instructions

Extinguishing media

- Suitable** : Use an extinguishing agent suitable for the surrounding fire.
- Not suitable** : The use of directly applied water is usually not recommended.
- Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.
- In a fire or if heated, a pressure increase will occur and the container may burst.

Special protective equipment for fire-fighters

- : Dangerous when exposed to heat or flame. Vapors may form flammable or explosive mixtures at elevated temperatures. Vapor or gas may spread to distant ignition sources (pilot lights, welding equipment, electrical equipment, etc.) and flash back. Vapors may accumulate in low areas. Vapors may concentrate in confined areas. Flowing product can be ignited by self generated static electricity. Use adequate bonding and grounding to prevent static buildup. Runoff to sewer may cause fire or explosion hazard. Containers may explode in heat of fire. Irritating or toxic substances may be emitted upon thermal decomposition. For fires involving this material, do not

enter any enclosed or confined space without proper protective equipment, which should include NIOSH approved self-contained breathing apparatus with full face mask. Clothing, rags or similar organic material contaminated with this product and stored in a closed space may undergo spontaneous combustion. Transfer to and from commonly bonded and grounded containers.

Special remarks on fire hazards

: When heated above its flash point, this material will release flammable vapors which, if exposed to a source of ignition, can burn in the open or be explosive in confined spaces. Mists or sprays may be flammable at temperatures below the normal flash point. Dry chemical, halon carbon dioxide are the preferred extinguishing media. Foam and water fog are effective but can cause frothing. Big fires, such as tank fires, should be fought with caution. If the burning liquid is 200F or hotter, the use of water, water spray, or foam can cause frothing and even sudden boilover of the tank, endangering the lives of personnel such as firefighters. If possible, pump the contents from the tank and keep adjoining structures cool with water. 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.

Section 6. Accidental Release Measures

Personal precautions

: Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (section 8). 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

Small spill

: For small spills, add absorbent (soil may be used in the absence of other suitable materials), scoop up material and place in a sealable, liquid-proof container for disposal. Stop leak if without risk. Move containers from spill area. Dispose of via a licensed waste disposal contractor.

Large spill

: If emergency personnel are unavailable, contain spilled material. 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 : Avoid contact with eyes, skin and clothing. Wash thoroughly after handling. Use only in well ventilated locations. Keep away from spark and flames. In case of fire, use water spray, foam, dry chemical or carbon dioxide as described in the Fire and Explosion Hazard Data 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.

Keep out of reach of children. Failure to use caution may cause serious injury or illness.

Storage : Material is normally stored in closed tanks at 150-300°F. Keep away from sources of ignition and incompatible materials. Use non-sparking tools and explosion proof equipment. Ground lines, containers, and other equipment used during product transfer to reduce the possibility of a static induced spark. Use good personal hygiene practices. After handling this product, wash hands before eating, drinking, smoking or using toilet facilities.

Section 8. Exposure controls, personal protection

Engineering measures : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory 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. Keep away from eyes. Eye contact can be avoided by wearing safety glasses or chemical splash goggles.

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. Keep away from skin. Skin contact can be minimized by wearing protective gloves such as neoprene, nitrile-butadiene rubber, etc. and, where necessary, impervious clothing and boots. Leather goods contaminated with this product should be discarded. A source of clean water should be available in the work area for flushing eyes and skin. 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. If workplace exposure limits for product or components are exceeded, NIOSH approved equipment should be worn. Proper respirator selection should be determined by adequately trained personnel, based on the contaminants, the degree of potential exposure and published respiratory protection factors. This equipment should be available for nonroutine and emergency use.

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 directions.



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.

- Recommended monitoring procedures** : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.
- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.
- Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Component**Exposure limits**

