

Material Safety Data Sheet

Material Name: Ferrous Sulfate Heptahydrate

ID: C1-124

*** Section 1 - Chemical Product and Company Identification ***

Chemical Name: Ferrous Sulfate Heptahydrate

Product Use: For Commercial Use

Synonyms: Ferrous monosulfate, heptahydrate; Iron (II) sulfate; Copperas

Supplier Information

Chem One Ltd.

14140 Westfair East Drive

Houston, Texas 77041-1104

Phone: (713) 896-9966

Fax: (713) 896-7540

Emergency # (800) 424-9300 or (703) 527-3887

General Comments: FOR COMMERCIAL USE ONLY; NOT TO BE USED AS A PESTICIDE.

NOTE: Emergency telephone numbers are to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure, or accident involving chemicals. All non-emergency questions should be directed to customer service.

*** Section 2 - Composition / Information on Ingredients ***

CAS #	Component	Percent
7782-63-0	Ferrous Sulfate Heptahydrate	> 99

Component Related Regulatory Information

This product may be regulated, have exposure limits or other information identified as the following: Iron Salts (soluble).

Component Information/Information on Non-Hazardous Components

Ferrous Sulfate Heptahydrate is considered hazardous under 29 CFR 1910.1200 (Hazard Communication).

*** Section 3 - Hazards Identification ***

Emergency Overview

Ferrous Sulfate Heptahydrate is a blue-green, crystalline or granular solid. The primary health hazard associated with exposure to this compound is the potential for irritation of the eyes, skin, nose and other tissues which come in contact with dusts or particulates of Ferrous Sulfate Heptahydrate. Ferrous Sulfate Heptahydrate is not flammable or reactive. Thermal decomposition of Ferrous Sulfate Heptahydrate produces irritating vapors and toxic gases (e.g. sulfur oxide). Emergency responders should wear proper personal protective equipment for the releases to which they are responding.

Hazard Statements

CAUTION! May cause irritation to eyes, skin, respiratory tract and gastrointestinal system. Harmful if swallowed. Chronic Exposure may cause adverse liver effects. Target organs affected from poisoning may include the liver, kidneys, digestive, circulatory, cardiovascular, and central nervous systems. Avoid contact with eyes and skin. Avoid breathing dusts. Wash thoroughly after handling. Keep container closed. Use with adequate ventilation.

Potential Health Effects: Eyes

Exposure to particulates or solution of Ferrous Sulfate Heptahydrate may cause moderate to severe irritation of the eyes with symptoms such as stinging, tearing and redness. Prolonged exposure of the eyes may cause discoloration to the sclera. Prolonged, low level contact with corrosives may result in conjunctivitis.

Potential Health Effects: Skin

Ferrous Sulfate Heptahydrate can cause irritation of the skin, especially after prolonged exposures. Repeated skin contact may lead to dermatitis (red, cracked skin).

Potential Health Effects: Ingestion

Ferrous Sulfate Heptahydrate is harmful if swallowed. Ingestion of concentrated solutions or powder may cause nausea, vomiting, diarrhea, and black stools. Pink to red-brown discoloration of the urine is an indication of iron poisoning. Severe hemorrhagic gastritis with abdominal pain, retching, and violent diarrhea may occur. Circulatory system may be affected with symptoms of shock, rapid, weak or no pulse, and severe hypotension may occur. Smaller doses are much more toxic to children in comparison to adults. Chronic ingestion may result in adverse effects on the liver. Severe or chronic Ferrous Sulfate poisonings may damage blood vessels. Large chronic doses cause rickets in infants.

Potential Health Effects: Inhalation

Breathing dusts or particulates generated by Ferrous Sulfate Heptahydrate can lead to irritation of the nose, throat or respiratory system. Symptoms of such exposure could include coughing and sneezing.

