CalComp

MATERIAL SAFETY DATA SHEET

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

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

1. PRODUCT IDENTIFICATION

TRADE NAME (AS LABELED): **RP–58M and SB–58SM**

MSDS NUMBER: 17; Revision 4
CHEMICAL NAME/CLASS: Petroleum-Based Ink
SYNONYMS: CalComp Replenisher, Magenta
PRODUCT USE: Magenta Replenisher for 5800 Series Electrostatic Plotters

SUPPLIER/MANUFACTURER'S NAME: **CALCOMP TECHNOLOGY, INC.**
ADDRESS: 2411 West La Palma Avenue
Anaheim, CA 92801

EMERGENCY PHONE: CHEMTREC: 1-800-424-9300 or 3E CO.: 1-800-451-8346
MSDS INFORMATION PHONE: 1-619-565-0302
DATE OF PREPARATION: June 5, 1997

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	EINECS #	% v/v	EXPOSURE LIMITS IN AIR					
				ACGIH		OSHA			
				TLV mg/m^3	STEL mg/m^3	PEL mg/m^3	STEL mg/m^3	IDLH mg/m^3	OTHER mg/m^3
D & C Red Number 7	5281-04-9	226-109-5	< 10	NE	NE	NE	NE	NE	NE
Isopar G (exposure limits are for petroleum distillates CAS # 8002-05-9)	64742-48-9	265-150-3	> 80	NE	NE	2000 1600 (vacated 1989 PEL)	NE	4521	NIOSH REL: 1800 C (15 minutes) Manufacturer (Exxon) exposure limit = 1800 (for CAS # 64742-48-9)
Methacrylic Acid / Methyl Methacrylate / Vinyl Acetate Copolymer Compound	28430-58-2	NE	< 10	NE	NE	NE	NE	NE	NE

NE = Not Established. C = Ceiling Limit. See Section 16 for Definitions of Terms Used.

NOTE: All WHMIS and European Economic Community required information is included. It is located in appropriate sections based on the ANSI Z400.1-1993 format.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: These products consist of 8 and 16 ounces of magenta ink with a faint petroleum odor. The primary health hazard associated with these products is the potential for central nervous system effects after inhalation over-exposure. The ink will stain skin, eyes, other contaminated tissue, and objects. These products are combustible and must be moderately preheated for ignition to become a potential hazard. These products are not reactive. Emergency responders must wear the personal protective equipment suitable for the situation to which they are responding.

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: The most significant routes of occupational over-exposure are via inhalation and contact with skin and eyes. The symptoms of over-exposure to these products are as follows:

INHALATION: These products do not normally present a significant inhalation hazard under anticipated circumstances of use. Inhalation of vapors, mists, or sprays of these products may irritate the nose, throat, and other tissues of the respiratory system. Symptoms of over-exposure, especially as may occur in poorly ventilated areas, may include coughing, headaches, dizziness, anesthesia, drowsiness, and unconsciousness. Discoloration of the tissues in the nasal passage may also occur. Severe inhalation over-exposure may be fatal.

CONTACT WITH SKIN or EYES: Due to the colorants, skin contact will cause discoloration of contaminated areas. Redness, pain, or itching may occur in sensitive individuals. Contact with the eyes can cause pain, tearing, and redness. Because the eye tissue can be stained, the vision may be temporarily blurred. Repeated or prolonged skin over-exposure may cause dermatitis (dry, red skin).

SKIN ABSORPTION: Skin absorption is not known to be a route of over-exposure to the components of these products.

INGESTION: Though not anticipated to be a significant route of occupational exposure, ingestion of large quantities of these products may cause stomach pains, nausea, and vomiting. Additionally, the mouth, teeth, and tissues of the throat will be discolored. Aspiration (inhalation of material into the lungs during ingestion or vomiting) of these products may result in severe, life-threatening lung damage.

HAZARDOUS MATERIAL INFORMATION SYSTEM

HEALTH	(BLUE)	1
FLAMMABILITY	(RED)	2
REACTIVITY	(YELLOW)	0
PROTECTIVE EQUIPMENT		B

EYES	RESPIRATORY	HANDS	BODY
	See Section 8		See Section 8

For 8/16 ounce bottle under special handling circumstances.

