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CHEMETALL FOOTE CORPORATION

MATERIAL SAFETY DATA SHEET

SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

CHEMETALL FOOTE CORPORATION
348 HOLIDAY INN DRIVE
KINGS MOUNTAIN, NC 28086
704-739-2501 (8 AM - 5 PM M-F)

FOR EMERGENCY TRANSPORTATION INFORMATION, CALL CHEMTREC
1-800-424-9300

SUBSTANCE: LITHIUM BROMIDE BRINE with MOLYBDATE INHIBITOR

TRADE NAMES/SYNONYMS: LITHIUM BROMIDE BRINE with MOLYBDATE INHIBITOR
PRODUCT CODE(s): CFM 087
CHEMICAL FAMILY: Inorganic Salt Solution
FORMULAS: $LiBr/H_20/Li_2MoO_4$
CREATION DATE: 4/12/96 REVISION DATE: 10/21/98

SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

Component	CAS#	% w/w	Exposure Limits in Air				
			ACGIH		OSHA		OTHER
			TLV	STEL	PEL	STEL	
Lithium Bromide	7550-35-8	54-56	10 mg/m^3; Inhalable Particulate; 3 mg/m^3, Respirable Particulate (Particulates not Otherwise Classified)	NE	5 mg/m^3; Respirable fraction 15 mg/m^3 ; Total Dust (Particulates not Otherwise Classified)	NE	NE
Lithium Molybdate	13568-40-6	<1	Molybdenum, Soluble Compounds: 5 mg/m^3	NE	Molybdenum, Soluble Compounds: 5 mg/m^3	NE	DFG MAK: Molybdenum, Soluble Compounds: 5 mg/m^3
Water	7732-18-5	Balance	NE	NE	NE	NE	NE

NE = Not Established. C = Ceiling Limit. See Section 16 for Definitions of Terms Used.
NOTE: All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1993 format.

SECTION 3 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: This is a clear, colorless and odorless solution. Lithium Bromide Brine poses a slight health hazard (in terms of irritation of contaminated skin and eyes) during typical emergency response situations. This product is not flammable. This product is not reactive under most circumstances.

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: The most serious health consequences reported for lithium compounds, such as lithium bromide or lithium molybdate, are adverse effects on the central nervous system from over-exposures via ingestion. In terms of anticipated occupational over-exposure situations for employees, the main health effect from over-exposure would be irritation or burns of contaminated skin and eyes.

SECTION 3 HAZARDS IDENTIFICATION (Continued)

INHALATION: Inhalation of mists or sprays of this product may irritate the eyes, nose, and respiratory system. Inhalation of relatively large doses of this product may produce symptoms such as ringing in the ears, nausea, vomiting, diarrhea, drowsiness, twitching and blurred vision. Additionally, inorganic bromides (such as lithium bromide, a component of this product) can cause rashes, which resemble acne, after prolonged inhalation over-exposures.

CONTACT WITH SKIN or EYES: Lithium bromide, the main component of this product, is a severe skin irritant. Over-exposure of the skin can lead to itching, pain, and reddening. Prolonged or repeated skin exposures can lead to dermatitis (inflammation of the outer layer of the skin). This product can cause eye irritation; symptoms of such over-exposure would be pain and reddening of the eye tissue. Prolonged eye contact may result in damage to eye tissues.

SKIN ABSORPTION: Skin absorption is not a significant route of exposure for any component of this product.

INGESTION: Ingestion of large doses of this product can impact the central nervous system, which can produce symptoms which appear as "drunkenness" (i.e. drowsiness, stumbling, dizziness, personality change). Repeated ingestion of this product may cause rash, ringing in the ears, nausea, vomiting, diarrhea, difficulty in speaking, drowsiness, twitching, visual disturbances and coma. Ingestion of relatively large quantities of lithium bromide, the main component of this product, can result in kidney damage. Inorganic bromides (such as lithium bromide, a component of this product) can also cause rashes, which resemble acne, after prolonged ingestion over-exposures.

INJECTION: Over-exposure via injection of this product can lead to pain and irritation at the point of injection; additionally, symptoms such as those described for "Ingestion" may develop.