HMIS Ratings: Health Hazard: 2* Fire Hazard: 0 Physical Hazard: 0

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

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*** Section 4 - First Aid Measures ***

First Aid: Eyes

If product contacts eyes, get immediate medical attention. Immediately rinse affected eye with plenty of water for at least 15 minutes.

First Aid: Skin

Remove all contaminated clothing. For skin contact, wash the exposed area extremely thoroughly with soap and water. Seek medical attention if irritation persists. Wash all contaminated clothing before reuse.

First Aid: Inhalation

Remove source of contamination or move victim to fresh air. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Get immediate medical attention.

First Aid: Ingestion

DO NOT INDUCE VOMITING, unless directed by medical personnel. Have victim rinse mouth thoroughly with water, if conscious. Never give anything by mouth to a victim who is unconscious or having convulsions. Contact a physician or poison control center immediately.

First Aid: Notes to Physician

Provide general supportive measures. Consult nearest Poison Control Center for all exposures except minor instances of inhalation or skin contact.

*** Section 5 - Fire Fighting Measures ***

Flash Point: Not applicable

Method Used: Not applicable

Upper Flammable Limit (UEL): Not applicable

Lower Flammable Limit (LEL): Not applicable

Auto Ignition: Not applicable

Flammability Classification: Non Combustible

General Fire Hazards

Ferrous Sulfate Heptahydrate is not combustible, and does not contribute to the intensity of a fire. When involved in a fire, this material may decompose and produce irritating vapors, acrid smoke and toxic gases.

Hazardous Combustion Products

When heated to decomposition, Ferrous Sulfate Heptahydrate may emit toxic fumes of sulfur oxide.

Extinguishing Media

Use methods for surrounding fire.

Fire Fighting Equipment/Instructions

Firefighters should wear full protective clothing including self-contained breathing apparatus.

NFPA Ratings: Health: 1 Fire: 0 Reactivity: 0 Other:

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

*** Section 6 - Accidental Release Measures ***

Containment Procedures

Stop the flow of material, if this can be done without risk. Contain the discharged material. If sweeping of a contaminated area is necessary use a dust suppressant agent, which does not react with product (see Section 10 for incompatibility information).

Clean-Up Procedures

Wear appropriate protective equipment and clothing during clean-up. Shovel the material into waste container. Thoroughly wash the area after a spill or leak clean-up. Avoid contamination of soil, and prevent spill residue from running to groundwater or storm drains.

Evacuation Procedures

Evacuate the area promptly and keep upwind of the spilled material. Isolate the spill area to prevent people from entering. Keep materials that burn away from spilled material. In case of large spills, follow all facility emergency response procedures.

Special Procedures

Remove soiled clothing and launder before reuse. Avoid all skin contact with the spilled material. Have emergency equipment readily available.

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* * * Section 7 - Handling and Storage * * *

Handling Procedures

All employees who handle this material should be trained to handle it safely. Do not breathe dust. Avoid all contact with skin and eyes. Use Ferrous Sulfate Heptahydrate only with adequate ventilation. Wash thoroughly after handling.

Storage Procedures

Keep container tightly closed when not in use. Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Material should be stored in secondary containers or in a diked area, as appropriate. Store containers away from incompatible chemicals (see Section 10, Stability and Reactivity). Storage areas should be made of fire-resistant materials. Post warning and "NO SMOKING" signs in storage and use areas, as appropriate. Use corrosion-resistant structural materials, lighting, and ventilation systems in the storage area. Floors should be sealed to prevent absorption of this material. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged. Have appropriate extinguishing equipment in the storage area (i.e., sprinkler system, portable fire extinguishers).

Empty containers may contain residual particulates; therefore, empty containers should be handled with care. Do not cut, grind, weld, or drill near this container. Never store food, feed, or drinking water in containers that held Ferrous Sulfate Heptahydrate. Keep this material away from food, drink and animal feed. Do not store this material in open or unlabeled containers. Limit quantity of material stored.

