MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI, and Canadian WHMIS Standards

PART I *What is the material and what do I need to know in an emergency*

1. PRODUCT IDENTIFICATION

TRADE NAME (AS LABELED):	**FLEX SEAL**
CHEMICAL NAME/CLASS:	Asphalt/Bentonite Water Dispersion
MANUFACTURER'S NAME:	Petrochem Manufacturing, Inc
ADDRESS:	5205 Avenida Encinas, Suite K Carlsbad, CA 92008-4366
EMERGENCY PHONE:	**CHEMTREC: 1-800-424-9300** INTERNATIONAL: 1-703-527-3887
BUSINESS PHONE:	(760) 603-0961
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DATE OF PREPARATION:	March 14, 2006

2. COMPOSITION and INFORMATION ON INGREDIENTS

The following table provides information on the exposure limits of the components that comprise this product.

CHEMICAL NAME	CAS #	% v/v	EXPOSURE LIMITS IN AIR							
			ACGIH-TLV		OSHA-PEL		NIOSH			OTHER
			TWA mg/m^3	STEL mg/m^3	TWA mg/m^3	STEL mg/m^3	TWA mg/m^3	STEL mg/m^3	IDLH mg/m^3	mg/m^3
Petroleum Asphalt (exposure limits are for Asphalt fume)	8052-42-4	30.0–60.0	0.5 (inhalable fraction as benzene-soluble aerosol)	NE	NE	NE	NE	5, ceiling (15 min)	NE	DFG MAK: Danger of cutaneous absorption (vapor & aerosol) Carcinogen: IARC-3, MAK-2, NIOSH-Ca, TLV-A4
Crumb Rubber	Mixture	5.0–10.0	NE	NE	NE	NE	NE	NE	NE	NE
Petroleum Distillates	Proprietary	0.0–3.0	NE	NE	2000	NE	350	NE	1800, ceiling (15 min)	NE
Hydrogen Sulfide	7783-06-4	0.1–1.0	14 NIC 1.4	21 NIC 7	NE	28 ceiling; 70 10 min peak, once per 8-hr shift	NE	15 ceiling (10 min)	140	DFG MAK: TWA = 14 STEL = 2 MAK 15 min, average value Carcinogen: EPA-I
Other Proprietary component with no exposure limits		4.18-21.25	NE	NE	NE	NE	NE	NE	NE	NE
Water and other components. Each of the other components is present in less than 1 percent concentration (or 0.1% concentration for potential carcinogens, reproductive toxins, respiratory tract sensitizers, and mutagens).		Balance	None of the other components contribute significant, additional, hazards at the concentrations present in this product. All pertinent hazard information has been provided in this document, per the requirements of the Federal Occupational Safety and Health Administration Standard (29 CFR 1910.1200), U.S. State equivalent Standards and Canadian Workplace Hazardous Materials Identification System Standards (CPR 4).							

NE = Not Established NIC = Notice of Intended Change. See Section 16 for Definitions of Terms Used.

NOTE: All Canadian WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1998 format.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: This product is a brown to black liquid or semisolid with a mild petroleum odor. The primary health hazards associated with this product under normal and recommended circumstances of use are from mechanical irritation of exposed tissues. This product is not flammable in emulsion form. Thermal decomposition of this product can produce black, sooty smoke, irritating vapors, and toxic gases (e.g., carbon oxides, nitrogen oxides, sulfur oxides). This product is not normally reactive. This product may be harmful to contaminated terrestrial and aquatic life. Emergency responders must wear proper personal protective equipment of for the situation to which they are responding.

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE: The chief health hazard associated with end-use applications of this product would be irritation of contaminated skin and eyes. Potential health effects, via route of exposure, are as follows:

INHALATION: Under normal circumstances of use, this product does not produce significant vapors. If mist or sprays generated by the liquid portion of this product are inhaled, they may cause dizziness, drowsiness, blurred vision, and other central nervous system effects.

3. HAZARD IDENTIFICATION (Continued)

INHALATION (continued): Fumes of Asphalt are suspected to be carcinogenic if exposure is chronic; however, this product is not typically transported or used at elevated temperatures [>100°C (212°F)] and so this hazard is not expected to be significant.

CONTACT WITH SKIN or EYES: Under normal circumstances of use, this product does not product significant vapors. Direct eye contact may cause chemical and mechanical irritation or permanent damage. Skin contact with this product may also cause mechanical irritation. Repeated or prolonged skin contact may cause dermatitis (dry, red skin). Some components of this product may be skin sensitizers; subsequent exposure to very small amounts may cause allergic reaction in susceptible individuals.

SKIN ABSORPTION: Some components of this product may be absorbed through the skin. Depending on the duration and the area of skin absorption, symptoms may include dizziness, drowsiness, blurred vision, and other central nervous system effects.

INGESTION: Though not anticipated to be a significant route of occupational exposure, ingestion of this product can irritate the mouth, throat, and other tissues of the gastrointestinal system. Symptoms of such overexposure can include nausea, vomiting, and diarrhea. Although no testing has been done on this product, it is possible that ingestion may cause permanent damage.

INJECTION: Injection is not anticipated to be a significant route of occupational exposure. Accidental injection (via puncture by a contaminated object) can cause pain and irritation in addition to the wound.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in **Lay Terms**.

ACUTE: At the temperature at which this product is transported, no acute health hazard beyond mechanical irritation of exposed tissue is anticipated. Ingestion may cause nausea, vomiting, and diarrhea. Eye contact will cause irritation from both chemical exposure and mechanical irritation, with the possibility of permanent damage. Severe exposure via ingestion or injection exposure to this product may cause damage.

CHRONIC: Asphalt fumes are possibly carcinogenic to humans; however, this product is not typically transported or used at elevated temperatures and so this hazard is not expected to be significant. Some components of this product may be skin sensitizers; subsequent exposure to very small amounts may cause allergic reaction in susceptible individuals. See Section 11 (Toxicological Information) for further information.

TARGET ORGANS: ACUTE: Skin, eyes (mechanical irritation). CHRONIC: Skin.

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

HEALTH HAZARD	(BLUE)	1
FLAMMABILITY HAZARD	(RED)	0
PHYSICAL HAZARD	(YELLOW)	0

PROTECTIVE EQUIPMENT

EYES	RESPIRATORY	HANDS	BODY
	See Section 8		See Section 8

For Routine Industrial Use and Handling Applications

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

PART II *What should I do if a hazardous situation occurs?*

4. FIRST-AID MEASURES

Victims of chemical exposure must be taken for medical attention. Rescuers should be taken for medical attention if necessary. Immediate first-aid treatment is recommended for overexposures. Take copy of label and MSDS to physician or health professional with victim.