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

ACUTE: In terms of occupational use situations, the chief health effect anticipated after over-exposure would be irritation of contaminated skin and eyes.

CHRONIC: Dermatitis (cracking and reddening of the skin) may develop after prolonged or repeated skin contact with this product. Long-term over-exposure via inhalation or ingestion can produce symptoms such as rash, ringing in the ears, nausea, vomiting, diarrhea, difficulty speaking, drowsiness, twitching, visual disturbances and coma. Inorganic bromides (such as lithium bromide, a component of this product) can also cause rashes, which resemble acne, after prolonged ingestion or inhalation over-exposures.

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM RATING: Health Hazard = 2; Fire Hazard = 0; Reactivity Hazard Rating = 0; PPE Rating = C

SECTION 4 FIRST-AID MEASURES

SKIN EXPOSURE: If this product is contaminates the skin, immediately begin decontamination with running water. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Victims must seek immediate medical attention.

EYE EXPOSURE: If the solution is splashed in eyes, open victim's eyes while under gentle running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 15 minutes. Victims must seek immediate medical attention.

INHALATION: If mists or sprays of the solution are inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Remove or cover gross contamination to avoid exposure to rescuers.

INGESTION: If this product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, induce vomiting (only if victim is conscious and is not having convulsions). Victim should drink milk, egg whites, or large quantities of water. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or who cannot swallow.

Victims of chemical exposure must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to physician or health professional with victim.

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SECTION 5 FIRE-FIGHTING MEASURES

FLASH POINT, °C (method): Not flammable.
AUTOIGNITION TEMPERATURE, °C: Not applicable.
FLAMMABLE LIMITS (in air by volume): Not applicable.
FIRE EXTINGUISHING MATERIALS: This product is not flammable. Use fire extinguishing material appropriate for surrounding fires.

Water Spray: YES Carbon Dioxide: YES Foam: YES Dry Chemical: YES Halon: YES Other: Any "ABC" Class.

UNUSUAL FIRE AND EXPLOSION HAZARDS: When involved in a fire, this material may evaporate or decompose to produce irritating fumes and toxic gases (lithium compounds, hydrogen bromide, molybdenum compounds).

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 fire fighters must wear Self-Contained Breathing Apparatus and full protective equipment. If possible, fire-fighters should control run-off water to prevent environmental contamination.

NFPA RATING: Health Hazard = 2; Fire Hazard = 0; Reactivity Hazard Rating = 0.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a spill, clear the affected area, protect people, and respond with trained personnel. The minimum Personal Protective Equipment recommended for response to non-incidental releases should be **Level C: triple-gloves (rubber gloves and nitrile gloves, over latex gloves), chemically resistant suit and boots, hard-hat, and air-purifying respirator with high-efficiency particulate filter. Self-Contained Breathing Apparatus would be worn in situations where the oxygen level is below 19.5 % or is unknown.** Use polypads or other suitable absorbent to clean-up spilled liquid. Avoid the generation of aerosols or mists. Decontaminate the area thoroughly. Place all spill residue in a double plastic bag and seal. Dispose of in accordance with Federal, State, and local solid waste disposal regulations (see Section 13, Disposal Considerations).

SECTION 7 HANDLING AND STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash hands after handling this product. Do not eat, drink, or smoke while handling this product. Remove contaminated clothing immediately. Use ventilation and other engineering controls to minimize potential exposure to this product.

STORAGE AND HANDLING PRACTICES: All employees who handle this material should be trained to handle it safely. Avoid breathing mists or sprays generated by this product. Always use this product in well-ventilated areas. Ensure containers of this product are properly labeled. Open containers slowly, on a stable surface. Close containers tightly after use. Wash thoroughly after using this material.

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). Periodically inspect containers of this product for leaks or damage. Read instructions provided with the product prior to use. Empty containers may contain residual material; therefore, empty containers must be handled with care.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged-out safely, as applicable. Always use this product in areas where adequate ventilation is provided. Decontaminate equipment using soapy water before maintenance begins. Collect all rinsates and dispose of according to applicable Federal, State, or local procedures.

