Lactol Spirits
Material Safety Data Sheet

CITGO Petroleum Corporation
1701 Golf Road, Suite 1-1101
Rolling Meadows, IL  60008-4295

MSDS No.  19006
Revision Date 07/13/1999

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

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**Emergency Overview**

**Physical State**  Liquid.
**Color**  Transparent, colorless.  **Odor**  Light hydrocarbon.

**DANGER!** Extremely flammable liquid; vapor may cause flash fire or explosion!
Mist or vapor may irritate the eyes, mucous membranes, and respiratory tract!
Liquid contact may cause minimal to moderate eye and/or moderate to severe skin irritation and inflammation!
May be harmful if inhaled or absorbed through the skin!
Overexposures may cause central nervous system (CNS) depression and/or other target organ effects!
May be harmful or fatal if ingested!
Aspiration into the lungs can cause pulmonary edema and chemical pneumonia!
Prolonged and/or repeated inhalation may increase the heart’s susceptibility to arrhythmias (irregular beats)!
Based upon animal testing, may adversely affect reproduction!
Spills may create a slipping hazard!

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**SECTION 1: IDENTIFICATION**

<table>
<thead>
<tr>
<th>Trade Name</th>
<th>Lactol Spirits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Number</td>
<td>2006</td>
</tr>
<tr>
<td>CAS Number</td>
<td>64742-89-8 or 8030-30-6</td>
</tr>
<tr>
<td>Product Family</td>
<td>C7-C8 Petroleum Hydrocarbon Solvent</td>
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<tr>
<td>Synonyms</td>
<td>LD Naphtha; Lacquer Diluent; Rubber Solvent; Lactol Solvent; C7-C8 Solvent; C7-C8 Alkanes and Toluene; C7-C8 Petroleum Hydrocarbons.</td>
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</tbody>
</table>

**Technical Contact**  (800) 967-7601
(8am - 4pm CT M-F)

**Medical Emergency**  (918) 495-4700

**CHEMTREC Emergency**  (800) 424-9300

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**SECTION 2: COMPOSITION**

<table>
<thead>
<tr>
<th>Component Name(s)</th>
<th>CAS Registry No.</th>
<th>Concentration (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Light Aliphatic Solvent Naphtha (Petroleum)</td>
<td>64742-89-8</td>
<td>100</td>
</tr>
<tr>
<td>2) Rubber Solvent</td>
<td>8030-30-6</td>
<td>100</td>
</tr>
<tr>
<td>3) Cyclohexane</td>
<td>110-82-7</td>
<td>0-3</td>
</tr>
<tr>
<td>4) Heptanes</td>
<td>Mixture</td>
<td>49-55</td>
</tr>
<tr>
<td>5) Methylcyclohexane</td>
<td>108-87-2</td>
<td>17-22</td>
</tr>
<tr>
<td>6) Toluene</td>
<td>108-88-3</td>
<td>12-20</td>
</tr>
<tr>
<td>7) Octanes</td>
<td>Mixture</td>
<td>12-17</td>
</tr>
</tbody>
</table>

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* = Chronic Health Hazard

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**Hazard Rankings**

<table>
<thead>
<tr>
<th>HMIS</th>
<th>NFPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Hazard</td>
<td>* 2 2</td>
</tr>
<tr>
<td>Fire Hazard</td>
<td>3 3</td>
</tr>
<tr>
<td>Reactivity</td>
<td>0 0</td>
</tr>
</tbody>
</table>

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**Protective Equipment**

Minimum Requirements
See Section 8 for Details

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SECTION 3: HAZARDS IDENTIFICATION

Also see Emergency Overview and Hazard Ratings on the top of Page 1 of this MSDS.

Major Route(s) of Entry  Skin Contact.  Eye Contact.  Absorption.  Inhalation.

Signs and Symptoms of Acute Exposure

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

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

Skin Contact  Animal test results on similar materials suggest that this product can cause moderate skin irritation.  Short-term contact symptoms include redness, itching, and burning of the skin.  This material may also be absorbed through the skin and produce CNS depression effects (see "Inhalation" above).  If the skin is damaged, absorption increases.  Prolonged and/or repeated contact may cause moderate to severe dermatitis.  Chronic symptoms may include drying, swelling, scaling, blistering, cracking, and severe tissue damage.

Ingestion  If swallowed, this material may irritate the mucous membranes of the mouth, throat, and esophagus.  It can be readily absorbed by the stomach and intestinal tract.  Symptoms include a burning sensation of the mouth and esophagus, nausea, vomiting, dizziness, staggering gait, drowsiness, loss of consciousness, and delirium, as well as additional central nervous system (CNS) effects (see "Inhalation" above).