See Section 16 for Definition of Ratings

INJECTION: Accidental injection of this liquid (as may occur by a puncture with a contaminated object) will cause local pain, irritation and redness.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in **Lay Terms**. In the event of over-exposure, the following symptoms may be observed:

ACUTE: Symptoms of inhalation over-exposure may include coughing, headaches, dizziness, anesthesia, drowsiness, and unconsciousness. Severe inhalation over-exposure may be fatal. Skin and eye contact can be irritating. Because the eye tissues can be stained, vision may be temporarily impaired. The ink will stain hair, skin, and other contaminated tissue. Ingestion of large quantities of these products may cause stomach pains, nausea, and vomiting.

CHRONIC: Repeated or prolonged skin over-exposure may cause dermatitis (dry, red skin).

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

4. FIRST-AID MEASURES

SKIN EXPOSURE: If these products contaminate the skin, immediately begin decontamination with running water and soap. The minimum recommended flushing time is 15 minutes. Remove exposed or contaminated clothing, taking care not to contaminate eyes. The contaminated individual must seek medical attention if any adverse effect occurs.

4. FIRST-AID MEASURES (Continued)

EYE EXPOSURE: If vapors, sprays, or mists of these products enter the eyes, open the contaminated individual's eyes while under gently running water. Use sufficient force to open eyelids. Have the contaminated individual "roll" eyes. Minimum flushing is for 15 minutes. The contaminated individual must seek medical attention if any adverse effect occurs.

INHALATION: If mists or sprays of these products are inhaled, remove the contaminated individual to fresh air. If necessary, remove or cover gross contamination to avoid exposure to rescuers.

INGESTION: If these products are swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, do not induce vomiting. The contaminated individual should drink milk or large quantities of water. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or unable to swallow.

Contaminated individuals must be taken for medical attention if any adverse effect occurs. Rescuers should be taken for medical attention, if necessary. Take a copy of the label and MSDS to health professional with victim.

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5. FIRE-FIGHTING MEASURES

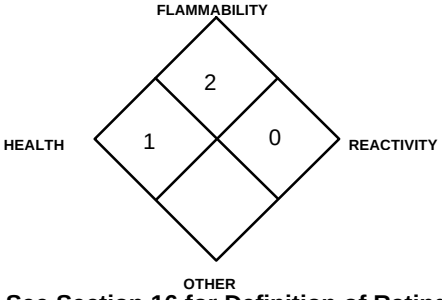
FLASH POINT, °C (ASTM D56): 39–41°C (103–106°F)

AUTOIGNITION TEMPERATURE, °C: Approximately 293°C (560°F).

FLAMMABLE LIMITS (in air by volume, %):

Lower (LEL): 0.8%
Upper (UEL): 7.0%

NFPA RATING



See Section 16 for Definition of Ratings

FIRE EXTINGUISHING MATERIALS:

Water Spray: YES (for cooling)	Carbon Dioxide: YES
Foam: YES	Dry Chemical: YES
Halon: YES	Other: Any "B" Class.

UNUSUAL FIRE AND EXPLOSION HAZARDS: These products are Class II combustible liquids. These products must be moderately preheated for ignition to become a potential hazard. When involved in a fire, these products may decompose and produce irritating vapors and toxic gases (i.e., carbon monoxide and carbon dioxide).

Explosion Sensitivity to Mechanical Impact: Not sensitive.
Explosion Sensitivity to Static Discharge: Not sensitive under normal conditions. These products' vapors may ignite by static discharge if this product is exposed to extremely high temperatures.

SPECIAL FIRE-FIGHTING PROCEDURES: Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Due to the presence of colorants, the runoff water from these products can discolor contaminated objects. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas. If necessary, rinse fire-response equipment with soapy water.

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6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: For incidental spills (e.g., 8 or 16 ounces of ink from a bottle), wear rubber gloves, splash goggles, and appropriate body protection. Non-incidental releases (e.g., one gallon of ink leaking from a crate of bottles) should be handled by trained personnel following pre-planned procedures. In the event of a non-incidental spill, clear the area and protect people. The minimum personal protective equipment for response to a non-incidental spill is as follows: rubber gloves, rubber boots, face shield, and Tyvek suit. If necessary, use non-sparking tools. Control sources of ignition before cleaning up.