Asphalt	<p>ACGIH TLV (United States). TWA: 0.5 mg/m³ 8 hour(s). Form: Fume</p> <p>NIOSH REL (United States, 6/2001). Notes: See Appendix A - NIOSH Potential Occupational Carcinogen CEIL: 5 mg/m³ 15 minute(s). Form: Fume</p>
Kerosene	<p>ACGIH TLV (United States, 1/2004). Skin Notes: Application restricted to conditions in which there are negligible aerosol exposures. ACGIH 2003 Adoption Refers to Appendix A -- Carcinogens. TWA: 200 mg/m³ 8 hour(s). Form: All forms</p> <p>NIOSH REL (United States, 6/2001). TWA: 100 mg/m³ 10 hour(s). Form: All forms</p>
Naphthalene	<p>NIOSH REL (United States, 6/2001). STEL: 15 ppm 15 minute(s). Form: All forms TWA: 10 ppm 10 hour(s). Form: All forms</p> <p>OSHA PEL (United States, 6/1993). TWA: 10 ppm 8 hour(s). Form: All forms</p> <p>ACGIH TLV (United States, 5/2004). Notes: 1996 Adoption Refers to Appendix A -- Carcinogens. STEL: 15 ppm 15 minute(s). Form: All forms TWA: 10 ppm 8 hour(s). Form: All forms</p>
n-Nonane	<p>NIOSH REL (United States, 6/2001). TWA: 200 ppm 10 hour(s). Form: All forms</p> <p>ACGIH TLV (United States, 9/2004). TWA: 200 ppm 8 hour(s). Form: All forms</p>
Hexane (Other Isomers)	<p>ACGIH TLV (United States, 9/2004). STEL: 1000 ppm 15 minute(s). Form: All forms TWA: 500 ppm 8 hour(s). Form: All forms</p> <p>NIOSH REL (United States, 6/2001). CEIL: 510 ppm 15 minute(s). Form: All forms</p>
n-Heptane	<p>ACGIH TLV (United States, 9/2004). STEL: 500 ppm 15 minute(s). Form: All forms TWA: 400 ppm 8 hour(s). Form: All forms</p> <p>NIOSH REL (United States, 6/2001). TWA: 350 mg/m³ 10 hour(s). Form: All forms</p> <p>OSHA PEL (United States, 6/1993). TWA: 500 ppm 8 hour(s). Form: All forms</p>
n-Hexane	<p>OSHA PEL (United States, 6/1993). TWA: 500 ppm 8 hour(s). Form: All forms</p> <p>ACGIH TLV (United States, 9/2004). Skin TWA: 50 ppm 8 hour(s). Form: All forms</p> <p>NIOSH REL (United States, 6/2001). TWA: 50 ppm 10 hour(s). Form: All forms</p>
Octane (All Isomers)	<p>NIOSH REL (United States, 6/2001). CEIL: 385 ppm 15 minute(s). Form: All forms TWA: 75 ppm 10 hour(s). Form: All forms</p> <p>OSHA PEL (United States, 6/1993). TWA: 500 ppm 8 hour(s). Form: All forms</p>
Xylene (o,m,p isomers)	<p>ACGIH TLV (United States, 3/2004). Notes: 1999 Adoption. TWA: 300 ppm 8 hour(s). Form: All forms</p> <p>ACGIH TLV (United States, 5/2004). STEL: 150 ppm 15 minute(s). Form: All forms TWA: 100 ppm 8 hour(s). Form: All forms</p> <p>OSHA PEL (United States, 6/1993). TWA: 100 ppm 8 hour(s). Form: All forms</p>
Ethylbenzene	<p>ACGIH TLV (United States, 1/2004). STEL: 125 ppm 15 minute(s). Form: All forms TWA: 100 ppm 8 hour(s). Form: All forms</p> <p>NIOSH REL (United States, 6/2001). STEL: 125 ppm 15 minute(s). Form: All forms TWA: 100 ppm 10 hour(s). Form: All forms</p>

	<p>OSHA PEL (United States, 6/1993). TWA: 100 ppm 8 hour(s). Form: All forms</p>
Hydrogen Sulfide	<p>ACGIH TLV (United States, 9/2004). TWA: 10 ppm 8 hour(s). Form: All forms STEL: 15 ppm 15 minute(s). Form: All forms NIOSH REL (United States, 12/2001). CEIL: 10 ppm 10 minute(s). Form: All forms OSHA PEL Z2 (United States, 8/1997). CEIL: 20 ppm Form: All forms AMP: 50 ppm 10 minute(s). Form: All forms</p>
Toluene	<p>ACGIH TLV (United States, 5/2004). Skin Notes: 1996 Adoption Refers to Appendix A -- Carcinogens. TWA: 50 ppm 8 hour(s). Form: All forms NIOSH REL (United States, 6/2001). STEL: 150 ppm 15 minute(s). Form: All forms TWA: 100 ppm 10 hour(s). Form: All forms OSHA PEL Z2 (United States, 6/2002). AMP: 500 ppm 10 minute(s). Form: All forms CEIL: 300 ppm Form: All forms TWA: 200 ppm 8 hour(s). Form: All forms</p>
Benzene	<p>NIOSH REL (United States, 6/2001). Notes: See Appendix A - NIOSH Potential Occupational Carcinogen STEL: 1 ppm 15 minute(s). Form: All forms TWA: 0.1 ppm 10 hour(s). Form: All forms ACGIH TLV (United States, 1/2006). Skin STEL: 2.5 ppm 15 minute(s). Form: All forms TWA: 0.5 ppm 8 hour(s). Form: All forms OSHA PEL (United States, 6/1993). STEL: 5 ppm 15 minute(s). Form: All forms TWA: 1 ppm 8 hour(s). Form: All forms</p>

Consult local authorities for acceptable exposure limits.

Section 9. Physical and Chemical Properties

Physical state	: Dark brown to black liquid with a strong petroleum odor at normal use temperature above 150 °F, viscous liquid at 70 °F.
Color	: BLACK, BROWN
Odor	: Strong Petroleum Odor
Boiling point	: 260 to 315.6°C (500 to 600.1°F)
Melting/freezing point	:
Specific gravity	: 0.96 to 1.01 (Water = 1)
Vapor density	: >1 (Air = 1)
Solubility	:

Section 10. Stability and reactivity data

Stability	: The product is stable.
Hazardous polymerization	: Will not occur.
Conditions to avoid	: Avoid exposure - obtain special instructions before use.
Materials to avoid	: Oxidizing agent.
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced. Combustion may produce carbon monoxide, carbon dioxide and reactive hydrocarbons (aldehydes, aromatics, etc.) compounds, nitrogen oxides, sulfur oxides, particulate matter, and hydrogen sulfide.

