Product Environmental Data

3M

vironmental Laboratory
...vironmental Engineering and Pollution Control
900 Bush Avenue
PO Box 33331
St. Paul, MN 55133
612/778 5104

COMMERCIAL CHEMICALS DIVISION

LIGHT WATER® BRAND ALCOHOL TYPE CONCENTRATE AQUEOUS FILM FORMING FOAM FC-600

DESCRIPTION: Water-miscible fire extinguishing agents.

APPEARANCE: Light brown liquid.

COMPOSITION:

	Percent by Weight
Water	80
Butyl Carbitol®	15
Synthetic Detergents	<5
Fluoroalkyl Surfactants	<5
Hydrophilic Polymer	<5

USAGE: Foams are normally made from solutions containing 3% or 6% FC-600 in water. These foams cover and thus extinguish hydrocarbon liquid or polar solvent based fires. For more detailed usage information, see your technical servic representative.

BIODEGRADATION:

Chemical Oxygen Demand (COD)	0.35 g/g
5-Day Biochemical Oxygen Demand (BOD_5)*	0.025 g/g
20-Day Biochemical Oxygen Demand (BOD_{20})	0.21 g/g
28-Day Biochemical Oxygen Demand (BOD_{28})	0.27 g/g
20-day BOD of 3% aqueous solution:	6,300 mg/l
20-day BOD of 6% aqueous solution:	12,600 mg/l
BOD_{20} to COD ratio:	0.6

* The reported BOD values were determined using a nitrification inhibitor. The inhibitor prevents errors in BOD measurements due to oxidation of NH_3, a component of BOD dilution wat r.

Date: 4/18/83 (Supersedes 6/13/80)

Form 14705-C PWO

3M General Offices
3M Center
St. Paul, Minnesota 55144-1000
612/733 1110

Duns No.: 00-617-3082

MATERIAL SAFETY
DATA SHEET

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3. FIRE AND EXPLOSION HAZARD DATA (continued)

SPECIAL FIRE FIGHTING PROCEDURES:
None Known
UNUSUAL FIRE AND EXPLOSION HAZARDS:
Toxic by-products, including small amounts of HF, may be formed. See Section 4.

4. REACTIVITY DATA

STABILITY: Stable
INCOMPATIBILITY - MATERIALS TO AVOID:
NA
HAZARDOUS POLYMERIZATION: Will Not Occur
HAZARDOUS DECOMPOSITION PRODUCTS:
Thermal decomposition may produce toxic materials including HF. Decomposition of usage concentrations does not present a hazard.

5. ENVIRONMENTAL INFORMATION

SPILL RESPONSE:
Observe precautions from other sections. Cover with absorbent material. Collect spilled material. Clean up residue with water.

RECOMMENDED DISPOSAL:
Bleed spent solutions and small product quantities, <5 gal., to a wastewater treatment system. Reduce discharge rate if foaming occurs. Mix with flammable material and incinerate in an industrial or commercial facility. Combustion products will include HF. Disposal alternative: Dispose of completely absorbed waste product in a facility permitted to accept chemical wastes. Since regulations vary, consult applicable regulations or authorities before disposal. U.S. EPA Hazardous Waste No.: None

ENVIRONMENTAL DATA:
96-Hr. LC50, Bluegill Sunfish(Lepomis macrochirus)=1500 mg/l; 96-Hr. LC50, Fathead Minnow(Pimephales promelas)=1700 mg/l; 48-Hr. EC50, Daphnia magna=2800 mg/l; COD=0.35 g/g; BOD20=0.21 g/g.

SARA HAZARD CLASS:
FIRE HAZARD: No PRESSURE: No REACTIVITY: No ACUTE: Yes CHRONIC: Yes

6. SUGGESTED FIRST AID

EYE CONTACT:
Immediately flush with plenty of water. Continue for 10 minutes. Call a physician.

SKIN CONTACT:
Wash affected area with soap and water.

INHALATION:
Remove to fresh air.

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6. SUGGESTED FIRST AID (continued)

IF SWALLOWED:
Give two glasses of water. Call a physician or Poison Control Center.

OTHER FIRST AID:
NONE

7. PRECAUTIONARY INFORMATION

Use only in well ventilated areas with sufficient air movement to maintain airborne levels at recognized health and safety levels. Av id prolonged breathing of vapors. Avoid eye and skin contact. Store above 30 degrees F.

SPECIAL PROTECTION:
EYE PROTECTION: Safety Glasses or Goggles
SKIN PROTECTION: Rubber Gloves
VENTILATION: General ventilation adequate.
RESPIRATORY PROTECTION: Above component exposure limits, use organic vapor cartridge respirator.