EYE EXPOSURE: If this product enters the eyes, *immediately* open victim's eyes while under gently running water. Use sufficient force to open eyelids. Have the contaminated individual "roll" eyes. The recommended minimum flushing time is 15 minutes. If any adverse effect, discomfort, or sight changes occur after 15 minutes of rinsing, victim must seek immediate medical attention.

SKIN EXPOSURE: If this product contaminates a small area of the skin, wash thoroughly with soap and water or waterless hand cleaner. If irritation develops or persists, consult a physician. If this product contaminates a large area of the skin, begin decontamination with running water for at least 15 minutes. Remove or cover gross contamination to avoid exposure to rescuers. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Victims must seek medical attention if adverse effect occurs.

INHALATION: If mist or sprays generated by the liquid portion of this product are inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Victim must seek immediate medical attention. Rescuers entering a closed vessel or tank to attempt rescue must wear positive-pressure, full facepiece, Self-Contained Breathing Apparatus (SCBA) or supplied air, NIOSH-approved respirators.

INGESTION: If this product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. DO NOT INDUCE VOMITING. Have victim rinse mouth with water if conscious. Never induce vomiting or give a diluent (e.g., water) to someone who is unconscious, having convulsions, or unable to swallow. If vomiting occurs, lean patient forward or place on left side (head-down position if possible) to maintain an open airway and prevent aspiration.

4. FIRST-AID MEASURES (Continued)

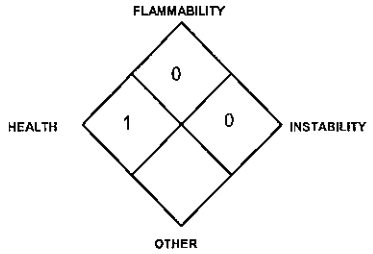
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Skin, respiratory, and central nervous system conditions may be aggravated by overexposure to this product.
RECOMMENDATIONS TO PHYSICIANS: Treat symptoms. Eliminate overexposure.

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not flammable.
AUTOIGNITION TEMPERATURE: Not applicable.
FLAMMABLE LIMITS (in air by volume, %):
Lower (LEL): Not applicable.
Upper (UEL): Not applicable.

FIRE EXTINGUISHING MATERIALS:
Water Spray: YES (for cooling)
Carbon Dioxide: YES
Foam: YES
Dry Chemical: YES
Halon: YES
Other: Any "ABC" Class.

NFPA RATING



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

UNUSUAL FIRE AND EXPLOSION HAZARDS: This product will not burn or support combustion until all water has evaporated and the temperature of the remaining asphalt residue exceeds the 218.1°C (425°F) PMCC flash point of petroleum asphalt. At normal Flex Seal storage temperatures, there are no flammable or explosive vapors above the liquid surface. When involved in a fire, this material may decompose and produce black, sooty smoke, irritating vapors and toxic gases (e.g., carbon oxides, nitrogen oxides, sulfur oxides). Containers of this product can rupture in a fire situation due to internal water vapor (steam) pressure. Persons responding to a fire involving containers of this product should be aware that solvents may have been used to clean out containers and may increase the fire hazard (refer to "CAUTION" note in Section 7 [Handling and Storage], "Storage and Handling Practices" heading, for further information).
Explosion Sensitivity to Mechanical Impact: Not sensitive.
Explosion Sensitivity to Static Discharge: Not sensitive.
SPECIAL FIRE-FIGHTING PROCEDURES: Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Move fire-exposed containers if it can be done without risk to firefighters. If possible, firefighters should control runoff water to prevent environmental contamination. Rinse contaminated equipment with soapy water before returning such equipment to service.

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Clean up small releases by shoveling up or scraping up and dispose of properly. Trained personnel using pre-planned procedures should respond to larger, uncontrolled releases. Proper protective equipment should be used. In case of a large spill, clear the affected area, protect people. Large spills should be cleaned up carefully, avoiding the generation of airborne mists or sprays of the liquid potion of this product. Minimum Personal Protective Equipment should be long-sleeved shirt, long pants, eye protection, steel toe boots, and gloves. **Self-Contained Breathing Apparatus must be selected if releases that occur in confined or poorly ventilated areas or in situations in which the level of oxygen is below 19.5%.** Strong precautions must be taken to avoid contamination of waterways. Close off sewers and take other measures to protect human health and the environment as necessary. Decontaminate the area thoroughly. Place all spill residue in an appropriate container and seal. Dispose of in accordance with applicable U.S. Federal, State, and local procedures or appropriate standards of Canada (see Section 13, Disposal Considerations).

PART III *How can I prevent hazardous situations from occurring?*

7. HANDLING and STORAGE

WORK AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash thoroughly after handling this product. Do not eat, drink, smoke, or apply cosmetics while handling this product. Avoid breathing mists or sprays generated by the liquid potion of this product. Use in a well-ventilated location. Remove contaminated clothing immediately. Skin contact should be minimized. If any skin contact occurs, clean asphalt from skin with waterless hand cleaner and then wash skin with soap and water. Do not use solvents to clean product from skin. Solvents may contain ingredients that are carcinogenic and/or cause skin irritation. Launder or discard contaminated clothing. Discard contaminated leather material.
STORAGE AND HANDLING PRACTICES: All employees who handle this material should be trained to handle it safely. Open containers slowly on a stable surface. Keep container tightly closed when not in use. Heating of the product to near boiling temperature of water [100°C (212°F)] may cause the product to separate into layers. Keep product from freezing; freezing will cause the product to permanently separate into layers. Store away from incompatible materials (see Section 10, Stability and Reactivity). Material should be stored in secondary containers or in a diked area as appropriate.

7. HANDLING and STORAGE (Continued)

STORAGE AND HANDLING PRACTICES (continued): Inspect all incoming containers before storage to ensure containers are properly labeled and not damaged. Empty containers may contain residual amounts of this product; therefore, empty containers should be handled with care. CAUTION: When solvents (e.g., diesel fuel, fuel oil, naphtha, etc) are used to clean out the container, tank, transport, pump, or piping system and are therefore introduced into the container with Flex Seal, the solvent may float to the surface. The vapor space above the liquid surface may have the same fire hazards as a container of the solvent. The container or tank should be labeled and treated in accordance with the hazards of the solvent in addition to the hazards of the Flex Seal.