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

Chronic Health Effects

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

Reports have associated repeated and proplonged occupational overexposure to solvents with irreversible brain and nervous system damage (sometimes referred to as "Solvent or Painter's Syndrome").  Intentional misuse by deliberately concentrating and inhaling this product may be harmful or fatal.

Available information indicates that toluene is NOT teratogenic, but it can be toxic to the embryo and fetus and may reduce fertility.  In animal tests, high inhaled doses of toluene has caused reduced litter sizes, retarded development of the fetus, and increased incidence of non-lethal abnormalities.  (See Section 11.)

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

Exposure to high concentrations of this material may increase the sensitivity of the heart to epinephrine (adrenalin) and catecholamine-like drugs.  Personnel with pre-existing cardiac disorders may be more susceptible to this effect (see Section 4, "Note to Physicians").

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

Carcinogenic Potential  This product does not contain any components at concentrations above 0.1% which are considered carcinogenic by OSHA, IARC, or NTP.
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OSHA Hazard Classification is indicated by an “X” in the box adjacent to the hazard title. If no “X” is present, the product does not exhibit the hazard as defined in the OSHA Hazard Communication Standard (29 CFR 1910.1200).

<table>
<thead>
<tr>
<th>OSHA Health Hazard Classification</th>
<th>OSHA Physical Hazard Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irritant</td>
<td>Toxic</td>
</tr>
<tr>
<td>Sensitizer</td>
<td>Highly Toxic</td>
</tr>
<tr>
<td>Corrosive</td>
<td>Carcinogenic</td>
</tr>
</tbody>
</table>

OSHA/NFPA Class-IA Flammable Liquid. Extremely flammable!

NFPA Flammability Classification
Flash Point Method: CLOSED CUP: -7° to -6°C (19° to 21°F). (Tagliabue (ASTM D-56))
Lower Flammable Limit: AP 1.0 %
Upper Flammable Limit: AP 7.1 %
Autoignition Temperature: AP 246°C (475°F)

SECTION 4: FIRST AID MEASURES

Take proper precautions to ensure your own health and safety before attempting rescue or providing first aid. For more specific information, refer to Exposure Controls and Personal Protection in Section 8 of this MSDS.

Inhalation
Immediately move victim to fresh air. If victim is not breathing, immediately begin rescue breathing. If heart has stopped, immediately begin cardiopulmonary resuscitation (CPR). If breathing is difficult, 100 percent humidified oxygen should be administered by a qualified individual. Seek medical attention immediately.

Eye Contact
Check for and remove contact lenses. If irritation or redness develops, flush eyes with cool, clean, low-pressure water for at least 15 minutes. Hold eyelids apart to ensure complete irrigation of the eye and eyelid tissue. Do not use eye ointment. Seek medical attention immediately.

Skin Contact
Remove contaminated shoes and clothing. Flush affected area with large amounts of water. If skin surface is damaged, apply a clean dressing and seek medical attention. Do not use ointments. If skin surface is not damaged, clean affected area thoroughly with mild soap and water. Seek medical attention if tissue appears damaged or if pain or irritation persists.

Ingestion
Do not induce vomiting or give anything by mouth. If spontaneous vomiting is about to occur, place victim’s head below knees. If victim is drowsy or unconscious, place on the left side with head down. Never give anything by mouth to a person who is not fully conscious. Do not leave victim unattended. Seek medical attention immediately.

Notes to Physician
Inhalation overexposure can produce toxic effects. Monitor for respiratory distress. If cough or difficulty in breathing develops, evaluate for upper respiratory tract inflammation, bronchitis, and pneumonitis. Vigorous anti-inflammatory/steroid treatment may be required at first evidence of upper airway or pulmonary edema. Administer 100 percent humidified supplemental oxygen with assisted ventilation, as required.

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

Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias (irregular beating) in persons exposed to high concentrations of this material (e.g., in enclosed spaces or with deliberate abuse).

If used, monitor heart action closely. Consider use of other drugs with less arrhythmogenic potential.

SECTION 5: FIRE FIGHTING MEASURES

NHFPA Flammability Classification
Flash Point Method
Closed Cup: -7° to -6°C (19° to 21°F). (Tagliabue (ASTM D-56))
Lower Flammable Limit: AP 1.0 %
Upper Flammable Limit: AP 7.1 %
Autoignition Temperature: AP 246°C (475°F)
Hazardous Combustion Products
Burning or excessive heating may produce smoke, carbon monoxide, carbon dioxide, and possibly other harmful gases/vapors.