8. HEALTH HAZARD DATA

EYE CONTACT: Can cause moderate irritation of the eye on direct contact with the concentrate. Diluted FC-600 (6 parts FC-600 in 94 parts water) is minimally irritating to the eyes.

SKIN CONTACT: Causes moderate irritation of skin on direct contact with FC-600 concentrate. Causes minimal irritation of skin on direct contact with FC-600 diluted (6 parts FC-600 and 94 parts water).

INHALATION: Mist or vapors may cause irritation of respiratory system. Very high concentration of vapors may cause vomiting, nausea, diarrhea, abdominal pain, pulmonary edema and stupor. Symptoms of overexposure may include unconsciousness; repeated overexposure may include nystagmus, recurrent unconsciousness, hemolysis and bone marrow depression.

INGESTION: Undiluted FC-600 has an acute oral LD50 (rat) greater than 10 grams per kilogram of body weight. This classifies this product as being practically non-toxic orally.

Abbreviations: N/D - Not Determined N/A - Not Applicable

DO A 041692
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3M LIGHT WATER BRAND AQUEOUS FILM FORMING FOAM (AFFF) DISPOSAL RECOMMENDATIONS AND HAZARD EVALUATION

CONCLUSIONS:

Light Water Brand AFFF and ATC wastes are treatable in a wastewater treatment system if disposed of according to 3M recommendations. These products have low toxicity to the microorganisms in wastewater treatment systems even at concentrations much higher than those recommended by 3M. Foaming problems may develop, however, particularly when recommended discharge concentrations are exceeded.

Fluorochemical thermal decomposition products do not present a health hazard during fire fighting nor do they affect the treatability of aqueous fire fighting wastes. The major reasons for this are that during usage, the concentration of fluorochemicals in Light Water AFFF solutions is low and little fluorochemical is burned.

DISPOSAL RECOMMENDATIONS FOR AFFF (AQUEOUS FILM FORMING FOAM) AND ATC (ALCOHOL TYPE CONCENTRATE) WASTES:

3M recommends handling wastes resulting from the use of Light Water AFFF products by pretreatment in an oil/water separator. The oil fraction should be incinerated in a facility designed to accept such wastes. The aqueous fraction should be metered to a wastewater treatment system at a rate sufficiently low so that the concentrations reaching the aeration basin of the wastewater treatment system will not cause excessive foaming. Appropriate discharge rates will be determined by individual circumstances and should follow applicable regulations.

When pretreatment by oil/water separation is not possible, 3M recommends metering wastes to a wastewater treatment system. Since regulations vary, consult applicable regulations or authorities before disposal. In addition, treatment plant operators should be contact d before discharge to determine the capacity of the treatment system and sewage flow rates into the system so that discharge rates can be estimated.

For most AFFF or ATC products used at 6%, 3M recommends adjusting the discharge rate so that the product concentration in the aeration basin of the wastewater treatment system will be less than 100 mg per liter of sewage. For most products used at 3%, 3M recommends a maximum

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product concentration of 50 mg/L in the aeration basin. Products used at 3% require greater dilution than products used at 6% because the 3% concentrates have higher surfactant concentrations than the 6% concentrates. Product Environmental Data Sheets for products with higher surfactant concentrations may recommend somewhat greater dilution.

In some situations, metered discharge of wastes to a wastewater tr atment system is impractical because the small size of the treatment system limits the discharge rate to such an extent that too much time would be required for disposal. 3M recommends two disposal alternatives in these situations: (1) transporting collected waste materials by tank trucks for metered discharge into a larger waste treatment facility, or (2) discharging the waste at a somewhat higher rate with appropriate concentrations of antifoaming agent added to the waste stream to control foaming.

Experiments conducted in the 3M Environmental Laboratory have determined that several antifoaming products are effective at controlling excessive foaming in activated sluge/AFFF mixtures. The effectiveness of antifoaming agents, however, will be determined by the specific conditions in the aeration basin in individual wastewater treatment systems.

While this is not an endorsement, the following nine products were found to be the most effective of thirty-one antifoam products tested using activated sludge/AFFF mixtures in laboratory tests:

GE Silicones 1-800-332-3390	Antifoam Emulsion AF72 Antifoam Emulsion AF93 Antifoam Emulsion AF9020
Henkel 1-800-922-0605	Defoamer WB-209 Foammaster™ DS
Union Carbide 1-800-523-5862	SAG 2001 Organosilicone Emulsion

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Wacker Silicones	Antifoam Agent SE-36
1-800-248-0063	Antifoam Agent SWS-214
	Antifoam Emulsion SRE

Of these nine products, the most cost-effective were Henkel WB-209, GE Silicones AF9020, Henkel Foammaster™ DS, and Wacker Silicones SRE. The cost analysis used in that study was based on antifoam prices obtained in July, 1992. Price and transport charges may vary which could cause other products to be more cost-effective in some locations.