* * * Section 8 - Exposure Controls / Personal Protection * * *

Exposure Guidelines

A: General Product Information

B: Component Exposure Limits

The exposure limits given are for Iron Salts, soluble as Fe.

ACGIH: as Fe: 1 mg/m³ TWA (related to Iron salts (soluble))

OSHA: as Fe: 1 mg/m³ TWA (related to Iron salts (soluble)) [vacated 1989 PEL]

NIOSH: 1 mg/m³ TWA (related to Iron salts (soluble))

Engineering Controls

Use mechanical ventilation such as dilution and local exhaust. Use a corrosion-resistant ventilation system and exhaust directly to the outside. Supply ample air replacement. Provide dust collectors with explosion vents.

PERSONAL PROTECTIVE EQUIPMENT

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132). Please reference applicable regulations and standards for relevant details.

Personal Protective Equipment: Eyes/Face

Wear safety glasses with side shields (or goggles) and a face shield. If necessary, refer to U.S. OSHA 29 CFR 1910.133.

Personal Protective Equipment: Skin

Where contact is likely, wear chemical resistant gloves, rubber boots, and coveralls. Nitrile gloves are recommended. Gloves should be tested to determine their suitability for prolonged contact with this material. If necessary, refer to U.S. OSHA 29 CFR 1910.138.

Personal Protective Equipment: Respiratory

None required where adequate ventilation conditions exist. If airborne concentrations are above the applicable exposure limits, use NIOSH-approved respiratory protection. 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. 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).

Personal Protective Equipment: General

Have an eyewash fountain and safety shower available in the work area. Use good hygiene practices when handling this material including changing and laundering work clothing after use. Wash hands thoroughly after handling material. Do not eat, drink, or smoke in work areas.

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*** Section 9 - Physical & Chemical Properties ***

Physical Properties: Additional Information

The data provided in this section are to be used for product safety handling purposes. Please refer to Product Data Sheets, Certificates of Conformity or Certificates of Analysis for chemical and physical data for determinations of quality and for formulation purposes.

Appearance:	Blue-green crystals or granules	Odor:	None
Physical State:	Solid	pH:	3.3-5 (5% solution)
Vapor Pressure:	Not applicable	Vapor Density:	Not applicable
Boiling Point:	Decomposes above 572 deg F	Melting Point:	149 deg F
Solubility (H2O):	48.6 g/100g of H2O	Specific Gravity:	1.898 (H2O = 1)
Freezing Point:	Not applicable	Particle Size:	-7 to +60 MESH (crystals or granules)
Softening Point:	Not applicable	Bulk Density:	55lb per cubic ft.
Octanol/H2O Coefficient:	Not available	Volatility:	Not Applicable
Molecular Weight:	278.01	Chemical Formula:	FeSO4•7H2O

*** Section 10 - Chemical Stability & Reactivity Information ***

Chemical Stability

Under normal conditions of temperature and pressure, Ferrous Sulfate Heptahydrate is stable. Ferrous Sulfate Heptahydrate reacts in moist air to form ferric sulfate. Ferrous Sulfate Heptahydrate loses water in dry air and may discolor upon exposure to moist air, forming a brown coating of extremely corrosive, basic ferric sulfate.

Chemical Stability: Conditions to Avoid

Avoid high temperatures, excessive heat and incompatible materials.

Incompatibility

Avoid strong alkalis, soluble carbonates, gold and silver salts, lead acetate, lime water, potassium iodide, potassium, sodium tartrate, sodium borate, and tannin.

Hazardous Decomposition

When heated to decomposition, Ferrous Sulfate Heptahydrate may emit toxic fumes of sulfur oxides.

Hazardous Polymerization

Will not occur.

*** Section 11 - Toxicological Information ***

Acute Toxicity

A: General Product Information

May cause eye, skin, nose, throat and respiratory tract irritation. Ingestion of an approximate volume or 5 grams or less can produce drowsiness, irritability, abdominal pain, nausea, vomiting and bloody stools. Delayed symptoms can include fluid in the lungs, liver abnormalities, shock, coma and breakdown of the stomach and intestinal lining. Death has resulted from ingestion of less than an ounce. Smaller doses are much more toxic to children in comparison to adults.