The minimum level of personal protective equipment for releases in which the level of oxygen is less than 19.5% or is unknown must be **Level B: triple-gloves (rubber gloves and nitrile gloves over latex gloves), chemical resistant suit and boots, hard-hat, and Self-Contained Breathing Apparatus.**

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6. ACCIDENTAL RELEASE MEASURES (Continued)

Absorb spilled ink with polypads or other suitable absorbent materials. Rinse area thoroughly with soapy water after ink has dried. Decontaminate the area thoroughly. If necessary, discard all stained response equipment or rinse with soapy water before returning such equipment to service. Place all spill residue in an appropriate container and seal. Dispose of in accordance with Federal, State, and local hazardous waste disposal regulations (see Section 13, Disposal Considerations).

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

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting the ink ON YOU or IN YOU. Avoid breathing vapors, mists, or sprays that may be generated by the ink.

STORAGE AND HANDLING PRACTICES: All employees who handle this material should be trained to handle it safely. Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Store away from incompatible materials (see Section 10, Stability and Reactivity).

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.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the limits provided in Section 2 (Composition and Information on Ingredients). Use local exhaust ventilation. Normal office ventilation conforming to the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Standards is adequate under normal circumstances of use. Persons using these products should consult a qualified Ventilation Engineer and/or Industrial Hygienist if concerns about exposures arise.

As with all products that contain chemicals, ensure proper decontamination equipment (i.e., eyewash/safety shower stations) are available near areas where these products are used, as necessary.

RESPIRATORY PROTECTION: None needed under normal circumstances of use. If respiratory protection is needed (i.e., during spill response), use only protection authorized in 29 CFR 1910.134 or applicable State regulations.

EYE PROTECTION: None needed under normal circumstances of use. Splash goggles or safety glasses should be worn during operations in which sprays of ink may occur.

HAND PROTECTION: Wear butyl rubber gloves for routine use to prevent staining. Check gloves for leaks.

BODY PROTECTION: None needed under normal circumstances of use. Use body protection appropriate for task (i.e., rubber apron when cleaning equipment; Tyvek suit and rubber boots during non-incidental spill response).

9. PHYSICAL and CHEMICAL PROPERTIES

VAPOR DENSITY (air = 1): 5

EVAPORATION RATE (n-BuAc = 1): 0.25–0.45

SPECIFIC GRAVITY (water = 1): 0.76

MELTING/FREEZING POINT: Not established.

SOLUBILITY IN WATER: Insoluble.

BOILING POINT: 160–180°C (320–356°F)

VAPOR PRESSURE, mm Hg @ 20°C: 1

pH: Not applicable.

ODOR THRESHOLD: Not available.

COEFFICIENT OF OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT): Not available.

APPEARANCE AND COLOR: These products consist of 8 and 16 ounces of magenta ink with a faint petroleum odor.
HOW TO DETECT THIS SUBSTANCE (warning properties): The appearance of these products is a distinguishing characteristic.

10. STABILITY and REACTIVITY

STABILITY: Stable.

DECOMPOSITION PRODUCTS: If exposed to extremely high temperatures, the components of these products can decompose to generate carbon monoxide and carbon dioxide.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong oxidizers, strong bases, strong acids.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Exposure or contact with extremely high temperatures, incompatible chemicals.

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

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The specific toxicology data available for components of these products are as follows.

D & C RED NUMBER 7:
Currently, there are no toxicological data available for this compound.

ISOPAR G:
LD_{50} (oral rat) > 5 g/kg
LD_{50} (dermal, rabbit) >3.16 g/kg

METHACRYLIC ACID / METHYL METHACRYLATE / VINYL ACETATE COPOLYMER COMPOUND
Currently, there are no toxicological data available for this compound.

SUSPECTED CANCER AGENT: These products' components are not found on the following lists: FEDERAL OSHA Z LIST, NTP, IARC, and CAL/OSHA and therefore are not considered to be, nor suspected to be, cancer-causing agents by these agencies.