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Section 11. Toxicological Information

Toxicity data

ASPHALT contains polycyclic aromatic hydrocarbons, which are potentially carcinogenic. Skin painting studies in laboratory animals with petroleum residuums have produced severe irritation and systemic toxicity, including cancers. The 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. While rodent studies are exquisitely sensitive to chemical carcinogens of this type, there is no clear evidence that these chemicals are carcinogenic to man. As a minimum, it has been demonstrated in early studies that application of these materials to human skin produces a fairly rapid local reaction and inflammation. Animal inhalation studies have not yielded sufficient evidence of asphalt-induced lung cancer, and only limited investigations of the metabolic changes caused by petroleum asphalt fumes have been done. Fumes from heated petroleum roofing asphalt did not produce cancers in the lungs of rats and guinea pigs inhaling such fumes for two years. Similarly, a roofing petroleum asphalt proved noncarcinogenic to the skin of mice and rabbits.

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.

BENZENE is considered to be a carcinogen to humans, and may cause adverse health effects following exposure via inhalation, ingestion or dermal or eye contact. Acute inhalation of benzene by rats, mice or rabbits caused narcosis, spontaneous heart contractions (ventricular fibrillation) and death due to respiratory paralysis. Subchronic inhalation of benzene by rats produced decreased white blood cell counts, decreased bone marrow cell activity, increased red blood cell activity and cataracts. In rats, chronic inhalation or oral administration of benzene produced cancers of the liver, mouth and Zymbal gland. Acute inhalation exposure of benzene in humans has caused nerve inflammation (polyneuritis), central nervous system depression and cardiac sensitization. Chronic exposure to benzene has produced anorexia and irreversible injury to the blood forming organs. Effects include aplastic anemia and leukemia. Animal studies have demonstrated testicular effects, alterations in reproductive cycles, chromosomal aberrations, and embryo/fetotoxicity. No birth defects have been shown to occur in pregnant laboratory animals exposed to doses not toxic to the mother.

ETHYLBENZENE can affect the body if it is inhaled, swallowed or comes in contact with the eyes or skin. It is primarily an irritant of skin, and to some degree, of eyes and upper respiratory tract. Systemic absorption causes depression of the central nervous system with narcosis at very high concentrations. On the eyes and nose, the vapor at 5000 ppm causes intolerable irritation, eye irritation and lacrimation are immediate and severe at 2000 ppm, irritation and tearing occur at 1000 ppm although tolerance develops rapidly, and the vapor is a transient irritant on human eyes at 200 ppm. Aspiration of small amounts causes extensive edema and hemorrhage of lung tissue. A draft report on a study conducted by the National Toxicology program states that lifetime inhalation exposure of rats and mice to concentrations of ethylbenzene(750 ppm) resulted in increases in certain types of cancer, including kidney tumors in rats and lung and liver tumors in mice. These effects were not observed in animals exposed to lower concentrations of ethylbenzene (75 ppm or 250 ppm). The draft report does not address the relevance of these results to humans.

TOLUENE can affect the body if it is inhaled, comes in contact with the eyes or skin or it is swallowed. It may also enter the body through the skin. Toluene vapors cause narcosis. Controlled exposures of human subjects to 200 ppm for 8 hours produced mild fatigue, weakness, confusion, lacrimation and paresthesia. At 600 ppm for 8 hours, there was euphoria, headache, dizziness, dilated pupils and nausea. At 800 ppm for 8 hours, symptoms were more pronounced, and after effects included nervousness, muscular fatigue and insomnia persisting for several days. In workers exposed for many years to concentrations in the range of 80 to 300 ppm, there was no clinical or laboratory evidence of altered liver function. Toluene exposure does not result in the same chronic injury to bone marrow caused by benzene. Liquid splashed in the eyes of workers has caused transient corneal damage and conjunctival irritation, complete recovery occurred within 48 hours. Animal studies have shown that inhalation of high levels of toluene produced cardiac sensitization. Such sensitization may cause fatal changes in heart rhythms. This later effect was shown to be enhanced by hypoxia or the injection of adrenalin-like agents. Workers exposed at less than 200 ppm have complained of headache, lassitude and nausea, but physical findings were essentially negative. At concentrations between 200 and 500 ppm, impairment of coordination, momentary loss of memory and anorexia were present. Between 500 and 1500 ppm, palpitation, extreme weakness, pronounced loss of coordination and impairment of reaction time were noted. The red cell count fell in many instances and there were cases of aplastic anemia in which recovery followed intensive hospital treatment (although some of the effects may have been due to benzene impurity). Toluene has been reported to decrease immunological responses and cause recordable hearing loss in test animals. Damages genetic material in mammalian test systems. May cause adverse reproductive effects based on animal testing.

XYLENE can affect the body if it is inhaled, comes in contact with the eyes or skin or it is swallowed. It may also enter the body through the skin. Xylene vapor irritates the eyes, mucous membranes and skin. At high concentrations it causes narcosis. In animals, xylene causes blood changes reflecting mild toxicity to the hematopoietic system. Laboratory animals exposed by various routes to high doses of xylene showed evidence of effects in the liver, kidneys, lungs, spleen, heart and adrenals. Rats exposed to xylene vapor during pregnancy showed embryo/fetotoxic effects. Mice exposed orally to doses producing maternal toxicity also showed embryo or fetotoxic effects. Laboratory rats exposed to high concentrations of toluene experienced recordable hearing loss. In humans, exposure to high concentrations can cause dizziness, excitement, drowsiness, incoordination and a staggering gait. Workers exposed to concentrations above 200 ppm complain of anorexia, nausea, vomiting and abdominal pain. Brief exposures of humans to 200 ppm caused irritation of the eyes, nose and throat. There are reports of reversible corneal vacuolation in workers exposed to xylene, or to xylene plus other volatile solvents.