The antifoam concentration required to limit foaming in laboratory tests on FC-203CF solutions of various concentrations are tabulated below. The products are listed in the table in order of most to least cost-effective. The antifoam concentrations given in the table are intended to serve as estimates since the actual antifoam concentration required to suppress foaming will be determined by the specific conditions in the aeration basin. Where no data are given in the table, the antifoam agent is not recommended for suppressing foam at or above that AFFF concentration.

The antifoam concentrations in the table were obtained in laboratory tests using 3M FC-203CF, but they are the approximate antifoam concentrations required for other 3M AFFF and ATC products used at 3%. For 3M AFFF products used at 6% in water, the antifoam concentrations should be approximately correct for twice the AFFF concentrations given at the top of each column. This is, the antifoam concentrations would be approximately correct for 6% AFFF concentrates at 200, 600, 1000, 1200, 1400, 1600, 1800, and 2200 mg/L in the aeration basin.

The AFFF and antifoam concentrations given in the preceding paragraph and in the table below are for foam control only. Other factors must be considered in selecting rates of discharge to a sewer. 3M recommends a case-by-case determination of the maximum concentrations of AFFF and antifoam to be discharged to a treatment system and subsequently to an aquatic environment. The maximum concentration will depend on a variety of factors, including the conditions in the individual wastewater treatment system and in the receiving watercourse, as well as the dilution factor of the treated wastewater in the receiving watercourse. These factors should be evaluated in

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each situation to ensure that neither the AFFF nor the antifoam will cause harm. Product Environmental Data Sheets on the particular 3M AFFF product(s) will help in this evaluation.

	FC-203CF Concentration (mg/L)*							
	100	300	500	600	700	800	900	1100
Henkel WB-209	20	100	190	---	---	---	---	---
GE Silicones AF9020	20	100	190	270	430	500	740	1950
Henkel Foammaster™ DS	20	110	200	300	430	500	690	1600
Wacker Silicones SRE	20	100	190	270	400	490	---	---
Wacker Silicones SWS-214	40	170	430	---	---	---	---	---
GE Silcones AF93	20	100	190	270	430	480	530	1600
GE Silicones AF72	20	100	190	270	430	480	600	1800
Wacker Silicones SE-36	30	140	310	470	580	---	---	---
Union Carbide SAG 2001	50	220	600	---	---	---	---	---

* See text for precautions and for extrapolating these data to other 3M AFFF products.

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DISPOSAL RECOMMENDATIONS AND HAZARD EVALUATION
(CON'T)

In situations where antifoam agents are used to control excessive foaming by 3M products used at 6% in water, 3M recommends adjusting the discharge rate so that the product concentration in the aeration basin of the wastewater treatment system will be less than 1,000 mg/L of sewage. When antifoam agents are used to control foaming by 3M products used at 3%, 3M recommends a maximum AFFF concentration of 500 mg/L in the aeration basin. These maximum concentrations are based on laboratory studies that have shown that 3M AFFF products at or below these concentrations are unlikely to cause toxicity in wastewater treatment systems. The AFFF and antifoam concentrations in the table that are greater than these maximum recommended concentrations are provided to assist customers in dealing with emergency foaming situations or where elevated concentrations are appropriate becaus of individual circumstances. In all cases, applicable local regulations and the antifoam Material Safety Data Sheet (MSDS) should be consulted before use.

At 3M's own wastewater treatment facilities, foaming caused by Light Water AFFF discharges has been controlled by spraying a dilution of Wacker Silicones Antifoam Emulsion SWS-214 over the aeration basin. This dilution is prepared by mixing one part of SWS-214 in twenty parts of water. The antifoam dilution is sprayed over the aeration basin surface until the desired level of foam control is obtained. This procedure could be used as an alternative to adding the antifoam directly to the AFFF containing waste stream.

REASONS FOR 3M DISPOSAL RECOMMENDATIONS:

The primary reason for recommending discharge to a sewer is that 3M AFFF wastes are treatable in a biological wastewater treatment syst m. Light Water AFFF usage wastes are approximately 99% water and therefore have very low concentrations of organic compounds. The dilute nature of the waste makes alternative disposal methods, such as incineration, carbon adsorption, ultrafiltration, or reverse osmosis, both difficult and costly. Moreover, the major components of 3M AFFF usage wastes are a biodegradable solvent, Butyl Carbitol™ (<1%), and a mixture of biodegradable and partially biodegradable surfactants (<0.3%).