Note: When steel equipment containing a film of lithium bromide salt is heated red-hot (for example, when cutting the steel with an oxy-acetylene torch), a small amount of elemental bromine gas could be liberated. This gas, which is reddish in color, can be smelled at low concentrations (Odor Threshold = 0.00999 ppm), and has an irritating odor. Bromine is also a lacrymator (can cause eyes to water uncontrollably). Therefore, all pipelines, process lines, and other equipment which contained lithium bromide solution must be thoroughly decontaminated before maintenance begins.

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SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation, to ensure exposures are below limits provided in Section 2 (Composition and Information on Ingredients). Mechanical exhaust may be needed. Emergency eye wash: Where there is any possibility that an employee's eyes may be exposed to this substance, the employer should provide an eye wash fountain within the immediate work area for emergency use.

RESPIRATORY PROTECTION: Respiratory protection is not generally needed when using this product. Maintain airborne contaminant concentrations below exposure limits listed in Section 2 (Composition and Information on Ingredients). If respiratory protection is needed, use only protection authorized in 29 CFR 1910.134, or applicable State regulations. Use supplied air respiration protection if oxygen levels are below 19.5% or are unknown.

EYE PROTECTION: Splash goggles or safety glasses.
HAND PROTECTION: Wear neoprene gloves for routine industrial use.
BODY PROTECTION: Use body protection appropriate for task (i.e. Apron or Tyvek suit).

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

VAPOR DENSITY: Approximately 17 g/m^3.
EVAPORATION RATE (water=1): < 1
SPECIFIC GRAVITY: Not available.
FREEZING/MELTING POINT: Not available.
SOLUBILITY IN WATER: Soluble.
BOILING POINT: 138 °C, (280 °F)
VAPOR PRESSURE, mm Hg @ 21 °C: 3.5
pH: Not available.
ODOR THRESHOLD: Not applicable.
LOG of OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT): Not available.

APPEARANCE AND COLOR: Clear, colorless solution which is also odorless.
HOW TO DETECT THIS SUBSTANCE (warning properties): The product does not have any unique warning properties.

SECTION 10 STABILITY AND REACTIVITY

STABILITY: Stable.
DECOMPOSITION PRODUCTS: Thermal decomposition of the components of this product include hydrogen bromide, lithium compounds, and molybdenum compounds.
MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: This product is not compatible with water-reactive materials, strong acids and strong oxidizers.
HAZARDOUS POLYMERIZATION: Will not occur.
CONDITIONS TO AVOID: Avoid mixing this product with incompatible chemicals.

SECTION 11 TOXICOLOGICAL INFORMATION

TOXICITY DATA: Additional toxicology information for components of this product greater than 1 percent in concentration is provided below:

LITHIUM BROMIDE:
LD_{50} (subcutaneous, mouse) = 1680 mg/kg

LITHIUM MOLYBDATE: No specific toxicology data is currently available for this component of the product. In general, molybdenum and its compounds are highly toxic, based on animal experiments. Symptoms of acute poisoning include severe gastrointestinal irritation with diarrhea coma, and death from heart failure. Experimental animals exposed to high levels of molybdenum dust for 120 days accumulated molybdenum in the lungs, spleen, and heart, and showed a decrease of DNA and RNA in the liver, kidneys, and spleen.

Workers exposed to molybdenum trioxide (concentrations of 1-19 mg Mo/m^3) over a period of 3-7 years have suffered pneumoconiosis. The toxicity of molybdenum trioxide was reported, as follows: LD_{50} (oral, rat) = 125 mg/kg.

SUSPECTED CANCER AGENT: The components of this product are not found on the following lists: NTP, IARC, Federal OSHA and therefore are not considered to be, or suspected to be, cancer-causing agents by these agencies.

IRRITANCY OF PRODUCT: This product is expected to cause irritancy to the skin. Mild eye irritation may occur if this product gets into the eyes.

SENSITIZATION TO THE PRODUCT: No component of this product is known to be a sensitizer.

SECTION 11 TOXICOLOGICAL INFORMATION (Continued)

REPRODUCTIVE TOXICITY INFORMATION: Overexposures to lithium bromide, a component of this product, may cause reproductive disorders, based on clinical tests with laboratory animals.