n-HEXANE can affect the body if it is inhaled, comes in contact with the eyes or skin, or is swallowed. Hexane vapor is a narcotic and a mild upper respiratory irritant. Polyneuropathy (peripheral nerve damage) has been reported to occur in workers exposed to hexane vapors, characterized by progressive weakness and numbness in the extremities, loss of deep tendon reflexes and reduction of motor nerve conduction velocity. Recovery ranges from no recovery to complete recovery depending upon the duration of exposure and severity of nerve damage. Concentrations of 30,000 ppm produced narcosis in mice within 30 to 60 minutes, convulsions and death occurred at 35,000 to 40,000 ppm, and at 64,000 ppm respiratory arrest was produced in 2.5 to 4.5 minutes from the start of exposure. Concentrations up to 8000 ppm produced no anesthesia. In human subjects, 2000 ppm for 10 minutes produced no effects, but 5000 ppm resulted in dizziness and a sensation of giddiness. Other investigators reported slight nausea, headache and irritation of the eyes and throat at 1400 to 1500 ppm. In industrial practice, mild narcotic symptoms such as dizziness have been observed when concentrations

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exceeded 1000 ppm, but not below 500 ppm.

HEXANE ISOMERS are three times as toxic to mice as is pentane. Narcosis was produced in mice within 30-60 minutes at concentrations of 30,000 ppm. In man, concentrations for 10 minutes at 2000 ppm produced no effects, but 5000 ppm caused dizziness and a sense of giddiness. Concentrations of 1400-1500 ppm produced slight nausea, headache, eye, and throat irritation.

NONANE causes a four hour LC50 in rats at concentrations of 3200 ppm, or at about the same level as VM&P Naphtha. This level is markedly lower than the lethal concentrations reported in earlier mice studies involving octane (13,500 ppm) and heptane (16,000 ppm), supporting the lower limit for nonane.

OCTANE can affect the body if it is inhaled, comes in contact with the skin or eyes or is swallowed. Octane vapor is a mild narcotic and mucous membrane irritant. Concentrations of 6600 to 13,700 ppm produced narcosis in mice in 30 to 90 minutes, the fatal concentration for animals is near 13,500 ppm. No chronic systemic effects have been reported in humans.

MIDDLE DISTILLATE FUELS have been demonstrated to cause chromosome damage in the in vivo rat bone marrow cytogenetics assay, and mutagenic in the L5178Y mouse lymphoma assay. Repeated dermal application of high levels of middle distillate fuels in experimental animals has produced extremely severe irritation on the skin. Varying degrees of liver and kidney damage were noted in these studies, including congestion, enlargement, mottling, and multifocal necrosis.

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.

Acute toxicity

Product/ingredient name	Result	Species	Dose
Gas Oil	LD Dermal	Rabbit	>2 g/kg
	LD Oral	Rat	>5 g/kg
Kerosene	LD Dermal	Rabbit	>2 g/kg
	LD Oral	Rat	>5 g/kg
	LD50 Intratracheal	Rat	800 mg/kg
	LD50 Oral	Rat	15 g/kg
	LDLo Intraperitoneal	Rat	10700 mg/kg
Naphthalene	LDLo Unreported	Rat	2 mg/kg
	LD50 Dermal	Rabbit	>20 g/kg
	LD50 Dermal	Rat	>2500 mg/kg
	LD50 Oral	Rat	>490 mg/kg
	LD50 Unreported	Rat	1250 mg/kg
n-Hexane	TDLo Intraperitoneal	Rat	100 mg/kg
	LD50 Oral	Rat	25 g/kg
	LDLo Intraperitoneal	Rat	9100 mg/kg
	TDLo Oral	Rat	20000 mg/kg
Xylene (o,m,p isomers)	LD50 Dermal	Rabbit	>1700 mg/kg
	LD50 Intraperitoneal	Rat	2459 mg/kg
	LD50 Oral	Rat	4300 mg/kg
	LD50 Subcutaneous	Rat	1700 mg/kg
Ethylbenzene	LD50 Dermal	Rabbit	17800 uL/kg
	LD50 Oral	Rat	3500 mg/kg
	TDLo Intraperitoneal	Rat	1062 mg/kg
Toluene	LD50 Dermal	Rabbit	14100 uL/kg
	LD50 Intraperitoneal	Rat	1332 mg/kg
	LD50 Intravenous	Rat	1960 mg/kg
	LD50 Oral	Rat	636 mg/kg
	LD50 Unreported	Rat	6900 mg/kg
	LDLo Intraperitoneal	Rat	2.5 mL/kg
	TDLo Intraperitoneal	Rat	900 mg/kg
	TDLo Intraperitoneal	Rat	1 g/kg
	TDLo Intraperitoneal	Rat	750 mg/kg
	TDLo Intraperitoneal	Rat	600 mg/kg
	TDLo Oral	Rat	400 mg/kg
Benzene	TDLo Oral	Rat	800 mg/kg
	LD50 Dermal	Rabbit	>9400 uL/kg
	LD50 Intraperitoneal	Rat	1100 ug/kg
	LD50 Oral	Rat	1800 mg/kg
	LD50 Oral	Rat	930 mg/kg
	LD50 Oral	Rat	1 mL/kg
	LD50 Oral	Rat	6400 mg/kg