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Chemicals are generally considered biodegradable when the ratio of their 20-day Biochemical Oxygen Demand (BOD_{20}) to their Chemical Oxygen Demand (COD) is greater than 0.6. The BOD_{20}/COD for Butyl Carbitol was found to be 0.85. There are several biodegradable surfactants in these products and their BOD_{20}/COD ratios were found to lie between 0.74 and 0.94. There are also surfactants in these products with BOD_{20}/COD ratios less than 0.6. This includes the fluorochemical surfactants and some of the hydrocarbon surfactants. The hydrocarbon surfactants that do not meet this BOD_{20}/COD criteria will likely fully biodegrade given more time. Some fluorochemical surfactants may have both hydrocarbon and fluorochemical portions. The fluorochemical portions of thes surfactants are not known to biodegrade, but the hydrocarbon portions are likely to be biodegraded to some degree in most wastewater treatment systems and, like the fully hydrocarbon surfactants, eventually completely biodegrade. Possible fates of the nondegradable materials in wastewater treatment systems include sorption onto the microbial solids or passage out of the system with the treated wastewater. In any event, their concentration will be very low. Nonbiodegradable fluorochemical materials are used in AFFF products because they are required to make the products work. All effective AFFF products on the market today (and all fluoroprotein products as well) contain fluorochemical surfactants. Finally, laboratory tests on both the individual product components and the product concentrates have determined the low toxicity of these materials to activated sludge bacteria, so discharge to ordinary wastewater treatment systems is reasonable.

Laboratory studies have shown that foaming, not toxicity, is usually the cause of problems from improper disposal of AFFF wastes to wastewater treatment systems. In laboratory studies, wastewat r containing FC-600 Light Water AFFF at 1,000 mg/L was treated successfully without toxicity. In that lab study, the foam was physically broken down and returned to the treatment system along with activated sludge solids that came out because of foaming. With these modifications to the normal treatment process, the quality of the treated effluent from the laboratory scale system was not adversely affected. Treatment at this concentration is not recommended, however, because of excessive foaming.

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Light Water AFFF wastes resulting from testing the operability of a fire fighting system, such as that installed in a hanger facility, normally don't contain much fuel or oil. On the other hand, wastes from fire fighting training facilities where hydrocarbon fires are extinguished may contain suspended oil. If oil is present, it should be separated from the waste before discharging the waste to a s wer as described above. If oil is emulsified in the waste, it may be difficult to separate but many oils can biodegrade. Furthermore, emulsified oils are more likely to biodegrade in a wastewater treatment system than are nonemulsified oils.

3M recommends metered discharge of Light Water AFFF wastes to flowing sewers because discharge to an intermittently flowing sewer could cause waste to collect and to be flushed to aeration basins at higher than recommended concentrations. Uncontrolled sewer discharge rates also could result in foam backing out of sewer drains.

THERMAL DECOMPOSITION FROM LIGHT WATER AFFF USAGE:

Thermal decomposition products resulting from Light Water AFFF usage present an insignificant hazard. Considerable confusion was caused by a precautionary statement formerly used on Light Water AFFF Material Safety Data Sheets (MSDSs). That statement was frequently misinterpreted as meaning that thermal decomposition products from usage concentration levels could cause a health hazard. The precaution onc simply stated: "Thermal decomposition may produce toxic materials, including HF." This statement has now been modified to include: "Decomposition of usage concentrations does not present a hazard."

The former MSDS precaution for Light Water AFFF products is still used on the MSDSs for other 3M products containing fluorochemicals. The statement is used because it is well known that most fluorochemical materials, including such commonly used items as polytetrafluoroethylene (PTFE) coated frying pans, utensils, etc., can liberate toxic fumes including HF or perfluorobutylenes under combustion or pyrolysis conditions. However, this will occur only if very high temperature conditions exist (>300C).

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Furthermore, formation of hazardous concentrations of thermal by-products is more likely in fluorocarbon containing products with high fluorine content (65 or 70%), but the fluorochemical content of 3M AFFF products is very low. For example, FC-206CF Light Water AFFF concentrate contains only about 1.1% fluorine, and when diluted to the usage concentration, it contains only about 0.06% fluorine. Thus, from a combustion or pyrolysis product hazard perspective, PTFE, which is widely known as a nontoxic, inert material, would be far more hazardous.

There are other reasons that make the production of hazardous concentrations of thermal degradation products during fire fighting with Light Water AFFF very unlikely. Most importantly, little of the fluorochemical would burn or thermally decompose. The reasons for this are that the product rapidly covers and extinguishes the fire, and the high percentage of water absorbs considerable heat, thereby cooling and limiting the decomposition of the dissolved fluorochemical.