Mutagenicity: This product is not reported to produce mutagenic effects in humans.

Embryotoxicity: This product is not reported to produce embryotoxic effects in humans.

Teratogenicity: This product is not reported to produce teratogenic effects in humans.

Reproductive Toxicity: This product is not reported to produce adverse 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.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing respiratory, skin, central nervous system, and kidney conditions can be aggravated by over-exposure to this product.

RECOMMENDATIONS TO PHYSICIANS: Currently there are no Biological Exposure Index (BEI) for the components of this product. Additional detailed toxicology information is presented in the sections below:

LITHIUM SALTS:

ACUTE EXPOSURE: Ingestion of a large dose of lithium salts may cause severe gastroenteritis and effects on the central nervous system, renal function and fluid and electrolyte balance. Symptoms, possibly delayed, may include nausea, vomiting, thirst, anorexia, diarrhea, blurred vision, drowsiness, weakness, tremor, staggering, bradycardia and coma. More unusual reactions may include delirium with EEG changes, action myoclonus, rhabdomyolysis, ECG changes, glycosuria, and allergic erythema. A painful discoloration of the fingers and toes and coldness of the extremities within 1 day of therapeutic use has been reported. In severe cases, death may occur due to renal failure or cardiac or pulmonary complications. Some survivors may have long-lasting or permanent sequelae, mostly of cerebellar nature but, sometimes with peripheral neuropathy or parkinsonism.

CHRONIC EXPOSURE: Repeated or prolonged ingestion of lithium salts may cause symptoms as detailed in acute ingestion. In addition, a metallic taste, dry mouth, excessive thirst, abdominal pain and incontinence of urine and feces may occur. Nervous system effects may include a dazed feeling, confusion, giddiness, mental lapses, dyspraxia, drowsiness, vertigo, headache, apathy, restlessness, anxiety, some suppression of the rem phases of sleep, positive Romberg sign, blackout spells, stupor, tinnitus, unconsciousness and coma. Neurologic asymmetry, psychomotor retardation, slurred speech, nystagmus, changes in the EEG and epileptiform seizures may occur. Pseudotumor cerebri (increased intracranial pressure and papilledema) has been reported and may possibly result in enlargement of the blind spot, constriction of visual fields and eventual blindness due to optic atrophy. Photophobia has been reported. Muscular effects may include tremors, ataxia, muscular and reflex hyperirritability with fasiculations, twitching and spastic or choreo-athetotic movements, cogwheel rigidity, parkinsonism and dystonia. Two cases involving severe generalized sensorimotor peripheral neuropathy have been reported. ECG changes, cardiac arrhythmias, hypotension, peripheral circulatory collapse, and interstitial myocarditis are possible. Leukocytosis is fairly common. Endocrine effects may include disturbed iodine metabolism, stimulation of antithyroidal auto-antibodies, hypothyroidism with myxedema, or rarely hyperthyroidism. Osteoporosis, an increase in serum total calcium, ionized calcium and parathyroid hormone and independently functioning parathyroid adenomas have been reported. Transitory nephrotic syndrome and acquired nephrogenic diabetes insipidus may occur. Transient hyperglycemia, lowered urinary concentrating ability leading to hypernatremia and hyperosmolality, sodium depletion, polyuria, glycosuria, oliguria, anuria, and azotemia are possible. Morphologic changes with glomerular and interstitial fibrosis and nephron atrophy have been reported. However, a causal relationship has not been established. Dermatologic effects may include cutaneous hyperalgesia or anesthesia, xerosis cutis, chronic folliculitis, generalized pruritus with or without rash, development or exacerbation of acne or psoriasis, cutaneous ulcers and alopecia. Hyper- or hypothermia, weight gain, edema of the ankles and wrists and sexual dysfunction have been reported. Death may occur due to renal failure, brain damage or pulmonary complications. Lithium readily crosses the placental barrier and is excreted in breast milk. The use of lithium during pregnancy has been associated with neonatal goiter, cardiac anomalies, especially ebstein's, central nervous system depression and hypotonia. Marked functional and structural changes in the kidneys of newborn rats exposed to lithium via their mother's milk have been reported. Adverse effects on nidation in rats and embryo viability in mice have been attributed to lithium, as have teratogenicity in submammalian species and cleft palates in mice. However, studies in rats, rabbits and monkeys have shown no evidence of lithium-induced developmental defects. Leukemia has been reported during lithium treatment. However, an epidemiological study involving a population of 173,000 persons yielded negative results.