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SECTION 7: HANDLING AND STORAGE

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

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

Empty containers may contain material residues which can ignite with explosive force. Misuse of empty containers can be dangerous if used to store toxic, flammable, or reactive materials. Cutting or welding of empty containers can cause fire, explosion, or release of toxic fumes from residues. Do not

SECTION 6: ACCIDENTAL RELEASE MEASURES

Take proper precautions to ensure your own health and safety before attempting spill control or clean-up. For more specific information, refer to the Emergency Overview on Page 1, Exposure Controls and Personal Protection in Section 8 and Disposal Considerations in Section 13 of this MSDS.

Flammable Liquid! Release causes an immediate fire or explosion hazard. Evacuate all non-essential personnel from immediate area and establish a "regulated zone" with site control and security. A vapor-suppressing foam may be used to reduce vapors. Eliminate all ignition sources. All equipment used when handling this material must be grounded. Stop the leak if it can done without risk. Do not touch or walk through spilled material. Remove spillage immediately from hard, smooth walking areas. Prevent its entry into waterways, sewers, basements, or confined areas. Absorb or cover with dry earth, sand, or other non-combustible material and transfer to appropriate waste containers. Use clean, non-sparking tools to collect absorbed material.

For large spills, secure the area and control access. Dike far ahead of a liquid spill to ensure complete collection. Water mist or spray may be used to reduce or disperse vapors; but, it may not prevent ignition in closed spaces. This material will float on water and its run-off may create an explosion or fire hazard. Verify that responders are properly HAZWOPER-trained and wearing appropriate respiratory equipment and fire-resistant protective clothing during cleanup operations. In an urban area, cleanup spill as soon as possible; in natural environments, cleanup on advice from specialists. Pick up free liquid for recycle and/or disposal if it can be accomplished safely with explosion-proof equipment. Collect any excess material with absorbant pads, sand, or other inert non-combustible absorbent materials. Place into appropriate waste containers for later disposal. Comply with all laws and regulations.

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

Extinguishing Media
SMALL FIRE: Use dry chemicals, carbon dioxide (CO₂), foam, water fog, or inert gas (nitrogen).
LARGE FIRE: Use foam, water fog, or waterspray. Water fog and spray are effective in cooling containers and adjacent structures but might cause frothing and/or may not achieve extinguishment. A water jet may be used to cool the vessel's external walls to prevent pressure build-up, autoignition, or explosion. NEVER use a water jet directly on the fire because it may spread the fire to a larger area.

Fire Fighting Protective Clothing
Firefighters must use full bunker gear including NIOSH-approved positive pressure self-contained breathing apparatus to protect against potential hazardous combustion or decomposition products and oxygen deficiencies. Evacuate area and fight the fire from a maximum distance or use unmanned hose holders or monitor nozzles. Cover pooling liquid with foam. Containers can build pressure if exposed to radiant heat; cool adjacent containers with flooding quantities of water until well after the fire is out. Withdraw immediately from the area if there is a rising sound from venting safety devices or discoloration of vessels, tanks, or pipelines. Be aware that burning liquid will float on water. Notify appropriate authorities if liquid(s) enter sewers/waterways.
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pressurize or expose empty containers to open flame, sparks, or heat. Keep container closed and drum bungs in place. All label warnings and precautions must be observed. Return empty drums to a qualified reconditioner. Consult appropriate federal, state and local authorities before reusing, reconditioning, reclaiming, recycling, or disposing of empty containers and/or waste residues of this material.

Storage

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

SECTION 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

Engineering Controls

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

Personal Protective Equipment

Personal protective equipment should be selected based upon the conditions under which this material is used. A hazard assessment of the work area for PPE requirements should be conducted by a qualified professional pursuant to OSHA regulations. The following pictograms represent the minimum requirements for personal protective equipment. For certain operations, additional PPE may be required.

Eye Protection

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

Hand Protection

Avoid skin contact and use gloves (disposable PVC, neoprene, nitrile, vinyl, or PVC/NBR). Before eating, drinking, smoking, use of toilet facilities, or leaving work, wash hands with plenty of mild soap and water. DO NOT use gasoline, kerosene, other solvents, or harsh abrasive skin cleaners.

Body Protection

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

Respiratory Protection

For unknown vapor concentrations use a positive-pressure, pressure-demand, self-contained breathing apparatus (SCBA). For known vapor concentrations above the occupational exposure guidelines (see below), use a NIOSH-approved organic vapor respirator if adequate protection is provided. Protection factors vary depending upon the type of respirator used. Respirator use should follow OSHA requirements (29 CFR 1910.134) or equivalent standard (e.g. ANSI Z88.2).