BULK SHIPMENTS: Bulk shipments of this product should be loaded and unloaded in strict accordance with truck manufacturer recommendation and all established onsite safety procedures. Appropriate personal protective equipment must be used (see Section 8). All loading and unloading equipment must be inspected prior to each use. Loading and unloading operations must be attended at all times. Trucks must be level and wheels must be locked or blocked prior to loading or unloading. Truck and material-handling equipment must be verified to be correct for receiving this product and be properly prepared prior to starting the transfer operations. Hoses must be verified to be free of incompatible chemicals prior to connection to the truck. Valves and hoses must be verified to be in the correct positions before starting transfer operations.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain that application equipment is locked and tagged-out safely if necessary. Collect all rinsates and dispose of according to applicable U.S. Federal, State, or local procedures or appropriate Canadian standards. Flex Seal is dispersible in water until the water phase evaporates ("cures") and/or the asphalt phase plates onto substrate ("breaks"). Do not use Flex Seal products when precipitation is expected before the emulsion will cure or break. Precipitation on uncured/unbroken Flex Seal may cause the emulsion to be carried with runoff water into storm sewer or other bodies of water.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: This product is normally used and applied outdoors; mechanical or other type of ventilation should not be needed. If this product is used in an area that does pose an inhalation hazard, use adequate ventilation to ensure exposure levels are maintained below the limits provided in Section 2 (Composition and Information on Ingredients) if applicable. A source of water should be nearby use for rinsing of contaminated skin or eyes.

RESPIRATORY PROTECTION: None normally required for routine industrial use. Airborne contaminant concentrations must be maintained below guidelines listed in Section 2 (Composition and Information on Ingredients). If respiratory protection is needed, use only protection authorized in the U.S. Federal OSHA Standard (29 CFR 1910.134), applicable U.S. State regulations, or the Canadian CSA Standard Z94.4-93. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under OSHA's Respiratory Protection Standard (1910.134-1998). The following are NIOSH respiratory guidelines for Asphalt Fumes in air:

ASPHALT FUME

CONCENTRATION	**RESPIRATORY EQUIPMENT**
At Concentrations Above the NIOSH REL, or Where There is no REL, at Any Detectable Concentration:	Any Self-Contained Breathing Apparatus (SCBA) that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode, or any Supplied-Air Respirator (SAR) that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.
Escape:	Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter, or any appropriate escape-type, SCBA.

EYE PROTECTION: Splash goggles or safety glasses and full coverage faceshield must be worn at all times when handling this product. If necessary, refer to U.S. OSHA 29 CFR 1910.133 or appropriate Canadian Standard.

HAND PROTECTION: Employees should wear lined nitrile or leather gloves for routine industrial use. Use triple gloves for spill response, as stated in Section 6 of this MSDS.

BODY PROTECTION: Clothing such as protective coveralls with long sleeves and full length legs should be worn to minimize contact with skin.

9. PHYSICAL and CHEMICAL PROPERTIES

RELATIVE VAPOR DENSITY (air = 1): Similar to water. pH: Not established.

SPECIFIC GRAVITY @ 60°F (water = 1): Not established. MELTING POINT: Not determined.

SOLUBILITY IN WATER: Dispersible. BOILING POINT: > 100°C (212°F)

VISCOSITY @ 122°F: Not established. VAPOR PRESSURE: Not established.

EVAPORATION RATE (n-BuAc = 1): Not established.

PARTITION COEFFICIENT (n-octanol/water): Not determined

APPEARANCE, ODOR and COLOR: This product is a brown to black liquid or semisolid with a mild petroleum odor.

HOW TO DETECT THIS SUBSTANCE (warning properties): The appearance may act as a warning property associated with this product.

10. STABILITY and REACTIVITY

STABILITY: Stable.

DECOMPOSITION PRODUCTS: The products of thermal decomposition from this product include black, sooty smoke, irritating vapors and toxic gases (e.g., carbon oxides, nitrogen oxides, sulfur oxides, and trace amounts of acrolein, aldehydes and ketones).

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: This product is not compatible with strong oxidizers, strong acids, strong bases, and amines.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Avoid exposure to and contact with extreme temperatures and incompatible materials.

PART IV *Is there any other useful information about this material?*

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The following information is available for the components of this product listed by CAS number in Section 2 (Composition and Information on ingredients) and present in concentrations greater than 1 percent.

ASPHALT:

TCLo (inhalation, rat) = 100 mg/m^3/6 hours/14 weeks-intermittent: Sense Organs and Special Senses (Olfaction): tumors; Behavioral: food intake (animal); Nutritional and Gross Metabolic: weight loss or decreased weight gain

TDLo (intratracheal, rat) = 1.35 mg/kg/3 days-intermittent: Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: hepatic microsomal mixed oxidase (dealkylation, hydroxylation, etc.)

TDLo (intratracheal, rat) = 26.64 mg/kg/3 days-intermittent: Blood: changes in bone marrow (not otherwise specified)

ASPHALT (continued):

TDLo (intramuscular, rat) = 5400 mg/kg/24 weeks-intermittent: Tumorigenic: neoplastic by RTECS criteria facilitates action of known carcinogen

TDLo (skin, mouse) = 130 g/kg/81 weeks-intermittent: Tumorigenic: carcinogenic by RTECS criteria; Lungs, Thorax, or Respiration: tumors; Skin and Appendages: tumors

TDLo (skin, mouse) = 905 g/kg/2 years-intermittent: Tumorigenic: neoplastic by RTECS criteria; Lungs, Thorax, or Respiration: tumors; Skin and Appendages: tumors

ASPHALT (continued):

TDLo (Intramuscular-Mouse) 12 g/kg/12 weeks-intermittent: Tumorigenic: neoplastic by RTECS criteria, tumors at site of application

TD (skin, mouse) = 69 g/kg/43 weeks-intermittent: Tumorigenic: equivocal tumorigenic agent by RTECS criteria; Lungs, Thorax, or Respiration: tumors; Skin and Appendages: tumors

DNA Adduct (skin, mouse) = 600 mg/kg

PROPRIETARY CLAY:

TDLo (intrapleural, rat) = 90 mg/kg: Tumorigenic: equivocal tumorigenic agent by RTECS criteria; Lungs, Thorax, or Respiration: tumors

GENERAL TOXICOLOGICAL INFORMATION: Due to the low temperature of this product, the toxicological effects from this product are expected to be of low order.