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SECTION 11 TOXICOLOGICAL INFORMATION (Continued)

NOTE TO PHYSICIAN:

ANTIDOTE: The following antidote has been recommended. However, the decision as to whether the severity of poisoning requires administration of any antidote and actual dose required should be made by qualified medical personnel.

BROMIDE POISONING: Give sodium chloride, 1 gram orally, every hour in water or as salt tablets; for more severe involvement in which oral medication is impossible, give normal saline, 1 liter every 8 hours intravenously to a maximum of 2 liters daily. Sodium Chloride therapy must be continued until the blood bromide level drops below 50 mg/dL. Simultaneous administration of diuretics is also useful (Dreiscach, Handbook of Poisoning, 12 ed.). The antidote should be administered by qualified medical personnel.

LITHIUM/LITHIUM SALT POISONING: 1) In single ingestion episodes, give syrup of ipecac and/or perform gastric lavage if productive vomiting has not already occurred. 2) Fluid and electrolyte replacement for the correction of dehydration and acid-base imbalances. Overhydration may precipitate pulmonary edema. 3) Infusion of urea or mannitol, alkalinization of the urine and, and aminophylline increase lithium excretion in patients with good renal function. 4) Extracorporeal or peritoneal hemodialysis to decrease lithium levels and control uremia in severe intoxications. If a massive overdose is known with certainty to have been ingested, it may be prudent to institute these measures even in the absence of positive clinical findings because of severe delayed toxicity. 5) Diazepam for the suppression of abnormal motor activity. 6) Support treatment for central nervous system depression. 7) Frequent electrocardiograms to assess cardiac status.

References and Notes: Gosselin, Smith, Hodge - Clinical Toxicology of Commercial Products, Fifth Edition. Activated charcoal does not bind lithium effectively and is not useful in isolated lithium toxicity. (Groleau, Lithium Toxicity, Emergency Medicine Clinics of North America, Volume 12, Number 2, May, 1994). Raising the sodium intake does not increase lithium clearance (Thomsen, K. Renal lithium elimination in man and active treatment of lithium poisoning. Acta Psychiatr. Scand., Suppl. No. 207:83-84,1969).

SECTION 12 ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: Lithium Bromide and the other inorganic salt components of this product are stable in the environment.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: The effects on exposed animals would be primarily irritation of contaminated tissue (see Section 11, Toxicological Information). The main effect on plants would be the increase in salinity of contaminated soils if large volumes of this product are released. As with all chemicals, work practices should be aimed at eliminating environmental releases.

EFFECT OF CHEMICAL ON AQUATIC LIFE: Releases of large quantities of this product can be detrimental to an aquatic environment, by altering the salinity of a body of water. As with all chemicals, work practices should be aimed at minimizing environmental releases.

ACUTE AQUATIC TOXICITY: No data available.

DEGRADABILITY: No data available.

LOG BIOCONCENTRATION FACTOR (BCF): No data available.

LOG OCTANOL/WATER PARTITION COEFFICIENT: No data available.

SECTION 13 DISPOSAL CONSIDERATIONS

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

EPA WASTE NUMBER: Not applicable to the product.

SECTION 14 TRANSPORT INFORMATION

THIS MATERIAL 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.

NORTH AMERICAN EMERGENCY RESPONSE GUIDE NUMBER (1996): Not applicable.

SECTION 14 TRANSPORT INFORMATION (Continued)

MARINE POLLUTANT: No component of this product is designated as a Marine Pollutant by the DOT (per 49 CFR 172.101, Appendix B).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS NOT CONSIDERED AS DANGEROUS GOODS.