IRRITANCY OF PRODUCT: Prolonged skin contact may be irritating. Contact with the eyes will be irritating and may cause temporary visual impairment.

SENSITIZATION TO THE PRODUCT: No component of these products is known to be a sensitizer with prolonged or repeated use.

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

Mutagenicity: These products are not reported to produce mutagenic effects in humans.
Embryotoxicity: These products are not reported to produce embryotoxic effects in humans.
Teratogenicity: These products are not reported to cause teratogenic effects in humans.
Reproductive Toxicity: These products are not reported to cause reproductive effects in humans.

A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An embryotoxin is a chemical which 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 which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with the reproductive process.

BIOLOGICAL EXPOSURE INDICES: Currently, there are no Biological Exposure Indices (BEIs) associated with the components of these products.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Preexisting dermatitis, other skin disorders, and respiratory conditions may be aggravated by exposure to these products.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate over-exposure.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY: The components of these products are relatively stable under ambient environmental conditions.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: These products may be harmful to plant or animal life, especially if large volumes are released. Refer to Section 11 (Toxicological Information) for specific information regarding the effects of these products' components on test animals. Plants can be discolored and damaged (depending on the severity of the contamination).

EFFECT OF CHEMICAL ON AQUATIC LIFE: These products may be harmful to aquatic plant or animal life, especially if large volumes are released into a body of water.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. These products, 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: D001 (Characteristic/Ignitability) applicable to wastes consisting only of these products.

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION. See note below for exception.

PROPER SHIPPING NAME: Printing ink, flammable
HAZARD CLASS NUMBER and DESCRIPTION: 3 (Flammable)
UN IDENTIFICATION NUMBER: UN 1210
PACKING GROUP: III
DOT LABEL(S) REQUIRED: FLAMMABLE LIQUID
NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER, 1996: 129.
MARINE POLLUTANT: No component of this product is designated by the DOT to be a Marine Pollutant (per Appendix B to 49 CFR 172.101).

NOTE: This product can be classified as a combustible liquid. An exception for Class 3 (flammable) and combustible liquids (49 CFR 173.150) is applicable to this product when non-aircraft shipments have a maximum quantity per inner packaging of less than 5L [1.3 gallons].

TRANSPORT CANADA, TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. Refer to above information for Canadian shipments.

IATA DESIGNATION: THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS BY THE INTERNATIONAL AIR TRANSPORT ASSOCIATION. Refer to above information for air shipments. See note below for exception.

PASSENGER AIRCRAFT: Packing instructions: 309, *Y309*
Maximum Net Quantity: 60 L, *10 L*
CARGO AIRCRAFT: Packing instructions: 310
Maximum Net Quantity: 220 L

NOTE: This product may be shipped under the Limited Quantities of Dangerous Goods Regulations (4.1.5) of IATA. If this product is shipped under the Limited Quantities of Dangerous Goods Regulations, use the information provided above in italics.

14. TRANSPORTATION INFORMATION (Continued)

IMO DESIGNATION: THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS BY THE INTERNATIONAL MARITIME ORGANIZATION. See note below for limited quantities.

PROPER SHIPPING NAME:	Printing ink, flammable
HAZARD CLASS NUMBER and DESCRIPTION:	3.3 (Flammable liquids)
UN IDENTIFICATION NUMBER:	UN 1210
PACKING GROUP:	III
LABEL(S) REQUIRED:	FLAMMABLE LIQUID

MARINE POLLUTANT: This product is not designated by the IMO to be a Marine Pollutant.

NOTE: This product may be shipped under the Dangerous Goods in Limited Quantities Regulations (IMGD CODE Amendment 28-96 Section 18). The maximum quantity per inner packaging for Class 3, Packing Group III materials is 5 L.

15. REGULATORY INFORMATION

ADDITIONAL UNITED STATES REGULATIONS:

SARA REPORTING REQUIREMENTS: The components of these products are not subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act.

SARA THRESHOLD PLANNING QUANTITY: Not applicable.

TSCA INVENTORY STATUS: All components of these products are listed on the TSCA Inventory.