SUSPECTED CANCER AGENT: The components of this product are listed by agencies tracking the carcinogenic potential of chemical compounds, as follows:

ASPHALT (FUMES ONLY): TLV-A4 (Not Classifiable as a Human Carcinogen); **IARC-3** (Confirmed Animal Carcinogen); **NIOSH Ca** (Potential Occupational Carcinogen Defined with no Further Categorization); **MAK-2** (Substances that Are Considered to Be Carcinogenic for Man Because Sufficient Data from Long-Term Animal Studies or Limited Evidence from Animal Studies Substantiated by Evidence from Epidemiological Studies Indicate that They Can Make a Significant Contribution to Cancer Risk)

HYDROGEN SULFIDE: EPA-A (Human Carcinogen)

The other the components of this product listed by CAS number in Section 2 (Composition and Information on ingredients) are not found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, and therefore are neither considered to be nor suspected to be cancer causing agents by these agencies.

IRRITANCY OF PRODUCT: This product may be cause mechanical irritation to contaminated tissue, especially after prolonged or repeated exposure.

SENSITIZATION TO THE PRODUCT: Some components of this product may be skin sensitizers; subsequent exposure to very small amounts may cause allergic reaction in susceptible individuals.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of this product and its components on the human reproductive system.

Mutagenicity: The components of this product are not reported to cause mutagenic effects in humans. Mutagenic data are available for the Asphalt, Carbon Black, and Zinc Oxide components of this product; these data are from fumes of Asphalt.

Embryotoxicity: The components of this product are not reported to produce embryotoxic effects in humans.

Teratogenicity: The components of this product are not reported to cause teratogenic effects in humans. Teratogenic data in animals are available for the Zinc Oxide component of this product.

Reproductive Toxicity: The components of this product are not reported to cause adverse reproductive effects in humans. Reproductive toxicity data in animals are available for the Zinc Oxide component of this product.

A mutagen is a chemical that causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An embryotoxin is a chemical that causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical that causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance that interferes in any way with the reproductive process.

BIOLOGICAL EXPOSURE INDICES: Currently, there are no Biological Exposure Indices (BEIs) determined for the components of this product.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: Hydrocarbons (such as the main components of this product) are not photolyzed or hydrolyzed to any great extent. This product will not evaporate or biodegrade readily in the environment. All work practices should be aimed at preventing releases to the environment. In the event of a release to soil, the contaminated soil should be removed if possible. Additional environmental data for components of this product are provided as follows:

ASPHALT:

Solubility: Insoluble.

Biodegradation: The biodegradation of both an n-alkane and several carboxylated cycloalkanes was examined within tailings produced by the extraction of bitumen from the Athabasca oil sands. The carboxylated cycloalkanes examined were structurally similar to naphthenic acids that have been associated with the acute toxicity of oil sand tailings. The biodegradation potential of naphthenic acids was estimated by determining the biodegradation of both the carboxylated cycloalkanes and hexadecane in oil sand tailings. Carboxylated cycloalkanes were biodegraded within oil sand tailings, although compounds with methyl substitutions on the cycloalkane ring were more resistant to microbial degradation. Microbial activity against hexadecane and certain carboxylated cycloalkanes was found to be nitrogen- and phosphorus-limited. (Type of asphalt used in this test report not indicated)

EFFECT OF MATERIAL ON PLANTS or ANIMALS: Large releases may have adverse effects on plant and animal life.

EFFECT OF CHEMICAL ON AQUATIC LIFE: This product may adversely affect aquatic life if released into an aquatic environment. If high concentrations of the product are released to an aquatic environment, death of fish, animals, and invertebrates may occur.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate U.S. Federal, State, and local regulations or with regulations of Canada. This product, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority.

EPA WASTE NUMBER: Not applicable for wastes consisting only of this product. NOTE: If solvents are used to clean piping and/or pumps and are therefore introduced into the tank of Flex Seal, the resulting mixture may be regulated as a flammable material. See Section 7, Handling and Storage, for further information.

14. TRANSPORTATION INFORMATION

THIS PRODUCT IS NOT HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME: Not applicable.
HAZARD CLASS NUMBER and DESCRIPTION: Not applicable.
UN IDENTIFICATION NUMBER: Not applicable.
PACKING GROUP: Not applicable.
DOT LABEL(S) REQUIRED: Not applicable.
EMERGENCY RESPONSE GUIDEBOOK NUMBER (2004): Not applicable.
MARINE POLLUTANT: This product is not designated by the DOT to be a Marine Pollutant (49 CFR 172.101, Appendix B).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This product is not considered as dangerous good, per regulations of Transport Canada.

15. REGULATORY INFORMATION

ADDITIONAL UNITED STATES REGULATIONS:

U.S. SARA 302 and 304 REPORTING REQUIREMENTS: Components of this product are subject to the reporting requirements of Sections 302 and 304 of Title III of the Superfund Amendments and Reauthorization Act, as follows:

CHEMICAL NAME	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)
Hydrogen Sulfide	Yes	Yes

U.S. SARA THRESHOLD PLANNING QUANTITY: Hydrogen Sulfide = 500 lb (226 kg). The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lb (4,540 kg) may apply to this product, per 40 CFR 370.20.

U.S. SARA SECTIONS 311/312 HAZARDOUS CHEMICAL REPORTING: This product has requirements of hazardous chemical reporting, as per 40 CFR, Part 370:

IMMEDIATE HEALTH (Acute Health Hazard)	DELAYED HEALTH (Chronic Health Hazard)	FIRE	SUDDEN RELEASE	REACTIVE
Yes	Yes (fumes)	No	No	No

U.S. SARA SECTION 313 HAZARDOUS CHEMICAL REPORTING: The Hydrogen Sulfide component of this product has reporting requirements under Section 313; however, these requirements are currently under an administrative stay.

U.S. TSCA INVENTORY STATUS: The components of this product listed by CAS number in Section 2 (Composition and Information on ingredients) are listed on the TSCA Inventory.

U.S. CERCLA REPORTABLE QUANTITY (RQ): Hydrogen Sulfide= 100 lb (45.4 kg)

15. REGULATORY INFORMATION (Continued)

ADDITIONAL UNITED STATES REGULATIONS (continued):

OTHER U.S. FEDERAL REGULATIONS: Proposed standards of performance for asphalt processing have been published in the U.S. Federal Register. These standards implement Section III of the Clean Air Act and are based on the Administrator's determination that asphalt processing causes or contributes significantly to air pollution which may reasonably be anticipated to endanger public health or welfare. The intended effect is to require all new, modified, and reconstructed asphalt processing facilities to use the best demonstrated system of continuous emission reduction considering costs non-air quality health and environmental impacts, and energy requirements. Effective August 6, 1982.
In addition, releases of this product may require reporting and the avoidance of releases of this product should be practiced, as per the requirements under the U.S. Federal Oil Release and Contamination Prevention Act.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): This product contains Carbon Black, which is on the California Proposition 65 lists. WARNING! This product contains a compound known to the State of California to cause cancer.