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LDLo Subcutaneous	Rat	5 mg/kg
TDLo Dermal	Rat	0.92 mL/kg
TDLo Oral	Rat	320 mg/kg
TDLo Oral	Rat	1280 mg/kg

Carcinogenicity

Classification

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA
Asphalt	A4	3	-	+	-	-
Kerosene	A3	2A	-	-	-	-
Naphthalene	A4	2B	-	-	Possible	-
Xylene (o,m,p isomers)	A4	3	-	-	-	-
Ethylbenzene	A3	2B	-	-	-	-
Toluene	A4	3	-	-	-	-
Benzene	A1	1	-	+	Proven.	+

Chronic effects on humans : **CARCINOGENIC EFFECTS:** Classified + (Proven - Animal) by NIOSH [Asphalt]. Classified A4 (Not classifiable for humans or animals.) by ACGIH, 3 (Not classifiable for humans.) by IARC [Asphalt]. Classified A3 (Proven for animals.) by ACGIH [Kerosene]. Classified 2A (Probable for human.) by IARC [Kerosene]. Classified 2B (Possible for humans.) by IARC [Naphthalene]. Classified A4 (Not classifiable for humans or animals.) by ACGIH [Naphthalene]. 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 A3 (Proven for animals.) by ACGIH, 2B (Possible for humans.) by IARC [Ethylbenzene]. Classified A4 (Not classifiable for humans or animals.) by ACGIH, 3 (Not classifiable for humans.) by IARC [Toluene]. Classified A4 (Not classifiable for humans or animals.) by ACGIH, 3 (Not classifiable for humans.) by IARC [Xylene (o,m,p isomers)]. Classified A1 (Confirmed for humans.) by ACGIH, 1 (Proven for humans.) by IARC, 1 (Known to be human carcinogens.) by NTP, + (Proven.) by OSHA, + (Proven.) by NIOSH [Benzene]. Causes damage to the following organs: upper respiratory tract, skin, eyes, eye, lens or cornea. Contains material which causes damage to the following organs: blood, kidneys, liver, peripheral nervous system, central nervous system (CNS).

Other toxic effects on humans : No specific information is available in our database regarding the other toxic effects of this material to humans.

Specific effects

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

Target organs : Causes damage to the following organs: upper respiratory tract, skin, eyes, eye, lens or cornea.

Section 12. Ecological Information

Ecotoxicity data

Product/ingredient name	Result	Species	Exposure
Naphthalene	Acute EC50 1.96 mg/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
	Acute EC50 1600 to 3400 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
	Acute EC50 2550 to 3400 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
	Acute EC50 2194 to 2459 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
	Acute EC50 6470 to 9140 ug/L Fresh water	Crustaceans - Brine shrimp - Artemia sp.	48 hours
	Acute EC50 5960 to 9190 ug/L Fresh water	Crustaceans - Brine shrimp - Artemia sp.	48 hours
	Acute LC50 32.9802 ppm Fresh water	Fish - Bluegill - Lepomis macrochirus	96 hours
	Acute LC50 31.0265 ppm Fresh water	Fish - Bluegill - Lepomis macrochirus	96 hours
	Acute LC50 19.7675 ppm Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
	Acute LC50 17.6998 ppm Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
	Acute LC50 2.6 to 2.89 ppm Marine water	Crustaceans - Daggerblade grass shrimp - Palaemonetes pugio	48 hours
	Acute LC50 2.1 ppm Fresh water	Fish - Coho salmon,silver salmon - Oncorhynchus kisutch	96 hours
	Acute LC50 1600 ug/L Fresh water	Fish - Rainbow trout,donaldson trout - Oncorhynchus mykiss	96 hours
	Acute LC50 17.4 mg/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
	Acute LC50 1370 to 1680 ug/L Marine water	Fish - Pink salmon - Oncorhynchus gorboscha	96 hours
	Acute LC50 1240 to 1620 ug/L Marine water	Fish - Pink salmon - Oncorhynchus gorboscha	96 hours
	Acute LC50 1200 ug/L Marine water	Fish - Pink salmon - Oncorhynchus gorboscha	96 hours