The 3M Industrial Hygiene Department conducted a test to confirm the lack of hazard from fluorochemical combustion when Light Water AFFF is used in fire fighting. The test was designed to simulate a "worst case" situation by maximizing the chance of fluorochemical combustion. The test burned a 2-3 inch layer of FC-203CE Light Water AFFF foam in a 10 square foot pan of gasoline inside a 20 by 20 foot wide and 15 foot high open topped concrete building. To cause the fluorochemical in the Light Water AFFF product to burn, the test operator had to stir vigorously the foam and gasoline, an atypical procedure. Stirring broke the foam barrier and allowed combustion that would normally have been extinguished by the foam. Even under this worst case situation, two HF measurements taken above and near this fire were only 0.23 and 0.16 parts per million (ppm). While not directly applicable to this situation, these measurements were below the Threshold Limit Value for HF of 3 ppm, a concentration judge not to present a health hazard for nearly all persons.

Thus, fluorochemical decomposition products from Light Water AFFF present an insignificant risk when compared to the many other hazardous decomposition products resulting from a fire. Light Water AFFF products certainly play a much more significant role in reducing the toxicity hazards of fire situations by rapidly cooling and extinguishing a fire and by covering and preventing the volatilization of other potentially toxic materials.

UNHYDRATED CFBC ASH
COXC0011 Revised 6-SEP-1993 Printed 22-SEP-1993

CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Tradenames and Synonyms

Unhydrated Circulating Fluidized Bed Combustor Ash
Unhydrated Bottom Ash
Unhydrated Fly Ash
CALSORB

Company Identification

MANUFACTURER/DISTRIBUTOR
NISCO/DBMC
P.O. Box 2150
Kenner, LA 70063
504-468-3247 (Mark Hite)

PHONE NUMBERS
Product Information : 1-713-293-5550
Transport Emergency : CHEMTREC 1-800-424-9300
Medical Emergency : 1-800-441-3637

COMPOSITION/INFORMATION ON INGREDIENTS

Components

Material	CAS Number	%
Calcium Oxide	1305-78-8	30-46
Anhydrite - Calcium Sulfate	7778-18-9	38-61
Silicon Dioxide (Crystalline Silica)	14808-60-7	<4.5
Magnesium Oxide	1309-48-4	0.4-3.9

Components (Remarks)

Remaining components are not known to be hazardous as defined by OSHA's Hazard Communication Standard, 29 CFR 1910.1200.

HAZARDS IDENTIFICATION

Potential Health Effects

Primary Routes of Exposure/Entry: Skin, inhalation.

Signs and Symptoms of Exposure/Medical Conditions Aggravated by Exposure to:

Crystalline silica:
Eye contact may initially include irritation with discomfort, tearing, or blurring of vision.

The predominant effect of overexposure to airborne crystalline silica in humans is silicosis. Silicosis is a chronic disease characterized by pulmonary fibrosis and the formation of silica-containing scar tissue in the lungs with symptoms of coughing, dyspnea, wheezing, and nonspecific respiratory ailments. Individuals with preexisting diseases of the lungs may have increased susceptibility to the toxicity of excessive exposures t crystalline silica. Very high concentrations of short exposures to crystalline silica may be lethal.

Several recent epidemiology studies have shown, that in addition to silicosis, there is limited evidence of an excess of lung cancer in occupations involving chronic excessive exposures to crystalline silica, such as stone cutters and granite industry workers. Occupational exposure at the recommended AEL of 0.1 mg/m3 for crystalline silica should protect workers from silicosis and lung tumors.

Carcinogenicity Information

The following components are listed by IARC, NTP, OSHA or ACGIH as carcinogens. A "P" indicates a proposed carcinogen.

Material	IARC	NTP	OSHA	ACGIH
Silicon Dioxide (Crystalline Silica)		X		X

FIRST AID MEASURES

First Aid

INHALATION

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT

(FIRST AID MEASURES - Continued)

In case of contact, immediately flush skin with plenty f water for at least 15 minutes, while removing contaminated clothing and shoes. Call a physician. Wash contaminated clothing before reuse.

EYE CONTACT

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

INGESTION

Ingestion is not considered a potential route of exposure.

FIRE FIGHTING MEASURES

Flammable Properties

Not a fire hazard under normal conditions.

Extinguishing Media

Use media appropriate for surrounding material.

Fire Fighting Instructions

Wear self-contained breathing apparatus.

ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Spill Clean Up

Recover undamaged and minimally contaminated material for reuse and reclamation. Shovel or sweep up.

Accidental Release Measures

Avoid generating dusting conditions.

Please note Hazardous Reactivity Section: Reacts exothermically to release heat when water is added.

HANDLING AND STORAGE

Handling (Personnel)

Avoid breathing dust. Avoid contact with eyes, skin, or clothing. Wash thoroughly after handling. Wash clothing after use.

Storage

Store in accordance with National Fire Protection Association recommendations.

EXPOSURE CONTROL /PERSONAL PROTECTION

Engineering Controls

Ventilation: Keep area well ventilated and avoid inhalation of dust.