ANSI LABELING (Z129.1): **CAUTION!** MAY CAUSE RESPIRATORY TRACT, SKIN, AND EYE IRRITATION. MAY BE HARMFUL IF SWALLOWED. POSSIBLE CANCER HAZARD. CONTAINS MATERIAL THAT MAY CAUSE CANCER BASED ON ANIMAL DATA. Avoid contact with skin, eyes, or clothing. Avoid breathing vapors, aerosols, mists, and sprays. Do not taste or swallow. Wash thoroughly after handling. Work in well-ventilated area. Wear gloves, goggles, and appropriate body protection. **FIRST-AID:** In case of contact with skin or eyes, flush skin with plenty of water for 15 minutes. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, do not induce vomiting. Get medical attention if adverse effects develop. **IN CASE OF FIRE:** Use water fog, dry chemical, CO_2, or "alcohol" foam. **IN CASE OF SPILL:** Absorb spill with inert material (sand, polypads, or other absorbent). For large spills, dike area. Consult Material Safety Data Sheet for additional information.

ADDITIONAL CANADIAN REGULATIONS:

CANADIAN WHMIS CLASSIFICATION AND SYMBOLS: **Class D2B** (Material Causing Other Toxic Effects, contains sensitizer).

16. OTHER INFORMATION

PREPARED BY: CHEMICAL SAFETY ASSOCIATES, Inc.
PO Box 3519, La Mesa, CA 91944-3519
800-441-3365

DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these, which are commonly used, include the following:

CAS #: This is the Chemical Abstract Service Number that uniquely identifies each constituent.

EXPOSURE LIMITS IN AIR:

CEILING LEVEL: The concentration that shall not be exceeded during any part of the working exposure.

DFG MAK Germ Cell Mutagen Categories: 1: Germ cell mutagens which have been shown to increase the mutant frequency in the progeny of exposed humans. **2:** Germ cell mutagens which have been shown to increase the mutant frequency in the progeny of exposed mammals. **3A:** Substances which have been shown to induce genetic damage in germ cells of human of animals, or which produce mutagenic effects in somatic cells of mammals *in vivo* and have been shown to reach the germ cells in an active form. **3B:** Substances which are suspected of being germ cell mutagens because of their genotoxic effects in mammalian somatic cell *in vivo*; in exceptional cases, substances for which there are no *in vivo* data, but which are clearly mutagenic *in vitro* and structurally related to known in vivo mutagens. **4:** Not applicable (Category 4 carcinogenic substances are those with non-genotoxic mechanisms of action. By definition, germ cell mutagens are genotoxic. Therefore, a Category 4 for germ cell mutagens cannot apply. At some time in the future, it is conceivable that a Category 4 could be established for genotoxic substances with primary targets other than DNA [e.g. purely aneugenic substances] if research results make this seem sensible.) **5:** Germ cell mutagens, the potency of which is considered to be so low that, provided the MAK value is observed, their contribution to genetic risk for humans is expected not to be significant.

DFG MAK Pregnancy Risk Group Classification: Group A: A risk of damage to the developing embryo or fetus has been unequivocally demonstrated. Exposure of pregnant women can lead to damage of the developing organism, even when MAK and BAT (Biological Tolerance Value for Working Materials) values are observed. **Group B:** Currently available information indicates a risk of damage to the developing embryo or fetus must be considered to be probable. Damage to the developing organism cannot be excluded when pregnant women are exposed, even when MAK and BAT values are observed.

EXPOSURE LIMITS IN AIR (continued):

DFG MAK Pregnancy Risk Group Classification (continued): Group C: There is no reason to fear a risk of damage to the developing embryo or fetus when MAK and BAT values are observed. **Group D:** Classification in one of the groups A-C is not yet possible because, although the data available may indicate a trend, they are not sufficient for final evaluation.

IDLH-Immediately Dangerous to Life and Health: This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury.

LOQ: Limit of Quantitation.

MAK: Federal Republic of Germany Maximum Concentration Values in the workplace.

NE: Not Established. When no exposure guidelines are established, an entry of NE is made for reference.

NIC: Notice of Intended Change.

NIOSH CEILING: The exposure that shall not be exceeded during any part of the workday. If instantaneous monitoring is not feasible, the ceiling shall be assumed as a 15-minute TWA exposure (unless otherwise specified) that shall not be exceeded at any time during a workday.

NIOSH RELs: NIOSH's Recommended Exposure Limits.

PEL-Permissible Exposure Limit: OSHA's Permissible Exposure Limits. This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL," is placed next to the PEL that was vacated by Court Order.

SKIN: Used when a there is a danger of cutaneous absorption.

STEL-Short Term Exposure Limit: Short Term Exposure Limit, usually a 15-minute time-weighted average (TWA) exposure that should not be exceeded at any time during a workday, even if the 8-hr TWA is within the TLV-TWA, PEL-TWA or REL-TWA.

DEFINITIONS OF TERMS (Continued)

EXPOSURE LIMITS IN AIR (continued):

TLV-Threshold Limit Value: An airborne concentration of a substance that represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour.

TWA-Time Weighted Average: Time Weighted Average exposure concentration for a conventional 8-hr (TLV, PEL) or up to a 10-hr (REL) workday and a 40-hr workweek.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS:

This rating system was developed by the National Paint and Coating Association and has been adopted by industry to identify the degree of chemical hazards.