CERCLA REPORTABLE QUANTITY (RQ): Not applicable.

OTHER FEDERAL REGULATIONS: Not applicable.

STATE REGULATORY INFORMATION: Components of these products are covered under specific State regulations, as denoted below:

Alaska - Designated Toxic and Hazardous Substances: None.
California - Permissible Exposure Limits for Chemical Contaminants: None.
Florida - Substance List: None.
Illinois - Toxic Substance List: None.
Kansas - Section 302/313 List: None.
Massachusetts - Substance List: None.
Michigan - Critical Materials Register: None.
Minnesota - List of Hazardous Substances: None.
Missouri - Employer Information/Toxic Substance List: None.
New Jersey - Right to Know Hazardous Substance List: None.
North Dakota - List of Hazardous Chemicals, Reportable Quantities: None.
Pennsylvania - Hazardous Substance List: None.
Rhode Island - Hazardous Substance List: None.
Texas - Hazardous Substance List: None.
West Virginia - Hazardous Substance List: None.
Wisconsin - Toxic and Hazardous Substances: None.

CALIFORNIA PROPOSITION 65: No component of these products is on the California Proposition 65 lists.

LABELING (Precautionary Statements): **CAUTION!** COMBUSTIBLE LIQUID AND VAPOR. INHALATION AND INGESTION MAY BE FATAL. MAY CAUSE SKIN AND EYE IRRITATION. CAN DISCOLOR CONTAMINATED SKIN, EYES, HAIR AND CLOTHES. FOR INDUSTRIAL USE ONLY. KEEP OUT OF REACH OF CHILDREN. Use with adequate ventilation. Keep away from heat, sparks, or open flame. Avoid contact of ink with skin, eyes, and clothing. Avoid exposure to vapors, mists, or sprays. Wash thoroughly after handling. Wear appropriate hand and eye protection. FIRST-AID: In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. 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 irritation develops or persists, or if any other adverse effect occurs. IN CASE OF FIRE: Use water fog, dry chemical, or CO_2, or alcohol foam. IN CASE OF SPILL: Absorb spill with inert materials (e.g., polypads, dry sand). Rinse area with soapy water. Consult Material Safety Data Sheet for additional information.

TARGET ORGANS: Skin and eyes.

ADDITIONAL CANADIAN REGULATIONS:

WHMIS SYMBOLS: B3**:** Combustible Liquids.

15. REGULATORY INFORMATION (Continued)

EUROPEAN ECONOMIC COMMUNITY INFORMATION:

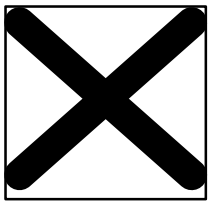
EEC Labeling/Classification: This product is considered to be dangerous according to current European Economic Community Guidelines. This product meets the definition of EEC hazard class Xn (Harmful) based on the presence of > 80% Isopar G.

Symbols: Xn
Risk Phrases: Harmful. May cause lung damage if swallowed. Flammable. [R: 65–10]
Safety Phrases: Do not breathe vapors, mists, or sprays. Avoid contact with skin. In case of fire use sand, earth, chemical powder, or foam. Never use water. If swallowed, do not induce vomiting; seek medical advice immediately and show this container or label. [S: 23–24–43a–62]

Note: Specific components of this product have classifications, as follows:

ISOPAR G:
EU RISK PHRASES: Harmful. May cause lung damage if swallowed. Flammable. [R: 65–10]
EU SAFETY PHRASES:
Do not breathe vapors, mists, or sprays. Avoid contact with skin. In case of fire use sand, earth, chemical powder, or foam. Never use water. If swallowed, do not induce vomiting; seek medical advice immediately and show this container or label [S: 23–24–43a–62]

EUROPEAN ECONOMIC COMMUNITY ANNEX II HAZARD SYMBOL: T.