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	Acute LC50 1200 ug/L Marine water	Fish - Pink salmon - Oncorhynchus gorboscha	96 hours
	Acute LC50 2920 to 3890 ug/L Fresh water	Daphnia - Water flea - Daphnia pulex	48 hours
	Acute LC50 9.93 mg/L Fresh water	Fish - Fathead minnow - Pimephales promelas	96 hours
	Acute LC50 12500 to 20500 ug/L Fresh water	Crustaceans - Brine shrimp - Artemia sp.	48 hours
	Acute LC50 2350 ug/L Marine water	Crustaceans - Daggerblade grass shrimp - Palaemonetes pugio	48 hours
	Acute LC50 4.9 mg/L Fresh water	Fish - Fathead minnow - Pimephales promelas	96 hours
	Acute LC50 9820 to 13100 ug/L Fresh water	Crustaceans - Brine shrimp - Artemia sp.	48 hours
	Acute LC50 2.25 mg/L Fresh water	Fish - Rainbow trout,donaldson trout - Oncorhynchus mykiss	96 hours
	Acute LC50 25.4 mg/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
	Acute LC50 2160 to 2560 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
	Acute LC50 4000 ug/L Fresh water	Crustaceans - Shrimp - Macrobrachium kistnensis	48 hours
	Acute LC50 2000 to 4000 ug/L Fresh water	Crustaceans - Shrimp - Macrobrachium kistnensis	48 hours
	Acute LC50 4000 to 6000 ug/L Fresh water	Crustaceans - Shrimp - Macrobrachium kistnensis	48 hours
n-Heptane	Acute LC50 4924000 ug/L Fresh water	Fish - Western mosquitofish - Gambusia affinis	96 hours
	Acute LC50 375000 ug/L Fresh water	Fish - Mozambique tilapia - Tilapia mossambica	96 hours
n-Hexane	Acute LC50 113000 ug/L Fresh water	Fish - Mozambique tilapia - Tilapia mossambica	96 hours
	Acute LC50 2500 to 2980 ug/L Fresh water	Fish - Fathead minnow - Pimephales promelas	96 hours
Xylene (o,m,p isomers)	Acute LC50 8.5 ppm Marine water	Crustaceans - Daggerblade grass shrimp - Palaemonetes pugio	48 hours
	Acute LC50 13500 to 15034 ug/L Fresh water	Fish - Bluegill - Lepomis macrochirus	96 hours
	Acute LC50 13500 to 19200 ug/L Fresh water	Fish - Rainbow trout,donaldson trout - Oncorhynchus mykiss	96 hours
	Acute LC50 13400 ug/L Fresh water	Fish - Fathead minnow - Pimephales promelas	96 hours
	Acute LC50 13300 to 16114 ug/L Fresh water	Fish - Bluegill - Lepomis macrochirus	96 hours
	Acute LC50 12000 to 16114 ug/L Fresh water	Fish - Bluegill - Lepomis macrochirus	96 hours
	Acute LC50 12000 to 13762 ug/L Fresh water	Fish - Bluegill - Lepomis macrochirus	96 hours
	Acute LC50 8600 to 9591 ug/L Fresh water	Fish - Bluegill - Lepomis macrochirus	96 hours
	Acute LC50 8500 ug/L Marine water	Crustaceans - Daggerblade grass shrimp - Palaemonetes pugio	48 hours
	Acute LC50 8200 to 10032 ug/L Fresh water	Fish - Rainbow trout,donaldson trout - Oncorhynchus mykiss	96 hours
	Acute LC50 3300 to 4093 ug/L Fresh water	Fish - Rainbow trout,donaldson trout - Oncorhynchus mykiss	96 hours
	Acute LC50 13500 to 16100 ug/L Fresh water	Fish - Bluegill - Lepomis macrochirus	96 hours
Ethylbenzene	Acute EC50 13300 to 18100 ug/L Fresh water	Crustaceans - Brine shrimp - Artemia sp.	48 hours
	Acute EC50 6530 to 9460 ug/L Fresh water	Crustaceans - Brine shrimp - Artemia sp.	48 hours
	Acute EC50 2970 to 4400 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
	Acute EC50 2930 to 4400 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
	Acute LC50 13300 to 18100 ug/L Fresh water	Crustaceans - Brine shrimp - Artemia sp.	48 hours
	Acute LC50 150 to 200 mg/L Fresh water	Fish - Bluegill - Lepomis macrochirus	96 hours
	Acute LC50 12100 to 12700 ug/L Fresh water	Fish - Fathead minnow - Pimephales promelas	96 hours
	Acute LC50 11900 to 15600 ug/L Fresh water	Fish - Fathead minnow - Pimephales promelas	96 hours
	Acute LC50 9600 ug/L Fresh water	Fish - Guppy - Poecilia reticulata	96 hours
	Acute LC50 9100 to 11000 ug/L Fresh water	Fish - Fathead minnow - Pimephales promelas	96 hours
	Acute LC50 9090 to 11000 ug/L Fresh water	Fish - Fathead minnow - Pimephales promelas	96 hours
	Acute LC50 8780 to 13700 ug/L Fresh water	Crustaceans - Brine shrimp - Artemia sp.	48 hours
	Acute LC50 40000 ug/L Marine water	Crustaceans - Dungeness or edible crab - Cancer magister	48 hours
	Acute LC50 >5200 ug/L Marine water	Crustaceans - Opossum shrimp - Americamysis bahia	48 hours
	Acute LC50 5100 to 5700 ug/L Marine water	Fish - Atlantic silverside - Menidia menidia	96 hours
	Acute LC50 4200 ug/L Fresh water	Fish - Rainbow trout,donaldson trout - Oncorhynchus mykiss	96 hours
	Acute LC50 18400 to 25400 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
	Acute LC50 13900 to 17200 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
	Acute LC50 75000 to 120000 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
	Acute LC50 4.3 to 4.7 u/L Marine water	Fish - Striped bass - Morone saxatilis	96 hours
Hydrogen Sulfide	Chronic NOEC 3300 ug/L Marine water	Fish - Atlantic silverside - Menidia menidia	96 hours
	Acute EC50 770 ug/L Fresh water	Crustaceans - Amphipod - Crangonyx richmondensis lauren	48 hours
	Acute EC50 540 ug/L Fresh water	Crustaceans - Amphipod - Crangonyx richmondensis lauren	48 hours
	Acute LC50 7 ug/L Fresh water	Fish - Fathead minnow - Pimephales promelas	96 hours
	Acute LC50 4 ug/L Fresh water	Fish - Lake whitefish - Coregonus clupeaformis	96 hours
	Acute LC50 3.2 ug/L Fresh water	Fish - Asian redtail catfish - Hemibagrus nemurus	96 hours
	Acute LC50 3 ug/L Fresh water	Fish - Lake whitefish - Coregonus clupeaformis	96 hours
	Acute LC50 <2 ug/L Fresh water	Fish - Yellow perch - Perca flavescens	96 hours
	Acute LC50 2 ug/L Fresh water	Fish - Lake whitefish - Coregonus clupeaformis	96 hours
Toluene	Acute EC50 6880 to 9830 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
	Acute EC50 6780 to 7810 ug/L Fresh water	Fish - Rainbow trout,donaldson trout - Oncorhynchus mykiss	96 hours
	Acute EC50 6000 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
	Acute EC50 19600 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
	Acute LC50 15.5 ppm Marine water	Crustaceans - Daggerblade grass shrimp - Palaemonetes pugio	48 hours
	Acute LC50 15500 ug/L Marine water	Crustaceans - Daggerblade grass shrimp - Palaemonetes pugio	48 hours