Personal Protective Equipment

Respiratory Protection: A NIOSH/MSHA approved air purifying respirator with a dust/mist cartridge or canister may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits. Protection provided by air-purifying respirators is limited. Use a positive pressure air-supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air-purifying respirators may not provide adequate protection.

Protective Gloves: Wear impervious gloves.

Eye Protection: Use close fitting goggles.

Other Protective Equipment: Sufficient protective clothing to minimize skin exposure. Launder contaminated clothing before reuse.

Other Precautions: Wash thoroughly with soap and water to avoid any prolonged skin contact.

 # Exposure Guidelines

Applicable Exposure Limits

Calcium Oxide

PEL	(OSHA)	: 5 mg/m3, 8 Hr. TWA
TLV	(ACGIH)	: 2 mg/m3, 8 Hr. TWA
AEL *	(Du Pont)	: None Established

Anhydrite - Calcium Sulfate

PEL	(OSHA)	: 15 mg/m3, total dust, 8 Hr. TWA 5 mg/m3, respirable dust, 8 Hr. TWA
TLV	(ACGIH)	: 10 mg/m3 of Total Dust - containing no asbestos and <1% free silica - 8 Hr TWA
AEL *	(Du Pont)	: None Established

Silicon Dioxide (Crystalline Silica)

PEL	(OSHA)	: Total dust, (30 mg/m3 / % SiO2 + 2) Respirable dust, (10 mg/m3 / % SiO2 + 2 as 8 Hr TWA's
TLV	(ACGIH)	: 0.1 mg/m3, respirable dust, 8 Hr. TWA Or see: Christobalite [14464-46-1], Silica, Fused [60676-86-0], Tridymite [15468-32-2], Tripoli [1317-95-9]
AEL *	(Du Pont)	: 0.1 mg/m3, 8 Hr. TWA, respirable dust

Magnesium Oxide

PEL	(OSHA)	: 15 mg/m3, total dust, 8 Hr. TWA
TLV	(ACGIH)	: 10 mg/m3, 8 Hr. TWA
AEL *	(Du Pont)	: None Established

* AEL is Du Pont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Solubility in Water	: Insoluble
Odor	: None
Form	: Dust
Color	: Ashen grey to white
Bulk Density (Loose)	: Approximately 52 lb/cu ft

STABILITY AND REACTIVITY

Chemical Stability

Stable.

Reacts exothermically to release heat when water is added.

(STABILITY AND REACTIVITY - Continu d)

Incompatibility with Other Materials

None reasonably foreseeable.

Polymerization

Polymerization will not occur.

TOXICOLOGICAL INFORMATION

Animal Data

Crystalline silica:
In animal studies, lung tumors were observed in rats exposed for up to two years by inhalation to 12.4 or 51.6 mg/m3 quartz. Pulmonary fibrosis, emphysema, and lung tumors were also observed in rats exposed to quartz by intratracheal instillation.

DISPOSAL CONSIDERATIONS

Waste Disposal

Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/Provincial, and Local regulations. Do not flush to surface water or sanitary sew r system.

TRANSPORTATION INFORMATION

Shipping Information

DOT
Proper Shipping Name : Not regulated.

ICAO/IMO

Proper Shipping Name : Not restricted.

REGULATORY INFORMATION

U.S. Federal Regulations

OSHA HAZARD DETERMINATION
This material is hazardous as defined by OSHA's Hazard Communication Standard, 29 CFR 1910.1200.

CERCLA/SUPERFUND
This material is n t known to contain any ingr di nt(s) subject to the Act.

(Continued)

Houston, TX 77252
Telephone : 713/293-5550

# Indicates updated section.

End of MSDS

(REGULATORY INFORMATION - Continued)

SARA, TITLE III, 302/304
This material is not known to contain extremely hazardous substances.

TITLE III HAZARD CLASSIFICATIONS SECTIONS 311, 312

Acute : Yes
Chronic : Yes
Fire : No
Reactivity : No
Pressure : No

SARA, TITLE III, 313
This material is not known to contain any chemical(s) at a level of 1.0% or greater (0.1% for carcinogens) on the list of Toxic Chemicals and subject to release reporting requirements.

TSCA
Material and/or components are listed in the TSCA Inventory of Chemical Substances (40 CFR 710).

RCRA
This material, when discarded or disposed of, is not specifically listed as a hazardous waste in Federal regulations. It could become a hazardous waste if it is mixed with, or comes in contact with, a listed hazardous waste. If it is a hazardous waste, regulations at 40 CFR 262-266 and 268 may apply.

CLEAN WATER ACT
This material is not known to contain any ingredient(s) subject to the Act.

