~~EU - 3/P OUTREACH~~ 3M PFOS issue and AFFF chemical detailed data

3M News

FOR IMMEDIATE RELEASE

3M Phasing Out Some of its Specialty Materials

ST. PAUL, Minnesota – May 16, 2000 – 3M today announced it is phasing out of the perfluorooctanyl chemistry used to produce certain repellents and surfactant products.

The affected product lines represent about two percent of 3M's nearly $16 billion in annual sales. These include many Scotchgard products, such as soil, oil and water repellent products; coatings used for oil and grease resistance on paper packaging; fire-fighting foams; and specialty components for other products. 3M said it plans to substantially phase out production by the end of the year and will work with customers to accomplish a smooth transition. "Our decision anticipates increasing attention to the appropriate use and management of persistent materials," said Dr. Charles Reich, executive vice president, Specialty Material Markets. "While this chemistry has been used effectively for more than 40 years and our products are safe, our decision to phase out production is based on our principles of responsible environmental management."

"We're reallocating resources to accelerate innovation in more sustainable opportunities and technologies. This decision is not only in the public interest, it's in the best interests of all our constituencies ... our employees, customers, communities and investors," Reich said.

Sophisticated testing capabilities – some developed in only the last few years – show that this persistent compound, like other materials in the environment, can be detected broadly at extremely low levels in the environment and in people. All existing scientific knowledge indicates that the presence of these materials at these very low levels does not pose a human health or environmental risk. 3M expects to meet consensus earnings estimates for the rest of 2000. This excludes a one-time charge on the order of $200 million, that will be taken sometime this year.

"Our growth engines are more powerful than ever and we're confident in our ability to continue delivering on expectations," said L.D. DeSimone, chairman and CEO. "Many of our new technology platforms directly address the fastest-growing segments of the new economy such as electronics, telecommunications and flat-panel displays." "We expect the positive momentum in our financial performance to continue into 2001 with earnings somewhat above current analyst estimates," DeSimone said.

3M is a leading manufacturer of innovative products for industrial, consumer, trans-portation, safety, health care and other markets, with operations in more than 60 countries worldwide. The company is well known for its "Pollution Prevention Pays" environmental initiative, and its emission reduction programs including water-based replacement of solvents in manufacturing and replacements for ozone-depleting chlorofluorocarbons (CFCs).

Forward-Looking Statements Certain portions of this news release that do not relate to historical financial information constitute forward-looking statements. These forward-looking statements are subject to certain risks and uncertainties. Actual future results and trends may differ materially from historical results or those expected depending on a variety of factors, including: (1) worldwide economic conditions; (2) foreign exchange rates and fluctuations in those rates; (3) the timing and acceptance of new product offerings; (4) raw materials, including shortages and increases in the costs of key raw materials; and (5) legal proceedings.

Scotchgard is a trademark of 3M company.

From:

3M Public Relations
3M Center, Building 225-1S-15
St. Paul, MN 55144-1000
Phone: (651) 733-8805
E-mail: www.3m.com

3M Home Page News and Profile Press Box

[3M Home] [News and Profile] [Press Box]

Williams Robert B NSSC

From: Barylski Doug J NSSC
Sent: Wednesday, August 23, 2000 10:38 AM
To: Williams Robert B NSSC
Subject: FW: FYI - Fwd: RE: PFOS Powerpoint Presentation

Some more info on the 3M EPA AFFF issue. Army opinion, etc.

-----Original Message-----
From: Pete Mullenhard [mailto:pete@navyseic.com]
Sent: Wednesday, August 23, 2000 10:34 AM
To: BarylskiDJ@navsea.navy.mil
Subject: FYI - Fwd: RE: PFOS Powerpoint Presentation