General Comments

Warning! Odor is an inadequate warning for hazardous conditions.

Occupational Exposure Guidelines

<table>
<thead>
<tr>
<th>Substance</th>
<th>Applicable Workplace Exposure Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Rubber Solvent (Naphtha)</td>
<td>TWA: 400 (ppm) from ACGIH (TLV) [1999]</td>
</tr>
<tr>
<td>2) Cyclohexane</td>
<td>TWA: 300 (ppm) from ACGIH (TLV) [1999]</td>
</tr>
<tr>
<td></td>
<td>TWA: 200 STEL: 400 (ppm) from ACGIH (TLV) [Proposed for 2000]</td>
</tr>
<tr>
<td></td>
<td>TWA: 300 (ppm) from OSHA (PEL) [1976]</td>
</tr>
<tr>
<td>3) Heptane (n-Heptane)</td>
<td>TWA: 400 STEL: 500 (ppm) from ACGIH (TLV) [1999]</td>
</tr>
<tr>
<td></td>
<td>TWA: 400 STEL: 500 (ppm) from OSHA (PEL) [1989]</td>
</tr>
<tr>
<td></td>
<td>TWA: 500 (ppm) from OSHA (PEL) [1976]</td>
</tr>
<tr>
<td>4) Methylcyclohexane</td>
<td>TWA: 400 (ppm) from ACGIH (TLV) [1999]</td>
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<tr>
<td></td>
<td>TWA: 400 (ppm) from OSHA (PEL) [1989]</td>
</tr>
<tr>
<td></td>
<td>TWA: 500 (ppm) from OSHA (PEL) [1976]</td>
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<tr>
<td>5) Toluene (&quot;A4&quot; = Not Classifiable)</td>
<td>TWA: 50 (ppm) from ACGIH (TLV) [1999] - SKIN</td>
</tr>
<tr>
<td></td>
<td>TWA: 100 STEL: 150 (ppm) from OSHA (PEL) [1989]</td>
</tr>
</tbody>
</table>

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6) Octane, all isomers

TWA: 200 CEIL: 300 (ppm) from OSHA (PEL) [1976]
TWA: 300 (ppm) from ACGIH (TLV) [1999]
TWA: 300 STEL: 375 (ppm) from OSHA (PEL) [1989]
TWA: 500 (ppm) from OSHA (PEL) [1976]

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Physical State</th>
<th>Color</th>
<th>Odor</th>
<th>Vapor Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid.</td>
<td></td>
<td>Light hydrocarbon.</td>
<td>3.4 (Air = 1)</td>
</tr>
</tbody>
</table>

Specific Gravity 0.75 (Water = 1)

Boiling Point/Range 90° to 125°C (194° to 258°F) (ASTM D-2887)
Melting/Freezing Point -135° to -90°C (-210° to -130°F)

Vapor Pressure 44 mm Hg at 20°C (68°F)

Viscosity (cSt @ 40°C) LT 1

Solubility in Water Slightly soluble in cold water (AP 0.02%).

Volatile Characteristics Volatile Organic Compounds (VOCs) Content = 100%; 745 gm/L.

Additional Properties
Alkane, Isoparaffin, and Cycloalkane Hydrocarbons Content = 80 to 88 Wt.% (ASTM D-1319);
C7 Aromatic Hydrocarbon Content = 12 to 20 Wt.% (ASTM D-1319);
Average Density at 60°F = 6.219 lbs./gal. (ASTM D-2161);
Aniline Cloud Point Temperature = 109°F (43°C) (ASTM D-611);
Kauri-Butanol (KB) Value = 42 (ASTM D-1133);
Dry Point Temperature = 255°F (124°C) (ASTM D-86);
Evaporation Rate = 3.9 when n-Butyl acetate = 1.0;
Heat Value = 19,150 Btu.

SECTION 10: STABILITY AND REACTIVITY

Chemical Stability Stable.

Hazardous Polymerization Not expected to occur.

Conditions to Avoid Keep away from extreme heat, sparks, open flame, and strongly oxidizing conditions.

Materials Incompatibility Strong acids, alkalies, and oxidizers such as liquid chlorine, other halogens, hydrogen peroxide, and oxygen. n-Heptane will dissolve some plastics.

Hazardous Decomposition Products No substances are readily identified from composition; but, no degradation data is available.

SECTION 11: TOXICOLOGICAL INFORMATION

For other health-related information, refer to the Emergency Overview on Page 1 and the Hazards Identification in Section 3 of this MSDS.

Toxicity Data

Rubber Solvent:
GAS (LC50): Acute: 61,000 ppm for 4 hours [Rat] - Convulsions.