HEALTH HAZARD:

0 (Minimal Hazard: No significant health risk, irritation of skin or eyes not anticipated. *Skin Irritation*: Essentially non-irritating. PII or Draize = "0". *Eye Irritation*: Essentially non-irritating, or minimal effects which clear in < 24 hours [e.g. mechanical irritation). Draize = "0". *Oral Toxicity LD_{50} Rat*: < 5000 mg/kg. *Dermal Toxicity LD_{50}Rat or Rabbit*: < 2000 mg/kg. *Inhalation Toxicity 4-hrs LC_{50} Rat*: < 20 mg/L.); **1** (Slight Hazard: Minor reversible Injury may occur; slightly or mildly irritating. *Skin Irritation*: Slightly or mildly irritating. *Eye Irritation*: Slightly or mildly irritating. *Oral Toxicity LD_{50} Rat*: > 500-5000 mg/kg. *Dermal Toxicity LD_{50}Rat or Rabbit*: > 1000-2000 mg/kg. *Inhalation Toxicity LC_{50} 4-hrs Rat*: > 2-20 mg/L); **2** (Moderate Hazard: Temporary or transitory injury may occur. *Skin Irritation*: Moderately irritating; primary irritant; sensitizer. PII or Draize > 0, < 5. *Eye Irritation*: Moderately to severely irritating and/or corrosive; reversible corneal opacity; corneal involvement or irritation clearing in 8-21 days. Draize > 0, ≤ 25. *Oral Toxicity LD_{50} Rat*: > 50-500 mg/kg. *Dermal Toxicity LD_{50}Rat or Rabbit*: > 200-1000 mg/kg. *Inhalation Toxicity LC_{50} 4-hrs Rat*: > 0.5-2 mg/L.); **3** (Serious Hazard: Major injury likely unless prompt action is taken and medical treatment is given; high level of toxicity; corrosive. *Skin Irritation*: Severely irritating and/or corrosive; may destroy dermal tissue, cause skin burns, dermal necrosis. PII or Draize > 5-8 with destruction of tissue. *Eye Irritation*: Corrosive, irreversible destruction of ocular tissue; corneal involvement or irritation persisting for more than 21 days. Draize > 80 with effects irreversible in 21 days. *Oral Toxicity LD_{50} Rat*: > 1-50 mg/kg. *Dermal Toxicity LD_{50}Rat or Rabbit*: > 20-200 mg/kg. *Inhalation Toxicity LC_{50} 4-hrs Rat*: > 0.05-0.5 mg/L.); **4** (Severe Hazard: Life-threatening; major or permanent damage may result from single or repeated exposure. *Skin Irritation*: Not appropriate. Do not rate as a "4", based on skin irritation alone. *Eye Irritation*: Not appropriate. Do not rate as a "4", based on eye irritation alone. *Oral Toxicity LD_{50} Rat*: ≤ 1 mg/kg. *Dermal Toxicity LD_{50}Rat or Rabbit*: ≤ 20 mg/kg. *Inhalation Toxicity LC_{50} 4-hrs Rat*: ≤ 0.05 mg/L).

FLAMMABILITY HAZARD:

0 (Minimal Hazard-Materials that will not burn in air when exposure to a temperature of 815.5°C [1500°F] for a period of 5 minutes.); **1** (Slight Hazard-Materials that must be pre-heated before ignition can occur. Material require considerable pre-heating, under all ambient temperature conditions before ignition and combustion can occur, Including: Materials that will burn in air when exposed to a temperature of 815.5°C (1500°F) for a period of 5 minutes or less; Liquids, solids and semisolids having a flash point at or above 93.3°C [200°F] (e.g. OSHA Class IIIB, or; Most ordinary combustible materials [e.g. wood, paper, etc.]; **2** (Moderate Hazard-Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur. Materials in this degree would not, under normal conditions, form hazardous atmospheres in air, but under high ambient temperatures or moderate heating may release vapor in sufficient quantities to produce hazardous atmospheres in air, Including: Liquids having a flash-point at or above 37.8°C [100°F]; Solid materials in the form of course dusts that may burn rapidly but that generally do not form explosive atmospheres; Solid materials in a fibrous or shredded form that may burn rapidly and create flash fire hazards (e.g. cotton, sisal, hemp; Solids and semisolids that readily give off flammable vapors.); **3** (Serious Hazard- Liquids and solids that can be ignited under almost all ambient temperature conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures, or, unaffected by ambient temperature, are readily ignited under almost all conditions, including: Liquids having a flash point below 22.8°C [73°F] and having a boiling point at or above 38°C [100°F] and below 37.8°C [100°F] [e.g. OSHA Class IB and IC]; Materials that on account of their physical form or environmental conditions can form explosive mixtures with air and are readily dispersed in air [e.g., dusts of combustible solids, mists or droplets of flammable liquids]; Materials that burn extremely rapidly, usually by reason of self-contained oxygen [e.g. dry nitrocellulose and many organic peroxides]); **4** (Severe Hazard-Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air, and which will burn readily, including: Flammable gases; Flammable cryogenic materials; Any liquid or gaseous material that is liquid while under pressure and has a flash point below 22.8°C [73°F] and a boiling point below 37.8°C [100°F] [e.g. OSHA Class IA; Material that ignite spontaneously when exposed to air at a temperature of 54.4°C [130°F] or below [e.g. pyrophoric]).

PHYSICAL HAZARD:

0 (*Water Reactivity*: Materials that do not react with water. *Organic Peroxides*: Materials that are normally stable, even under fire conditions and will not react with water. *Explosives*: Substances that are Non-Explosive. Unstable *Compressed Gases*: No Rating. *Pyrophorics*: No Rating. *Oxidizers*: No "0" rating allowed. *Unstable Reactives*: Substances that will not polymerize, decompose, condense or self-react.);

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

PHYSICAL HAZARD (continued):