Chronic: Long term skin overexposure to Ferrous Sulfate Heptahydrate may lead to dermatitis (red, itchy skin). Excessive long-term ingestion of Ferrous Sulfate Heptahydrate may damage blood vessels, and cause liver effects. Large chronic doses cause rickets in infants. Prolonged exposure of the eyes may cause discoloration.

B: Component Analysis - LD50/LC50

Ferrous Sulfate Heptahydrate (7782-63-0):

LD₅₀ (Oral-Mouse) 1520 mg/kg; LD₅₀ (Intraperitoneal-Mouse) 245 mg/kg; LD₅₀ (Intravenous-Mouse) 51 mg/kg

B: Component Analysis - TDLo/LDLo

Ferrous Sulfate Heptahydrate (7782-63-0):

LDLo (Oral-Rat) 1389 mg/kg; LDLo (Oral-Rabbit, adult) 2778 mg/kg; LDLo (Rectal-Rat) 697 mg/kg; LDLo (Subcutaneous-Rabbit, adult) 279 mg/kg; LDLo (Intravenous-Rabbit, adult) 99 mg/kg

Carcinogenicity

A: General Product Information

No information available.

B: Component Carcinogenicity

Ferrous Sulfate Heptahydrate is not listed by ACGIH, IARC, OSHA, NIOSH, or NTP.

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*** Section 11 - Toxicological Information (Continued) ***

Epidemiology

There is a large body of data on the clinical toxicology of ingested iron salts. There are little data on the health effects from occupational (inhalation or dermal contact) exposures. The recommended exposure limit reduces risk of skin and mucous membrane irritation.

Neurotoxicity

No information available.

Mutagenicity

Mutation in Microorganisms (Escherichia coli) 30 mmol/L; Micronucleus Test (Mouse Cells-not otherwise specified) 500 µmol/L

Teratogenicity

No information available.

Other Toxicological Information

No information available.

*** Section 12 - Ecological Information ***

Ecotoxicity

No information available.

Environmental Fate

No information available.

*** Section 13 - Disposal Considerations ***

US EPA Waste Number & Descriptions

A: General Product Information

As shipped, product is not considered a hazardous waste by the EPA. Wastes from this compound must be tested using methods described in 40 CFR Part 261 to determine if it meets applicable definitions of hazardous wastes.

B: Component Waste Numbers

No EPA Waste Numbers are applicable for wastes of Ferrous Sulfate Heptahydrate.

Disposal Instructions

Dispose of in accordance with all applicable Federal, State or provincial, and local regulations.

*** Section 14 - Transportation Information Ground ***

NOTE: The shipping classification information in this section (Section 14) is meant as a guide to the overall classification of the product. However, transportation classifications may be subject to change with changes in package size. Consult shipper requirements under 49 CFR, IATA and IMDG to assure regulatory compliance.

US DOT 49 CFR 100-185 Revised July 24, 2009 Information

UN/NA #: UN 3077

Shipping Name: Environmentally Hazardous Substance, solid, n.o.s. (Ferrous Sulfate)

Hazard Class: 9

Packing Group: III

Required Label(s): Class 9

RQ Quantity: For a single package greater than the RQ of 1,000lb (4.54 kg), this product is regulated.

Special Provision: IB8, IP2

Packaging: 172.240

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*** Section 14 - Transportation Information Air ***

International Air Transport Association (IATA)

For Shipments by Air transport: We classify this product as hazardous (Class 9) when shipped by air because 49 CFR 173.140 (a). "For the purposes of this subchapter, miscellaneous hazardous material (Class 9) means a material which presents a hazard during transportation, but which does not meet the definition of any other hazard class. This class includes: (a) Any material which has an anesthetic, noxious, or other similar property which could cause extreme annoyance or discomfort to a flight crew member so as to prevent the correct performance of assigned duties."