Cyclohexane:
GAS (LC50): Acute: 22,500 ppm for 4 hours [Rabbit].
ORAL (LD50): Acute: 12,705 mg/kg [Rat].
ORAL (LD50): Acute: 813 to 1,300 mg/kg [Mouse].
ORAL (LD50): Acute: GT 180,000 mg/kg [Rabbit].- Severe diarrhea, vascular damage and collapse, hepato-cellular degeneration, and glomerulonephritis.

n-Heptane:
GAS (LC50): Acute: 103,000 mg/m³ for 4 hours [Rat] - Convulsions.
DERMAL (LD50): Acute: GT 2,000 mg/kg [Rabbit].
INTRAVENOUS (LD50): Acute: 222 mg/kg [Mouse].

Methylcyclohexane:
ORAL (LD50): Acute: 2,250 mg/kg [Mouse].
GAS (LC50): Acute: 41,500 mg/m³ for 2 hours [Mouse] - Hypermotility and diarrhea.
GAS (LC50): Acute: 15,227 ppm for 1 hour [Rabbit] - General anesthetic, convulsions, and changes in the salivary glands.

Toluene:

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ORAL (LD50): Acute: 636 mg/kg or [Rat].
ORAL (LD50): Acute: 4,000 mg/kg or [Cat].
GAS (LC50): Acute: 49,000 mg/m³ for 4 hours [Rat].
GAS (LC50): Acute: 5,320 ppm for 8 hours [Mouse].
GAS (LC50): Acute: 400 ppm for 24 hours [Mouse].
DERMAL (LD50): Acute: 14,100 μL/kg or 12,125 mg/kg [Rabbit].
INTRAVENOUS (LD50): Acute: 2,250 mg/kg [Mouse].
INTRAVENOUS (LD50): Acute: 1,960 mg/kg [Rat].
SUBCUTANEOUS (LD50): Acute: 1,332 mg/kg [Guinea Pig].
INTRAPERITONEAL (LD50): Acute: 1,332 mg/kg [Rat].
INTRAPERITONEAL (LD50): Acute: 59 mg/kg [Mouse].
INTRAPERITONEAL (LD50): Acute: 500 mg/kg [Guinea Pig].
GAS  (LC50): Acute: 5,320 ppm for 8 hours [Mouse].
GAS  (LC50): Acute: 400 ppm for 24 hours [Mouse].

Rubber Solvent (Naphtha) is a minimal to mild eye irritant, mild skin irritant, and non-sensitizer on rabbits and Guinea pigs using standard acute test protocols. And, at a 1.7 mg/L in air concentration, it is a slight eye, nose, and throat irritant for humans. Rats exposed to 1.9, 3.7, and 7.9 mg/L/day of rubber solvent in air for 4 weeks exhibited no ill effects; however, when rabbits were skin painted with 200, 1,000, and 2,000 mg/kg/day for 4 weeks, moderate skin irritation was seen at the lowest dose level and severe irritation at the higher doses. A study using pregnant rodents exposed to 800 and 1,600 ppm of rubber solvent in air for 6 hours/day during days 6 through 15 of gestation showed negative maternal and fetal effects. Rubber solvent produced negative or equivocal mutagenic response in the Salmonella/microsome (Ames) assay, the in-vivo rat bone marrow cell chromosome aberrations assay, the in-vitro mouse lymphoma assay, and the 8-week dominant lethal assay; however, the IP injection into rat somatic cells assay produced a positive response. The significance of these animal study results to humans is not known.

Cyclohexane is an eye, skin, and mucous membrane irritant, CNS depressant, and causes narcosis at high concentrations in air. There is a narrow margin between narcosis, loss of reflexes, and death. In experimental animals exposed to lethal concentrations by inhalation or oral route, there was generalized vascular damage and severe degenerative changes in the heart, lungs, liver, kidneys, and brain. Cyclohexane does not act as a promoter for tumors on mice when exposed to dimethylbenzanthracene; and, it did not induce unscheduled DNA synthesis in cultured human lymphocytes. It is not mutagenic in the Salmonella/microsome (Ames) or the mouse lymphoma L5178Y assays, with or without metabolic activation; however, it did increase the number of chromosomal aberrations in bone marrow cells of rats exposed to between 100 and 300 ppm for 6 hours/day for 5 days. These chromosomal aberrations did not appear to be dose-related.

n-Heptane is a mucous membrane and respiratory tract irritant, but non-irritating to the eyes. It is irritating to skin and readily absorbed by either inhalation or dermal exposure. Exposures may cause decreased red blood cell counts, liver and heart damage, and central nervous system depression. Repeated direct skin application can produce defatting dermatitis. n-Heptane is metabolized in the liver to form alcohols and ketones, including neurotoxic 2,5-heptanedione which is detectable in small amounts in the urine of exposed humans.