16. OTHER INFORMATION

PREPARED BY: CHEMICAL SAFETY ASSOCIATES, Inc.
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(619) 565 - 0302

DATE OF PRINTING: June 23, 1998

The data in this Material Safety Data Sheet is true and accurate to the best of CalComp Technology Inc. knowledge. However, since data, safety standards, and government regulations are subject to change conditions of handling, use, or misuse are beyond CalComp Technology, Inc. control, CALCOMP MAKES NO WARRANTY, EITHER EXPRESSED OR IMPLIED, WITH RESPECT TO THE COMPLETENESS OR CONTINUING ACCURACY OF THE INFORMATION CONTAINED HEREIN AND DISCLAIMS ALL LIABILITY FOR RELIANCE THEREON. The user is required to comply with all laws and regulations relating to the purchase, use, storage, and disposal of the product. User must be familiar with and follow generally accepted safe handling procedures of chemicals, and is solely responsible for any effects caused by its misuse or mixing of this chemical with any other substance.

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 which uniquely identifies each constituent. It is used for computer-related searching.

EINECS #: This is the European Inventory of Existing Commercial Chemical Substances Number which uniquely identifies each constituent.

EXPOSURE LIMITS IN AIR:
ACGIH - American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits.
TLV - Threshold Limit Value - an airborne concentration of a substance which 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 **Time Weighted Average (TWA)**, the 15-minute **Short Term Exposure Limit (STEL)**, and the instantaneous **Ceiling Level**. Skin absorption effects must also be considered.
OSHA - U.S. Occupational Safety and Health Administration.
PEL - Permissible Exposure Limit - 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 which was vacated by Court Order.
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. **The DFG - MAK** is the Republic of Germany's Maximum Exposure Level, similar to the U.S. PEL. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. **O**ccupational **S**afety and **H**ealth **A**dministration (**OSHA**). NIOSH issues exposure guidelines called **R**ecommended **E**xposure **L**evels (**REL**s). When no exposure guidelines are established, an entry of **NE** is made for reference.

HAZARD RATINGS:
HAZARDOUS MATERIALS IDENTIFICATION SYSTEM: Health Hazard: **0** (minimal acute or chronic exposure hazard); **1** (slight acute or chronic exposure hazard); **2** (moderate acute or significant chronic exposure hazard); **3** (severe acute exposure hazard; onetime over-exposure can result in permanent injury and may be fatal); **4** (extreme acute exposure hazard; onetime over-exposure can be fatal). Flammability Hazard: **0** (minimal hazard); **1** (materials that require substantial pre-heating before burning); **2** (combustible liquid or solids; liquids with a flash point of 38-93°C [100-200°F]); **3** (Class IB and IC flammable liquids with flash points below 38°C [100°F]); **4** (Class IA flammable liquids with flash points below 23°C [73°F] and boiling points below 38°C [100°F]. Reactivity Hazard: **0** (normally stable); 1 (material that can become unstable at elevated temperatures or which can react slightly with water); **2** (materials that are unstable but do not detonate or which can react violently with water); **3** (materials that can detonate when initiated or which can react explosively with water); **4** (materials that can detonate at normal temperatures or pressures).
NATIONAL FIRE PROTECTION ASSOCIATION: Health Hazard: **0** (material that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials); **1** (materials that on exposure under fire conditions could cause irritation or minor residual injury); **2** (materials that on intense or continued exposure under fire conditions could cause temporary incapacitation or possible residual injury); **3** (materials that can on short exposure could cause serious temporary or residual injury); **4** (materials that under very short exposure could cause death or major residual injury). Flammability Hazard and Reactivity Hazard: Refer to definitions for "Hazardous Materials Identification System".

FLAMMABILITY LIMITS IN AIR:
Much of the information related to fire and explosion is derived from the **N**ational **F**ire **P**rotection **A**ssociation (**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:
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. Data from several sources are used to evaluate the cancer-causing potential of the material. 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 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 death. **BEI** - 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.

REGULATORY INFORMATION:
This section explains the impact of various laws and regulations on the material. **EPA** is the U.S. Environmental Protection Agency. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **DOT** and **TC** are the U.S. Department of Transportation and the Transport Canada, respectively. Other acronyms used are: **Superfund Amendments and Reauthorization Act (SARA)**; the **Toxic Substance Control Act (TSCA)**; Marine Pollutant status according to the **DOT**; California's Safe Drinking Water Act (**Proposition 65**); 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.