1 (*Water Reactivity*: Materials that change or decompose upon exposure to moisture. *Organic Peroxides*: Materials that are normally stable, but can become unstable at high temperatures and pressures. These materials may react with water, but will not release energy. *Explosives*: Division 1.5 & 1.6 substances that are very insensitive explosives or that do not have a mass explosion hazard. *Compressed Gases*: Pressure below OSHA definition. *Pyrophorics*: No Rating. *Oxidizers*: Packaging Group III; Solids: any material that in either concentration tested, exhibits a mean burning time less than or equal to the mean burning time of a 3:7 potassium bromate/cellulose mixture and the criteria for Packing Group I and II are not met. Liquids: any material that exhibits a mean pressure rise time less than or equal to the pressure rise time of a 1:1 nitric acid (65%)/cellulose mixture and the criteria for Packing Group I and II are not met. *Unstable Reactives*: Substances that may decompose, condense or self-react, but only under conditions of high temperature and/or pressure and have little or no potential to cause significant heat generation or explosive hazard. Substances that readily undergo hazardous polymerization in the absence of inhibitors.); **2** (*Water Reactivity*: Materials that may react violently with water. *Organic Peroxides*: Materials that, in themselves, are normally unstable and will readily undergo violent chemical change, but will not detonate. These materials may also react violently with water. *Explosives*: Division 1.4 – Explosive substances where the explosive effect are largely confined to the package and no projection of fragments of appreciable size or range are expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package. *Compressed Gases*: Pressurized and meet OSHA definition but < 514.7 psi absolute at 21.1°C (70°F) [500 psig]. *Pyrophorics*: No Rating. *Oxidizers*: Packing Group II Solids: any material that, either in concentration tested, exhibits a mean burning time of less than or equal to the mean burning time of a 2:3 potassium bromate/cellulose mixture and the criteria for Packing Group I are not met. Liquids: any material that exhibits a mean pressure rise time less than or equal to the pressure rise of a 1:1 aqueous sodium chlorate solution (40%)/cellulose mixture and the criteria for Packing Group I are not met. *Unstable Reactives*: Substances that may polymerize, decompose, condense, or self-react at ambient temperature and/or pressure, but have a low potential for significant heat generation or explosion. Substances that readily form peroxides upon exposure to air or oxygen at room temperature); **3** (*Water Reactivity*: Materials that may form explosive reactions with water. *Organic Peroxides*: Materials that are capable of detonation or explosive reaction, but require a strong initiating source, or must be heated under confinement before initiation; or materials that react explosively with water. *Explosives*: Division 1.2 – Explosive substances that have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but do not have a mass explosion hazard. *Compressed Gases*: Pressure ≥ 514.7 psi absolute at 21.1°C (70°F) [500 psig]. *Pyrophorics*: No Rating. *Oxidizers*: Packing Group I Solids: any material that, in either concentration tested, exhibits a mean burning time less than the mean burning time of a 3.:2 potassium bromate/cellulose mixture. Liquids: Any material that spontaneously ignites when mixed with cellulose in a 1:1 ratio, or which exhibits a mean pressure rise time less than the pressure rise time of a 1:1 perchloric acid (50%)/cellulose mixture. *Unstable Reactives*: Substances that may polymerize, decompose, condense or self-react at ambient temperature and/or pressure and have a moderate potential to cause significant heat generation or explosion.); **4** (*Water Reactivity*: Materials that react explosively with water without requiring heat or confinement. *Organic Peroxides*: Materials that are readily capable of detonation or explosive decomposition at normal temperature and pressures. *Explosives*: Division 1.1 & 1.2-explosive substances that have a mass explosion hazard or have a projection hazard. A mass explosion is one that affects almost the entire load instantaneously. *Compressed Gases*: No Rating. *Pyrophorics*: Add to the definition of Flammability "4". *Oxidizers*: No "4" rating. *Unstable Reactives*: Substances that may polymerize, decompose, condense or self-react at ambient temperature and/or pressure and have a high potential to cause significant heat generation or explosion.).

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS:

HEALTH HAZARD: **0** (materials that, under emergency conditions, would offer no hazard beyond that of ordinary combustible materials): Gases and vapors whose LC_{50} for acute inhalation toxicity is greater than 10,000 ppm. Dusts and mists whose LC_{50} for acute inhalation toxicity is greater than 200 mg/L. Materials whose LD_{50} for acute dermal toxicity is greater than 2000 mg/kg. Materials whose LD_{50} for acute oral toxicity is greater than 2000 mg/kg. Materials that are essentially non-irritating to the respiratory tract, eyes and skin. **1** (materials that, under emergency conditions, can cause significant irritation): Gases and vapors whose LC_{50} for acute inhalation toxicity is greater than 5,000 ppm but less than or equal to 10,000 ppm. Dusts and mists whose LC_{50} for acute inhalation toxicity is greater than 10 mg/L but less than or equal to 200 mg/L. Materials whose LD_{50} for acute dermal toxicity is greater than 1000 mg/kg but less than or equal to 2000 mg/kg. Materials whose LD_{50} for acute oral toxicity is greater than 500 mg/kg but less than or equal to 2000 mg/kg. Materials that cause slight to moderate irritation to the respiratory tract, eyes and skin. **2** (materials that, under emergency conditions, can cause temporary incapacitation or residual injury): Gases and vapors whose LC_{50} for acute inhalation toxicity is greater than 3,000 ppm but less than or equal to 5,000 ppm.

DEFINITIONS OF TERMS (Continued)

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS:

HEALTH HAZARD (continued): **2 (continued):** Dusts and mists whose LC_{50} for acute inhalation toxicity is greater than 2 mg/L but less than or equal to 10 mg/L. Materials whose LD_{50} for acute dermal toxicity is greater than 200 mg/kg but less than or equal to 1000 mg/kg. Materials whose LD_{50} for acute oral toxicity is greater than 50 mg/kg but less than or equal to 500 mg/kg. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than one-fifth its LC_{50} for acute inhalation toxicity, if its LC_{50} is less than or equal to 5000 ppm and that does not meet the criteria for either degree of hazard 3 or degree of hazard 4. Compressed liquefied gases with boiling points between -30°C (-22°F) and -55°C (-66.5°F) that cause severe tissue damage, depending on duration of exposure. Materials that are respiratory irritants. Materials that cause severe, but reversible irritation to the eyes or are lachrymators. Materials that are primary skin irritants or sensitizers. **3** (materials that, under emergency conditions, can cause serious or permanent injury): Gases and vapors whose LC_{50} for acute inhalation toxicity is greater than 1,000 ppm but less than or equal to 3,000 ppm. Dusts and mists whose LC_{50} for acute inhalation toxicity is greater than 0.5 mg/L but less than or equal to 2 mg/L. Materials whose LD_{50} for acute dermal toxicity is greater than 40 mg/kg but less than or equal to 200 mg/kg. Materials whose LD_{50} for acute oral toxicity is greater than 5 mg/kg but less than or equal to 50 mg/kg. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than one-fifth its LC_{50} for acute inhalation toxicity, if its LC_{50} is less than or equal to 3000 ppm and that does not meet the criteria for degree of hazard 4. Compressed liquefied gases with boiling points between -30°C (-22°F) and -55°C (-66.5°F) that cause frostbite and irreversible tissue damage. Materials that are respiratory irritants. Cryogenic gases that cause frostbite and irreversible tissue damage. Materials that are corrosive to the respiratory tract. Materials that are corrosive to the eyes or cause irreversible corneal opacity. Materials that are corrosive to the skin. **4** (materials that, under emergency conditions, can be lethal): Gases and vapors whose LC_{50} for acute inhalation toxicity less than or equal to 1,000 ppm. Dusts and mists whose LC_{50} for acute inhalation toxicity is less than or equal to 0.5 mg/L. Materials whose LD_{50} for acute dermal toxicity is less than or equal to 40 mg/kg. Materials whose LD_{50} for acute oral toxicity is less than or equal to 5 mg/kg. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than one-fifth its LC_{50} for acute inhalation toxicity, if its LC_{50} is less than or equal to 1000 ppm.