UN: UN 3077

Proper Shipping Name: Environmentally hazardous substance, solid, n.o.s. (Ferrous Sulfate)

Hazard Class: 9

Packing Group: III

Passenger & Cargo Aircraft Packing Instruction: 911

Passenger & Cargo Aircraft Maximum Net Quantity: 400 kg

Limited Quantity Packing Instruction (Passenger & Cargo Aircraft): Y911

Limited Quantity Maximum Net Quantity (Passenger & Cargo Aircraft): 30 kg

Special Provisions: A97 A149

ERG Code: 9L

Limited Quantity Shipments: Shipments for air must be marked with the Proper Shipping Name, Environmentally hazardous substance, solid, n.o.s. (Ferrous Sulfate), and shall be marked with the UN Number (3077) preceded by the letters "UN", placed within a diamond. The width of the line forming the diamond shall be at least 2 mm; the number shall be at least 6 mm high. The total weight of each outer packaging cannot exceed 30 kg.

Excepted Quantities: The maximum quantity of this material per inner receptacle is limited to 30 g per receptacle and the aggregate quantity of this material per completed package does not exceed 1kg. The inner receptacles must be securely packed in an intermediate packaging with cushioning material to prevent movement in the inner receptacles and packed in a strong outer box with a gross mass not to exceed 29kg. The completed package must meet a drop test. The requirements are found in 2.7.6.1. The package must not be opened or otherwise altered until it is no longer in commerce. For air transportation no shipping paper is required. The package must be legibly marked with the following marking:



NOTE: The "" must be replaced by the primary hazard class, or when assigned, the division of each of the hazardous materials contained in the package. The "" must be replaced by the name of the shipper or consignee if not shown elsewhere on the package. The symbol shall be not less than 100 mm x 100 mm and must be durable and clearly visible.

*** Section 14 – Transportation Information Vessel ***

Amendment 34-08 International Maritime Dangerous Goods (IMDG) Code

For shipments via marine vessel transport, the following classification information applies.

UN/NA #: UN 3077

Proper Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Ferrous Sulfate)

Hazard Class: Class 9 (Miscellaneous Dangerous Goods)

Packing Group: III

Special Provisions: 179,274,335,909

IBC Instructions IBC08

IBC Provisions: B2

EmS: F-A, S-S

Stowage and Segregation: Category A

RQ Quantity: For a single package greater than the RQ of 1,000lb (4.54 kg), this product is regulated.

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*** Section 15 - Regulatory Information ***

US Federal Regulations

A: General Product Information

Components of this product have been checked against the non-confidential TSCA inventory by CAS Registry Number. Components not identified on this non-confidential inventory are either exempt from listing (i.e. polymers, hydrates or salts) or are listed on the confidential inventory as declared by the supplier.

B: Component Analysis

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4):

Ferrous Sulfate (7782-63-0)

CERCLA: Final RQ = 1000 lbs (454 kg)

SARA 302 (EHS TPQ) There are no specific Threshold Planning Quantities for Ferrous Sulfate Heptahydrate. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lbs. (4,540 kg) therefore applies, per 40 CFR 370.20.

C: Sara 311/312 Tier II Hazard Ratings:

Component	CAS #	Fire Hazard	Reactivity Hazard	Pressure Hazard	Immediate Health Hazard	Chronic Health Hazard
Ferrous Sulfate Heptahydrate	7782-63-0	No	No	No	Yes	Yes

U.S. State Regulations

A: General Product Information

Other state regulations may apply.

B: Component Analysis - State

The following components appear on one or more of the following state hazardous substance lists:

Component	CAS #	CA	FL	MA	MN	NJ	PA
Ferrous Sulfate Heptahydrate	7782-63-0	No	No	No	No	No	No

Other Regulations

A: General Product Information

Not determined.