EMERGENCY RESPONSE CONTACT FOR AN INCIDENT DURING TRANSPORTATION:
CHEMTREC 1-800-424-9300 or 1-703-527-3887

SECTION 15 REGULATORY INFORMATION

SARA REPORTING REQUIREMENTS: The components of this product are subject to the reporting requirements of the Comprehensive Environmental Response, Compensation, and Liability Act and Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act., as follows:

CERCLA SECTION 103 (40 CFR 302.4):	NO
SARA SECTION 302 (40 CFR 355.30):	NO
SARA SECTION 304 (40 CFR 355.40):	NO
SARA SECTION 313 (40 CFR 372.65):	NO

SARA Threshold Planning Quantity: Not applicable.
TSCA INVENTORY STATUS: The components of this product are listed on the TSCA Inventory.
CERCLA REPORTABLE QUANTITY (RQ): Not applicable.
OTHER FEDERAL REGULATIONS: Not applicable.
STATE REGULATORY INFORMATION: No component of this product is 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.
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: The components of this product are not on the California Proposition 65 lists.

LABELING (Precautionary Statements): **WARNING!** CAUSES SKIN AND EYE IRRITATION. MAY BE HARMFUL IF SWALLOWED. CAN CAUSE CENTRAL NERVOUS SYSTEM EFFECTS AND KIDNEY DAMAGE. Avoid contact with skin, eyes, and clothing. Wash thoroughly after handling. Wear gloves, goggles, and appropriate body protection. FIRST-AID: In case of skin or eye contact, flush skin with water for 15 minutes. Remove contaminated clothing and shoes. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. if ingested, do not induce vomiting. Seek medical attention. IN CASE OF FIRE: Use water fog, dry chemical, CO_2, or "alcohol" foam. IN CASE OF SPILL: Absorb spilled product with inert material (i.e. polypads). Place in a suitable container. Consult Material Safety Data Sheet before use.

TARGET ORGANS: Eyes, skin, (via inhalation or ingestion: central nervous system, kidneys).
WHMIS SYMBOLS: D2B - Other Toxic Effects (see Section 16, Other Information).

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SECTION 16 OTHER INFORMATION

REVISIONS – Changed company name

The information in this Material Safety Data Sheet is based on data that Chemetall Foote Corporation believes to be reliable as of the MSDS's date of revision. Chemetall Foote Corporation makes no warranty or representation of any kind that the MSDS does not contain errors. The data in this MSDS relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process. It is intended for use by persons having technical skill and at their own discretion and risk. Since conditions of use are outside the control of Chemetall Foote Corporation, there are no warranties, expressed or implied, and Chemetall Foote Corporation assumes no liability in connection with the use of this information. Nothing herein is to be taken as a license to operate under or a recommendation to infringe on any patents. Any use of these data and information must be determined by the user to be in accordance with Federal, State and local laws and regulations.

PREPARED BY:

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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.

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**, and the instantaneous **Ceiling Level**. Skin adsorption 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. Occupational Safety and Health Administration (**OSHA**). NIOSH issues exposure guidelines called Recommended Exposure Levels (**RELs**). When no exposure guidelines are established, an entry of **NE** is made for reference.

FLAMMABILITY LIMITS IN AIR:

Much of the information related to fire and explosion is derived from the National Fire Protection Association (**NFPA**). 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 Transport Canada, respectively. The following laws a pertinent to the information presented in the MSDS: **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).** This section also includes information on the precautionary warnings which appear on the materials package label.

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SECTION 16 OTHER INFORMATION (Continued)

GRAPHICAL REPRESENTATION OF HAZARDS

HAZARDOUS MATERIAL INFORMATION SYSTEM RATING

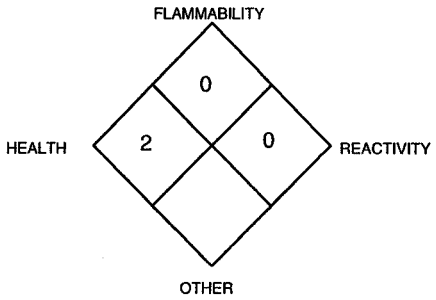
HAZARDOUS MATERIAL INFORMATION SYSTEM

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

EYES	RESPIRATORY	HANDS	BODY
	SEE SECTION 8		

For routine industrial applications

NATIONAL FIRE PROTECTION SYSTEM RATING



WHMIS SYMBOL