FLAMMABILITY HAZARD: **0** Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand: Materials that will not burn in air when exposed to a temperature of 816°C (1500°F) for a period of 5 minutes in according with Annex D. **1** Materials that must be preheated before ignition can occur. Materials in this degree require considerable preheating, under all ambient temperature conditions, before ignition and combustion can occur: Materials that will burn in air when exposed to a temperature of 816°C (1500°F) for a period of 5 minutes in accordance with Annex D. Liquids, solids and semisolids having a flash point at or above 93.4°C (200°F) (i.e. Class IIIB liquids). Liquids with a flash point greater than 35°C (95°F) that do not sustain combustion when tested using the *Method of Testing for Sustained Combustibility*, per 49 CFR 173, Appendix H or the UN *Recommendation on the Transport of Dangerous Goods, Model Regulations* (current edition) and the related *Manual of Tests and Criteria* (current edition). Liquids with a flash point greater than 35°C (95°F) in a water-miscible solution or dispersion with a water non-combustible liquid/solid content of more than 85 percent by weight. Liquids that have no fire point when tested by ASTM D 92 Standard Test Method for Flash and Fire Points by Cleveland Open Cup, up to a boiling point of the liquid or up to a temperature at which the sample being tested shows an obvious physical change. Combustible pellets with a representative diameter of greater than 2 mm (10 mesh). Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed up flash point of the solvent. Most ordinary combustible materials. **2** Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur. Materials in this degree would not under normal conditions form hazardous atmospheres with air, but under high ambient temperatures or under moderate heating could release vapor in sufficient quantities to produce hazardous atmospheres with air: Liquids having a flash point at or above 37.8°C (100°F) and below 93.4°C (200°F) (i.e. Class II and Class IIIA liquids.) Solid materials in the form of powders or coarse dusts of representative diameter between 420 microns (40 mesh) and 2 mm (10 mesh) that burn rapidly but that generally do not form explosive mixtures in air. Solid materials in fibrous or shredded form that burn rapidly and create flash fire hazards, such as cotton, sisal and hemp. Solids and semisolids that readily give off flammable vapors. Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent.**3** Liquids and solids that can be ignited under almost all ambient temperature conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures or, though unaffected by ambient temperatures, are readily ignited under almost all conditions: Liquids having a flash point below 22.8°C (73°F) and having a boiling point at or above 37.8°C (100°F) and those liquids having a flash point at or above 22.8°C (73°F) and below 37.8°C (73°F) and below 37.8°C (100°F) (i.e. Class IB and IC liquids). Materials that, on account of their physical form or environmental conditions, can form explosive mixtures with air and are readily dispersed in air.

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS (continued):

FLAMMABILITY HAZARD (continued): **3 (continued):** Flammable or combustible dusts with a representative diameter less than 420 microns (40 mesh). Materials that burn with extreme rapidity, usually by reason of self-contained oxygen (e.g. dry nitrocellulose and many organic peroxides). Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. **4** Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air and will burn readily: Flammable gases. Flammable cryogenic materials. Any liquid or gaseous materials that is liquid while under pressure and has a flash point below 22.8°C (73°F) and a boiling point below 37.8°C (100°F) (i.e. Class IA liquids). Materials that ignite when exposed to air, Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent.

INSTABILITY HAZARD: **0** Materials that in themselves are normally stable, even under fire conditions: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) below 0.01 W/mL. Materials that do not exhibit an exotherm at temperatures less than or equal to 500°C (932°F) when tested by differential scanning calorimetry. **1** Materials that in themselves are normally stable, but that can become unstable at elevated temperatures and pressures: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 0.01 W/mL and below 10 W/mL. **2** Materials that readily undergo violent chemical change at elevated temperatures and pressures: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 10 W/mL and below 100W/mL. **3** Materials that in themselves are capable of detonation or explosive decomposition or explosive reaction, but that require a strong initiating source or that must be heated under confinement before initiation: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 100 W/mL and below 1000 W/mL. Materials that are sensitive to thermal or mechanical shock at elevated temperatures and pressures. **4** Materials that in themselves are readily capable of detonation or explosive decomposition or explosive reaction at normal temperatures and pressures: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) of 1000 W/mL or greater. Materials that are sensitive to localized thermal or mechanical shock at normal temperatures and pressures.

FLAMMABILITY LIMITS IN AIR:

Much of the information related to fire and explosion is derived from the National Fire Protection Association (**NFPA**). Flash Point - Minimum temperature at which a liquid gives off sufficient vapors to form an ignitable mixture with air. Autoignition Temperature: The minimum temperature required to initiate combustion in air with no other source of ignition. LEL - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. UEL - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

TOXICOLOGICAL INFORMATION:

Human and Animal Toxicology: Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **LD_{50}** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC_{50}** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **mg/m^3** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TDo**, **LDLo**, and **LDo**, or **TC**, **TCo**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause lethal or toxic effects. **Cancer Information:** The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. **Other Information: BEI** - ACGIH Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV.

DEFINITIONS OF TERMS (Continued)

ECOLOGICAL INFORMATION:

EC is the effect concentration in water. **BCF** = Bioconcentration Factor, which is used to determine if a substance will concentrate in lifeforms which consume contaminated plant or animal matter. $\mathbf{TL_m}$ = median threshold limit; Coefficient of Oil/Water Distribution is represented by **log** $\mathbf{K_{ow}}$ or **log** $\mathbf{K_{oc}}$ and is used to assess a substance's behavior in the environment.

REGULATORY INFORMATION:

U.S. and CANADA:

ACGIH: American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits.

This section explains the impact of various laws and regulations on the material. **EPA** is the U.S. Environmental Protection Agency. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration (**OSHA**). **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **DOT** and **TC** are the U.S. Department of Transportation and the Transport Canada, respectively. Superfund Amendments and Reauthorization Act (**SARA**); the Canadian Domestic/Non-Domestic Substances List (**DSL/NDSL**); the U.S. Toxic Substance Control Act (**TSCA**); Marine Pollutant status according to the **DOT**; the Comprehensive Environmental Response, Compensation, and Liability Act (**CERCLA or Superfund**); and various state regulations. This section also includes information on the precautionary warnings which appear on the material's package label. **OSHA** - U.S. Occupational Safety and Health Administration.