Benzene

Acute LC50 36.2 to 44.6 mg/L Fresh water	Palaemonetes pugio	96 hours
Acute LC50 17.03 to 19.05 mg/L Fresh water	Fish - Fathead minnow - Pimephales promelas	96 hours
Acute LC50 6780 to 7810 ug/L Fresh water	Fish - Fathead minnow - Pimephales promelas	96 hours
	Fish - Rainbow trout,donaldson trout -	96 hours
	Oncorhynchus mykiss	
Acute LC50 6410 to 7180 ug/L Marine water	Fish - Pink salmon - Oncorhynchus gorbuscha	96 hours
Acute LC50 15.53 to 17.16 mg/L Fresh water	Fish - Rainbow trout,donaldson trout -	96 hours
	Oncorhynchus mykiss	
Acute LC50 5800 ug/L Fresh water	Fish - Rainbow trout,donaldson trout -	96 hours
	Oncorhynchus mykiss	
Acute LC50 5500 ug/L Fresh water	Fish - Coho salmon,silver salmon - Oncorhynchus	96 hours
	kisutch	
Acute LC50 310000 to 420000 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
Acute LC50 170000 ug/L Marine water	Crustaceans - Dungeness or edible crab - Cancer	48 hours
	magister	
Acute LC50 97700 to 174700 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
Acute LC50 13 to 15 mg/L Fresh water	Fish - Bluegill - Lepomis macrochirus	96 hours
Acute LC50 86300 to 174700 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
Acute LC50 7.3 ul/L Marine water	Fish - Striped bass - Morone saxatilis	96 hours
Acute EC50 22000 to 29500 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
Acute EC50 11730 to 15600 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
Acute EC50 10000 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
Acute EC50 9230 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
Acute EC50 58400 to 82300 ug/L Fresh water	Crustaceans - Brine shrimp - Artemia sp.	48 hours
Acute LC50 35 to 43.8 ppm Marine water	Crustaceans - Daggerblade grass shrimp -	48 hours
	Palaemonetes pugio	
Acute LC50 33000 ug/L Marine water	Crustaceans - Daggerblade grass shrimp -	48 hours
	Palaemonetes pugio	
Acute LC50 9.2 to 11.7 mg/L Fresh water	Fish - Rainbow trout,donaldson trout -	96 hours
	Oncorhynchus mykiss	
Acute LC50 21000 ug/L Marine water	Crustaceans - Brine shrimp - Artemia salina	48 hours
Acute LC50 11.38 ml/L Marine water	Crustaceans - Crab - Scylla serrata	48 hours
Acute LC50 9.15 ml/L Marine water	Crustaceans - Crab - Scylla serrata	48 hours
Acute LC50 6.59 ml/L Marine water	Crustaceans - Crab - Scylla serrata	48 hours
Acute LC50 35000 ug/L Marine water	Crustaceans - Daggerblade grass shrimp -	48 hours
	Palaemonetes pugio	
Acute LC50 99200 to 122600 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
Acute LC50 135700 to 168800 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
Acute LC50 96200 to 134100 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
Acute LC50 76900 to 114100 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
Acute LC50 59600 to 80700 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
Acute LC50 5.02 ml/L Marine water	Crustaceans - Crab - Scylla serrata	48 hours
Acute LC50 11.73 to 13.63 ul/L Fresh water	Fish - Chinook salmon - Oncorhynchus	96 hours
	tshawytscha	
Acute LC50 14.09 to 18.3 ul/L Fresh water	Fish - Coho salmon,silver salmon - Oncorhynchus	96 hours
	kisutch	
Acute LC50 8.47 to 9.09 ul/L Marine water	Fish - Pink salmon - Oncorhynchus gorbuscha	96 hours
Acute LC50 10.9 ul/L Marine water	Fish - Striped bass - Morone saxatilis	96 hours
Acute LC50 10.76 to 12.04 ul/L Fresh water	Fish - Sockeye salmon - Oncorhynchus nerka	96 hours
Acute LC50 5.8 ul/L Marine water	Fish - Striped bass - Morone saxatilis	96 hours
Acute LC50 5.55 to 8.21 ul/L Marine water	Fish - Sockeye salmon - Oncorhynchus nerka	96 hours

Biodegradability

Biodegradability



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

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	UN 1999	Asphalt, Cutback	3	III		<p>Limited quantity Yes.</p> <p>Packaging instruction Passenger aircraft Quantity limitation: 60 L</p> <p>Cargo aircraft Quantity limitation: 220 L</p> <p>Special provisions B1, B13, IB3, T1, TP3</p>
TDG Classification	UN 1999	Asphalt, Cutback	3	III		Not available.