In a controlled study, human volunteers exposed to an airborne concentration of n-heptane of 1,000 ppm for 6 minutes or 2,000 ppm for 4 minutes experienced slight dizziness and incoordination. Higher-level exposures produced hilarity, dizziness, and semi-consciousness. Inhaling a concentration of 5,000 ppm for 15 minutes caused stupor and a gasoline-like taste. These higher exposures also decreased the myocardial threshold to the arrhythmogenic effects (irregular heart beats) of epinephrine, producing only a narrow margin of safety between exposures causing CNS effects, cardiac effects, and loss of consciousness.

One occupational exposure study involving a 95% purity n-heptane from 1 to 9 years duration concluded that it could produce minimal peripheral nerve damage with numbness and tingling of the extremities in the stocking-and-glove areas. In the same study, there was a decrease in motor nerve conduction velocities correlated with duration of exposure and adjusted for age effects; however, the average motor nerve conduction velocity in exposed workers was normal. Polyneuropathy associated with n-heptane exposure was reversible within a year following removal of exposure.

n-Heptane was not mutagenic in the Salmonella/microsome (Ames) assay and is not expected to be
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carcinogenic.

Rats inhaling methycyclohexane at an airborne concentration of 15,250 ppm for 1 hour displayed tremors, loss of coordination, anesthesia, and convulsions. Inhalation of 10,050 ppm for 6 hours per day for 14 days showed rodent weight loss or decreased weight gain and changes in the structure of their salivary glands. Using rabbits, methycyclohexane was shown to have an LD50 somewhere between 3,300 ppm and 7,300 ppm when exposed repeatedly for 6 hours per day, 5 days per week, for 3 weeks. Death was preceded by conjunctival congestion with mucoid secretion and lacrimation, salivation, coughing, sneezing, labored breathing, and diarrhea. Lethal oral dosing of rabbits caused lethargy, severe diarrhea, and circulatory collapse. Vascular and degenerative lesions were observed in the kidneys and liver.

Toluene (methylbenzene) has been a major solvent of intentional inhalation abuse. Deliberate long-term inhalation of high concentrations of toluene (glue sniffing, etc.) has been shown to cause liver, kidney, central nervous system, and permanent brain damage. Effects such as impaired speech, visual disturbances, and hearing loss, loss of balance and/or muscle control, and memory loss have been reported. Exposures of 100 to 200 ppm in air for 24 hours cause hallucinations, distorted perceptions, and changes in motor activity. Studies have indicated that children of women who sniffed massive exposures of toluene during pregnancy are at significant risk for pre-term delivery, perinatal death, growth retardation, and other adverse developmental effects. Isolated case reports have suggested a spectrum of congenital defects similar to those seen in fetal alcohol (ethanol) syndrome. These children's defects included microcephaly (small head size), central nervous system (CNS) deficiencies, facial abnormalities, and reduced growth rate.

Animal studies suggest that toluene causes kidney, liver, and/or lung dysfunction and cardiac (heart muscle) sensitization to epinephrine or other adrenalin-like agents. This sensitization may cause fatal changes in heart beat rhythms. Also, this latter effect was shown to be enhanced by hypoxia (oxygen deficiency).

Long-term rodent inhalation studies with toluene produced kidney damage, enlargement of the liver and thymus, heart palpitations, brain damage, general weakness, and impaired reaction time. Also, rats exposed to 1,200 ppm and 1,400 ppm of toluene in air for 14 hours per day for 5 or 4 weeks (respectively) exhibited high-frequency hearing loss. Several animal studies using pregnant rodents have shown that toluene exposures may all cause embryo and/or feto-toxicity. Adverse effects included decreased fetal body weight and increased skeletal variations. In chronic feeding and inhalation studies, toluene has not been shown to be carcinogenic; nor is it mutagenic in the Salmonella/microsome (Ames) assay, the in-vivo rat bone marrow cell chromosome aberrations assay, the in-vitro mouse lymphoma assay, 8-week dominant lethal assay, and the in-vitro human adult male lymphocyte sister chromatid exchanges assay. The significance of these animal study results to humans is not known.