B: Component Analysis - Inventory

Component	CAS #	TSCA	DSL	EINECS
Ferrous Sulfate Heptahydrate	7782-63-0	No	Yes	Yes

Other Regulations (continued)

C: Component Analysis - WHMIS IDL

Ferrous Sulfate Heptahydrate is on the Canadian Hazardous Products Act Ingredient Disclosure List.

Component	CAS #	Minimum Concentration
Ferrous Sulfate Heptahydrate	7782-63-0	1% disclosure limit

ANSI Labeling (Z129.1):

CAUTION! MAY CAUSE SKIN AND EYE IRRITATION. HARMFUL IF INGESTED OR INHALED. CHRONIC EXPOSURE MAY CAUSE ADVERSE LIVER EFFECTS. Avoid contact with skin, eyes, or clothing. Do not taste or swallow. Avoid breathing dusts and particulates. Use only with adequate ventilation. Wash thoroughly after handling. Wear gloves, goggles, facemasks, suitable body protection, and NIOSH/MSHA-approved respiratory protection, as appropriate. **FIRST-AID:** In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. If inhaled, remove to fresh air. If ingested, do not induce vomiting. Get medical attention. **IN CASE OF FIRE:** Use water fog, dry chemical, CO₂, or "alcohol" foam. **IN CASE OF SPILL:** Absorb spill with inert material. Place residue in suitable container. Consult Material Safety Data Sheet for additional information.

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**** Section 16 - Other Information ****

Other Information

Chem One Ltd. ("Chem One") shall not be responsible for the use of any information, product, method, or apparatus herein presented ("Information"), and you must make your own determination as to its suitability and completeness for your own use, for the protection of the environment, and for health and safety purposes. You assume the entire risk of relying on this Information. In no event shall Chem One be responsible for damages of any nature whatsoever resulting from the use of this product or products, or reliance upon this Information. By providing this Information, Chem One neither can nor intends to control the method or manner by which you use, handle, store, or transport Chem One products. If any materials are mentioned that are not Chem One products, appropriate industrial hygiene and other safety precautions recommended by their manufacturers should be observed. Chem One makes no representations or warranties, either express or implied of merchantability, fitness for a particular purpose or of any other nature regarding this information, and nothing herein waives any of Chem One's conditions of sale. This information could include technical inaccuracies or typographical errors. Chem One may make improvements and/or changes in the product (s) and/or the program (s) described in this information at any time. If you have any questions, please contact us at Tel. 713-896-9966 or E-mail us at Safety@chemone.com.

Key/Legend

EPA = Environmental Protection Agency; TSCA = Toxic Substance Control Act; ACGIH = American Conference of Governmental Industrial Hygienists; IARC = International Agency for Research on Cancer; NIOSH = National Institute for Occupational Safety and Health; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; WHMIS = Workplace Hazardous Materials Information System

Contact: Sue Palmer-Koleman, PhD

Contact Phone: (713) 896-9966

Revision log

08/04/00 3:30 PM SEP Changed company name, Sect 1 and 16, from Corporation to Ltd.
05/30/01 9:31 AM HDF Checked exposure limits; made changes to Sect 9; overall review, add SARA 311/312 Haz Ratings.
08/20/01 12:25 PM CLJ Add Shipments by Air information to Section 14, Changed contact to Sue, non-800 Chemtrec Num.
2/18/02: 10:35 AM HDF Up-date of SARA Hazard Ratings.
08/12/03: 10:35 AM HDF General review and up-date of entire MSDS. Up-date of HMIS categories. Up-date of Section 8. Up-date of Section 14.
06/22/05 2:52PM SEP Update IATA Section 14
09/05/06 2:59 PM SEP Updated DOT Section 14
10/17/07 4:32 PM SEP Update IATA, DOT Section 14
10/15/08 8:41 AM DLY Changed Chem One Physical Address, Section 1
09/18/09 MMK Updated Section 14 limited & excepted quantities and exceptions

This is the end of MSDS # C1-124