Section 15. Regulatory Information

United States

HCS Classification

: Irritating material
Carcinogen
Target organ effects

U.S. Federal regulations

: TSCA 4(a) final test rules: Naphthalene; n-Nonane; Hexane (Other Isomers); n-Heptane; n-Hexane
TSCA 8(a) PAIR: Naphthalene; n-Nonane; n-Heptane
United States inventory (TSCA 8b): All components are listed or exempted.
TSCA 12(b) one-time export: Naphthalene; n-Nonane; n-Heptane
TSCA 12(b) annual export notification: Hexane (Other Isomers); n-Hexane

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: Asphalt

SARA 311/312 MSDS distribution - chemical inventory - hazard identification:

Asphalt: Fire hazard, Immediate (acute) health hazard, Delayed (chronic) health hazard

Clean Water Act (CWA) 307: Naphthalene; Ethylbenzene; Toluene; Benzene; Polycyclic Aromatic Hydrocarbons

Clean Water Act (CWA) 311: Naphthalene; Xylene (o,m,p isomers); Ethylbenzene; Toluene; Benzene

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

Product name

CAS number

Concentration

Form R - Reporting requirements	:	Naphthalene	91-20-3	0 - 3
		n-Hexane	110-54-3	0 - 2
		Ethylbenzene	100-41-4	<0.5
		Benzene	71-43-2	<0.3
Supplier notification	:	Naphthalene	91-20-3	0 - 3
		n-Hexane	110-54-3	0 - 2
		Ethylbenzene	100-41-4	<0.5
		Benzene	71-43-2	<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 : **California Volatility Requirements: Slow Cure (SC) Cutback Liquid Asphalts comply with the VOC (Volatile Organic Compound) requirements of the Bay Area Air Quality Management District (Rule 8-15-304) and of the South Coast Air Quality Management District (Rule 1108).**
 Connecticut Carcinogen Reporting: Benzene
 Connecticut Hazardous Material Survey: n-Hexane; Naphthalene; Toluene; Xylene (o,m,p isomers); Ethylbenzene; Benzene
 Illinois Toxic Substances Disclosure to Employee Act: n-Hexane; Naphthalene; Toluene; Xylene (o,m,p isomers); Ethylbenzene; Benzene
 Rhode Island Hazardous Substances: n-Hexane; Naphthalene; Toluene; Xylene (o,m,p isomers); Ethylbenzene; Benzene
 Pennsylvania RTK Hazardous Substances: Asphalt: (generic environmental hazard)
 Florida: n-Hexane; Naphthalene; Toluene; Xylene (o,m,p isomers); Ethylbenzene; Benzene
 Minnesota: Asphalt
 Michigan Critical Material: Toluene; Xylene (o,m,p isomers); Benzene
 Massachusetts Substances: Asphalt
 New Jersey: Asphalt

California Prop. 65

WARNING: This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm.

<u>Ingredient name</u>	<u>Cancer</u>	<u>Reproductive</u>	<u>No significant risk level</u>	<u>Maximum acceptable dosage level</u>
Naphthalene	Yes.	No.	Yes.	No.
Ethylbenzene	Yes.	No.	No.	No.
Toluene	No.	Yes.	No.	7000 µg/day (ingestion) 13000 µg/day (inhalation)
Benzene	Yes.	Yes.	6.4 µg/day (ingestion) 13 µg/day (inhalation)	24 µg/day (ingestion) 49 µg/day (inhalation)
Polycyclic Aromatic Hydrocarbons	Yes.	No.	Yes.	No.

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 & NDSL: All materials are either listed or exempt

EU regulations

Hazard symbol or symbols



- Risk phrases** : R45- May cause cancer.
 R46- May cause heritable genetic damage.
 R20- Also harmful by inhalation.
 R51/53- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
- Safety phrases** : S53- Avoid exposure - obtain special instructions before use.
 S2- Keep out of the reach of children.
 S29- Do not empty into drains.
 S46- If swallowed, seek medical advice immediately and show this container or label.
 S61- Avoid release to the environment. Refer to special instructions/safety data sheet.

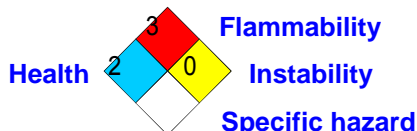
Section 16. Other Information

- Label requirements** : CAUSES SKIN IRRITATION.
 CAUSES DAMAGE TO THE FOLLOWING ORGANS: RESPIRATORY TRACT, SKIN, EYE, LENS OR CORNEA.
 POSSIBLE CANCER HAZARD - CONTAINS MATERIAL WHICH MAY CAUSE CANCER, BASED ON ANIMAL DATA.

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

Health	*	2
Fire hazard		3
Physical Hazard		0
Personal protection		

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



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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

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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.