2,2,4-Trimethylpentane (Iso-octane) was highly irritating to mice at a 1,000 ppm in air exposure for 5 minutes and respiratory arrest occurred at exposures above 10,000 ppm for 5 minutes. CNS depression was observed at concentrations between 8,000 and 10,000 ppm in air. Kidney tubule necrosis, hyaline droplet formation, and acute renal failure were seen in male rats following oral administration of 10 gm/kg, 8 mL/kg, or 2,100 mg/kg of iso-octane for 2, 3, and 4 weeks, respectively.

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity

Ecotoxicity testing has not been conducted on this material. If spilled, this naphtha, its storage tank water bottoms and sludge, and any contaminated soil or water may be hazardous to human, animal, and aquatic life. If released from its container, this material will probably contribute to the creation of atmospheric smog. n-Heptane, heptane isomers, and iso-octane all have estimated half-lives of between 2.4 and 4.4 days in air when photochemical hydroxyl and/or nitrate radicals are present. Toluene has a half-life of from 3 hours to slightly over 1 day and cyclohexane has a half-life of from 6 hours to over 4 days when hydroxyl radicals are present.

Using Rainbow Trout (Oncorhynchus mykiss) and Dungeness Crab (Cancer magister), similar naphthas showed a 96-hour TLm (Median Toxic Limit) from 5 ppm to 30 ppm in ambient saltwater. 24-hour TLms resulted in 2,990 ppm and 250 ppm when using Bluegill Sunfish (Lepomis macrochirus) and juvenile American Shad (Squalius cephalus), respectively. Also, 24-hour and 96-hour LC50s for cyclohexane and toluene produced results from 25 ppm to 60 ppm when using Bluegill Sunfish (Lepomis macrochirus), Goldfish (Carassius auratus), and Guppy (Lebistes reticulatus) in fresh water. Using Water Fleas (Daphnia magna), toluene showed 24-hour TLms of from 100 ppm to 200 ppm. Using
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Mosquito Fish (Gambusia affinis), cyclohexane showed a 24-hour TLm of 15,500 ppm and n-heptane showed a 24-hour TLm of 4,925 ppm and a LC100 of 10,000 ppm in turbid fresh water. Based upon actual spill incident investigations, similar naphthas have been shown to bioaccumulate in tissues of various fish from a 1 ppm to 10 ppm levels.

Environmental Fate

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

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

SECTION 13: DISPOSAL CONSIDERATIONS

Hazard characteristic and regulatory waste stream classification can change with product use. Accordingly, it is the responsibility of the user to determine the proper storage, transportation, treatment and/or disposal methodologies for spent materials and residues at the time of disposition.

Maximize material recovery for reuse or recycling. If spilled material is introduced into a wastewater treatment system, chemical and biological oxygen demand (COD and BOD) will likely increase. This material is biodegradable if gradually exposed to microorganisms, preferably in an aerobic environment. In sewage-seeded wastewater, at or below concentrations of 0.2 vol.% of this naphtha, there is little or no effect on bio-oxidation and/or digestion. However, at 1 vol.%, it doubles the required digestion period. Higher concentrations interfere with floc formation and sludge settling and also plug filters or exchange beds. Vapor emissions from a bio-oxidation process contaminated by this material might prove to be a health hazard.

Recovered non-usable material may be regulated by US EPA as a hazardous waste due to its ignitibility (D001) and/or its toxic (D018) characteristics. In addition, conditions of use may cause this material to become a hazardous waste, as defined by Federal or State regulations. It is the responsibility of the user to determine if the material is a RCRA "hazardous waste" at the time of disposal. Transportation, treatment, storage, and disposal of waste material must be conducted in accordance with RCRA regulations (see 40 CFR Parts 260 through 271). State and/or local regulations might be even more restrictive. Contact the RCRA/Superfund Hotline at (800) 424-9346 or your regional US EPA office for guidance concerning case specific disposal issues.

SECTION 14: TRANSPORT INFORMATION

DOT Status
This material is regulated by the U.S. Department of Transportation (DOT).

Proper Shipping Name
Petroleum distillates, n.o.s. (Naphtha Solvent) or (Heptanes, Methylcyclohexane)

Hazard Class
Class 3: Flammable liquid.

Packing Group(s)
PG II

UN/NA ID
UN1268

Reportable Quantity
The Reportable Quantity (RQ) substance components present in this product which might require DOT HAZMAT bill-of-lading display are Toluene and 2,2,4-Trimethylpentane (Iso-octane).

Placards
Emergency Response Guide No.
128

HAZMAT STCC No.
49 102 56

MARPOL III Status
Not a DOT "Marine Pollutant" per 49 CFR 171.8.
SECTION 15: REGULATORY INFORMATION

TSCA Inventory
This product and/or its components are listed on the Toxic Substance Control Act (TSCA) inventory.