OTHER INFORMATION

NFPA, NPCA-HMIS

NPCA-HMIS Rating
Health : 1
Flammability : 0
Reactivity : 0

Personal Protection rating to be supplied by user depending on use conditions.

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any ther material r in any process.

Resp nsibility f r MSDS : MSDS Administrat rs
Address : Con c Inc.
PO Box 2197

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aldrich chemical co.
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ATTN: SAFETY DIRECTOR
DOW CHEMICAL CO
P O BOX 500
LOUISIANA DIVISION
PLAQUEMINE LA 70764

DATE: 01/06/88
CUST # 181706 P.O. # 926981-10

MATERIAL SAFETY DATA SHEET

PAGE:

IDENTIFICATION

PRODUCT # 25254-9 NAME: [redacted]

CAS # 50-00-0

FORMALDEHYDE

TOXICITY HAZARDS

RTECS # LP8925000
FORMALDEHYDE
IRRITATION DATA

SKN-HMN 150 UG/3D-I MLD	85DKA8 -,127,77
EYE-HMN 4 PPM/5M	IAPWAR 4,79,61
EYE-HMN 1 PPM/6M NSE MLD	AIHAAP 44,463,83
SKN-RBT 500 MG/24H SEV	28ZPAK -,40,72
SKN-RBT 540 MG OPEN MLD	UCDS** 4/21/67
SKN-RBT 50 MG/24H MOD	TXAPA9 21,369,72
EYE-RBT 50 UG/24H SEV	28ZPAK -,40,72
EYE-RBT 750 UG SEV	AJOPAA 29,1363,46
EYE-RBT 10 MG SEV	TXAPA9 55,501,80

TOXICITY DATA

ORL-WMN LDLO:108 MG/KG	29ZWAE -,328,68
UNR-MAN LDLO:477 MG/KG	85DCAI 2,73,70
ORL-RAT LD50:800 MG/KG	JIHTAB 23,259,41
IHL-RAT LC50:590 MG/M3	GISAAA 41(6),103,76
SCU-RAT LD50:420 MG/KG	APTOA6 6,299,50
IVN-RAT LD50:87 MG/KG	AEPPAE 221,166,54
ORL-MUS LD50:42 MG/KG	NTIS** AD-A125-539
IHL-MUS LC50:400 MG/M3/2H	85GMAT -,69,82
SCU-MUS LD50:300 MG/KG	APTOA6 6,299,50
SKN-RBT LD50:270 MG/KG	UCDS** 4/21/67
ORL-GPG LD50:260 MG/KG	JIHTAB 23,259,41
IHL-MAM LC50:92 MG/M3	GTPZAB 19(8),37,75

REVIEWS, STANDARDS, AND REGULATIONS
ACGIH TLV-SUSPECTED CARCINOGEN 85INA8 5,276,86
ACGIH TLV-TWA 1 PPM 85INA8 5,276,86
MSHA STANDARD:AIR-CL 2 PPM (3 MG/M3) DTLWS* 3,19,73
OSHA STANDARD-AIR:TWA 3 PPM;CL 5 PPM;PK 10 PPM/30M/8H FEREAC 39,23540,74
NIOSH REL TO FORMALDEHYDE-AIR:LIMIT TO LOWEST FEASIBLE LEVEL MMWR** 34(1S),17S,85
EPA GENETOX PROGRAM 1986, POSITIVE: CARCINOGENICITY-MOUSE/RAT
EPA GENETOX PROGRAM 1986, POSITIVE: D MELANOGASTER-RECIPROCAL TRANSLOCATION
EPA GENETOX PROGRAM 1986, POSITIVE: N CRASSA-REVERSION; E COLI POLA WITHOUT S9
EPA GENETOX PROGRAM 1986, POSITIVE: D MELANOGASTER SEX-LINKED LETHAL
EPA GENETOX PROGRAM 1986, POSITIVE: S CEREVISIAE GENE CONVERSION; S CEREVISIAE-REVERSION
EPA GENETOX PROGRAM 1986, INCONCLUSIVE: IN VITRO UDS-HUMAN FIBROBLAST
EPA TSCA CHEMICAL INVENTORY, 1986
EPA TSCA SECTION 8(E) STATUS REPORT 8EHQ-1079-0314
EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, JUNE 1987
NIOSH CURRENT INTELLIGENCE BULLETIN 34, APRIL 1981
NIOSH ANALYTICAL METHODS: SEE FORMALDEHYDE (OXAZOLIDINE), 2502; (CHROMOTROPIC ACID), 3500

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MATERIAL SAFETY DATA SHEET

CATALOG # 25254-9 NAME: FORMALDEHYDE, 37 WT. % SOLUTION IN WATER, A.C.S. REAGENT

NIOSH ANALYTICAL METHODS: SEE FORMALDEHYDE (GIRARD T), 3501
NTP FOURTH ANNUAL REPORT ON CARCINOGENS, 1984
MEETS CRITERIA FOR PROPOSED OSHA MEDICAL RECORDS RULE FEREAC 47,30420, 82

ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS) DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR COMPLETE INFORMATI

HEALTH HAZARD DATA

ACUTE EFFECTS
MAY BE FATAL IF INHALED, SWALLOWED, OR ABSORBED THROUGH SKIN.
CAUSES SEVERE EYE IRRITATION.
MATERIAL IS IRRITATING TO MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT.
MAY CAUSE ALLERGIC RESPIRATORY AND SKIN REACTIONS.
EXPOSURE CAN CAUSE:
COUGHING, CHEST PAINS, DIFFICULTY IN BREATHING.
PULMONARY EDEMA. EFFECTS MAY BE DELAYED.
GASTROINTESTINAL DISTURBANCES
CHRONIC EFFECTS
CARCINOGEN.
FIRST AID
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.
ASSURE ADEQUATE FLUSHING OF THE EYES BY SEPARATING THE EYELIDS WITH FINGERS.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
CALL A PHYSICIAN.
DISCARD CONTAMINATED CLOTHING AND SHOES.
ADDITIONAL INFORMATION
WARNING: CONTAINS METHANOL. MAY BE FATAL OR CAUSE BLINDNESS IF SWALLOWED. CANNOT BE MADE NONPOISONOUS.

PHYSICAL DATA

SPECIFIC GRAVITY: 1.083

FIRE AND EXPLOSION HAZARD DATA

LOWER EXPLOSION LEVEL: 7.0%
UPPER EXPLOSION LEVEL: 73.0%
FLASH POINT: 133 F
EXTINGUISHING MEDIA
WATER MAY BE EFFECTIVE FOR COOLING, BUT MAY NOT EFFECT EXTINGUISHMENT.
CARBON DIOXIDE, DRY CHEMICAL POWDER, ALCOHOL OR POLYMER FOAM.
SPECIAL FIRE FIGHTING PROCEDURES
WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES.
COMBUSTIBLE LIQUID.
USE WATER SPRAY TO COOL FIRE-EXPOSED CONTAINERS.
UNUSUAL FIRE AND EXPLOSION HAZARDS
EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

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MATERIAL SAFETY DATA SHEET

CATALOG # 25254-9 NAME: FORMALDEHYDE, 37 WT. % SOLUTION IN WATER A.C.S. REAGENT

REACTIVITY DATA

INCOMPATIBILITIES
STRONG ACIDS
STRONG BASES
REACTS VIOLENTLY WITH:
STRONG OXIDIZING AGENTS
HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS
TOXIC FUMES OF:
CARBON MONOXIDE, CARBON DIOXIDE

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED
EVACUATE AREA.
WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY RUBBER GLOVES.
ABSORB ON SAND OR VERMICULITE AND PLACE IN CLOSED CONTAINERS FOR DISPOSAL.
VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.
WASTE DISPOSAL METHOD
DISSOLVE OR MIX THE MATERIAL WITH A COMBUSTIBLE SOLVENT AND BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER.

OBSERVE ALL FEDERAL, STATE & LOCAL LAWS.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

WEAR APPROPRIATE NIOSH/MSHA-APPROVED RESPIRATOR, CHEMICAL-RESISTANT GLOVES, SAFETY GOGGLES, OTHER PROTECTIVE CLOTHING.
USE ONLY IN A CHEMICAL FUME HOOD.
SAFETY SHOWER AND EYE BATH.
DO NOT BREATHE VAPOR.
DO NOT GET IN EYES, ON SKIN, ON CLOTHING.
AVOID PROLONGED OR REPEATED EXPOSURE.
WASH THOROUGHLY AFTER HANDLING.
POISON.
CARCINOGEN.
IRRITANT.
SENSITIZER.
LACHRYMATOR.
KEEP TIGHTLY CLOSED.
KEEP AWAY FROM HEAT AND OPEN FLAME.

ADDITIONAL PRECAUTIONS AND COMMENTS

ADDITIONAL INFORMATION
INCOMPATIBLE WITH: ANILINE, PHENOL, ISOCYANATES, ANHYDRIDES.

THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT BUT DOES NOT PURPORT TO BE ALL INCLUSIVE AND SHALL BE USED ONLY AS A GUIDE. ALDRICH SHALL NOT BE HELD LIABLE FOR ANY DAMAGE RESULTING FROM HANDLING OR FROM CONTACT WITH THE ABOVE PRODUCT. SEE REVERSE SIDE OF INVOICE OR PACKING SLIP FOR ADDITIONAL TERMS AND CONDITIONS OF SALE.

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