SARA 302/304
The Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III requires facilities subject to Subparts 302 and 304 to submit emergency planning and notification information based on Threshold Planning Quantities (TPQs) and Reportable Quantities (RQs) for "Extremely Hazardous Substances" listed in 40 CFR 302.4 and 40 CFR 355. No components were identified.

SARA 311/312
The Superfund Amendments and Reauthorization Act of 1989 (SARA) Title III requires facilities subject to this subpart to submit aggregate information on chemicals by "Hazard Category" as defined in 40 CFR 370.2. This material would be classified under the following hazard categories:

Fire Hazard, Acute (Immediate) Health Hazard, and Chronic (Delayed) Health Hazard.

SARA 313
This material contains the following components in concentrations which might be at or above de minimis levels and are listed as a toxic chemicals in 40 CFR Part 372 pursuant to the requirements of Section 313:

- Cyclohexane [CAS No. 110-82-7] concentration: 0 to 3%
- Toluene [CAS No. 108-88-3] concentration: 12 to 20%.

CERCLA
The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) requires notification of the National Response Center concerning release of quantities of "hazardous substances" equal to or greater than the reportable quantities (RQs) listed in 40 CFR 302.4. As defined by CERCLA, the term "hazardous substance" does not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically designated in 40 CFR 302.4. Chemical substances that might be present in this product which are subject to this statute are:

- Cyclohexane [CAS No. 110-82-7] (RQ = 1000 lbs. [453.6 kg]) concentration: 0 to 3%
- Benzene [CAS No. 71-43-2] (RQ = 10 lbs. [4.54 kg]) concentration: 0.001 to 0.018%
- Toluene [CAS No. 108-88-3] (RQ = 1000 lbs. [453.6 kg]) concentration: 12 to 20%
- 2,2,4-Trimethylpentane (Iso-octane) [CAS No. 540-84-2] (RQ = 1000 lbs. [453.6 kg]) concentration: 1 to 5%.

CWA
This material is classified as an oil under Section 311 of the Clean Water Act (CWA) and the Oil Pollution Act of 1990 (OPA). Discharges or spills which produce a visible sheen on waters of the United States, their adjoining shorelines, or into conduits leading to surface waters must be reported to the EPA's National Response Center at (800) 424-8802.

California Proposition 65
This material might contain the following chemical substances which are known to the State of California to cause cancer, birth defects, or other reproductive harm, and may be subject to requirements of CA Health & Safety Code Section 25249.5: Benzene [CAS No. 71-43-2] and Toluene [CAS No. 108-88-3].

New Jersey Right-to-Know Label
For New Jersey labeling refer to components listed in Section 2.

Additional Regulatory Remarks
Under the Federal Hazardous Substances Act, related statutes, and Consumer Product Safety Commission regulations, as defined by 16 CFR 1500.14(b)(3) and 1500.83(a)(13): This product contains "Petroleum Distillates" which may require special labeling if distributed in a manner intended or packaged in a from suitable for use in the household or by children. Precautionary label dialogue should display the following: Contains Petroleum Distillates! May be harmful or fatal if swallowed! Keep Out of Reach of Children!

Under Section 12(b) of the Toxic Substances Control Act: Because it contains detectable amounts of Cyclohexane [CAS No. 110-82-7], this product might be subject to US EPA's one-time only per country export notification requirements.

In regulations promulgated pursuant to the Clean Air Act - Section 111 "Standards of Performance for New Stationary Sources" (40 CFR 60.489), the EPA classifies the following minor components of this material as "Volatile Organic Compounds (VOCs)" which contribute significantly to air pollution which endangers public health and welfare: Cyclohexane [CAS No. 110-82-7], Benzene [CAS No. 71-43-2], Methylcyclohexane [CAS No. 108-87-2], and Toluene [CAS No. 108-88-3].
SECTION 16: OTHER INFORMATION

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

REVISION INFORMATION

Version Number 2.1
Revision Date 07/13/1999
Print Date Printed on 04/27/2000.

ABBREVIATIONS

AP = Approximately        EQ = Equal         GT = Greater Than      LT = Less Than         NA = Not Applicable         ND = No Data        NE = Not Established

ACGIH = American Conference of Governmental Industrial Hygienists        AIHA = American Industrial Hygiene Association
IARC = International Agency for Research on Cancer                      NTP = National Toxicology Program
NIOSH = National Institute of Occupational Safety and Health           OSHA = Occupational Safety and Health Administration
NPCA = National Paint and Coating Manufacturers Association          HMIS = Hazardous Materials Information System
NFPA = National Fire Protection Association                            EPA = Environmental Protection Agency

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