PFOS EPA BRIEF AUG 00.ppt


winmail13.dat

>From: "Koehler-Contractor, David Civ AMCRDA01"
><KOEHLERD-Contractor@alexandria-emh1.army.mil>
>To: '"Dormer, Ken"' <dormerk@af.pentagon.mil>,
> '"Leach, Bill"' <leachwb@navair.navy.mil>,
> '"Mullenhard, Pete"' <mullenhard@technologist.com>
>Cc: '"Terrell, George"' <gterrell@alexandria-emh1.army.mil>,
> '"Baker, Forrest"' <Forrest.Baker@peoavn.redstone.army.mil>,
> '"Conrad, Jeff"' <jconrad@alexandria-emh1.army.mil>,
> '"Jones.Gilbert@hq.navy.mil"' <Jones.Gilbert@hq.navy.mil>,
> '"Allen, Ed"' <ed.allen@redstone.army.mil>,
> '"Evans, George"' <gevans@netpath.net>,
> '"Williams, Bob"' <rwilliams@corrpro.com>,
> '"Wren, Don"' <wrend@safety-emh1.army.mil>,
> '"Macko, Joe"' <Joseph.Macko@apg.amedd.army.mil>
>Subject: RE: PFOS Powerpoint Presentation
>Date: Wed, 23 Aug 2000 10:22:27 -0400
>X-MS-TNEF-Correlator: <3373D6D0401AD41191F20008C7F958F9D9E00E@mail401>
>X-Mailer: Internet Mail Service (5.5.2650.21)
>
>
>
> > -----Original Message-----
> > From: Koehler-Contractor, David Civ AMCRDA01
> > Sent: Wednesday, August 23, 2000 9:07 AM
> > To: 'Dormer, Ken'; 'Leach, Bill'; 'Mullenhard, Pete'
> > Cc: 'Terrell, George'; 'Baker, Forrest'; 'Conrad, Jeff';
> > 'Jones.Gilbert@hq.navy.mil'; 'Allen, Ed'; 'Evans, George'; 'Williams,
> > Bob'; 'Wren, Don'; 'Macko, Joe'
> > Subject: RE: PFOS Powerpoint Presentation
> >
> > Gentlemen,
> >
> > Interesting EPA summary briefing attached on PFOS. Was asked if I
> > was concerned about the disappearance of AFFF come 1 Jan 04. My answer
> > was, No. Not as long as the FAA continues to endorse it and municipal
> > airports continue to use it. I can't rationally believe 3M will stop
> > production before they come up with a replacement (probably a drop-in).
> > And the EPA won't ban the use of it before they can demonstrate more
> > rational and substantial toxicity concerns.
> >
> > And, of course, the Army will require a toxicity clearance from the
> > Army Surgeon General before the fielding of any alternative material to
> > AFFF.
> >
> >
> > Dave Koehler
> > AAPPSO
> > 703-617-5941
> >

> > -----Original Message-----
> > From: Conrad-Contractor, Jeffrey Civ AMCRDA01
> > [mailto:CONRADJ-Contractor@hqamc.army.mil]
> > Sent: Wednesday, August 23, 2000 8:15 AM
> > To: 'Koehler, Dave'; 'Macko, Joe'; 'Terrell, George'
> > Cc: 'Evans, George'; 'Williams, Bob'
> > Subject: FW: PFOS Powerpoint Presentation
> > Importance: High
> >
> > FYI. This was sent to me by my Navy JG-PP counterpart. It is a
> > PFOS issue that affects AFFF. Let me know if you want me to gather more
> > information from the joint world.
> >
> > Jeff
> >
> > -----Original Message-----
> > From: Jones, Gilbert {Contractor}
> > [mailto:Jones.Gilbert@hq.navy.mil]
> > <mailto:[mailto:Jones.Gilbert@hq.navy.mil]>
> > Sent: Tuesday, August 22, 2000 2:08 PM
> > To: 'jconrad@hqamc.army.mil'
> > Subject: FW: PFOS Powerpoint Presentation
> > Importance: High
> >
> > << Message: FW: PFOS Powerpoint Presentation >> fyi
> > Gil
> > -----Original Message-----
> > From: Barbeau, Cindy I
> > Sent: Friday, August 18, 2000 10:05 AM
> > To: Hennessy-Webb, Trish C; Jones, Gilbert {Contractor}
> > Subject: FW: PFOS Powerpoint Presentation
> > Importance: High
> >
> >
> > fyi, cindy
> >
> >
>
>
>

Phasing Out a Problem: Perfluorooctyl Sulfonate (PFOS)

Mary F. Dominiak
U.S. Environmental Protection Agency
Naval Research Laboratory
3 August 2000

PFOA's

What is PFOS?

- Perfluorooctyl sulfonates; *acids, salts, halides, etc.*
- Man-made: do not occur in nature
- Produced since 1950's for use in surface treatment, paper protection, and performance chemical (surfactant and insecticide) products
- Also produced by breakdown/degradation of other sulfonyl-based fluorochemicals
- Made mostly by 3M Company

What is PFOS used for?

- Soil and stain resistant coatings on textiles, carpets, leather (2.3 million lbs/year)
- Oil, grease, and water resistance on paper products, including paperboard and food contact papers (2.6 million lbs/year)
- Performance chemicals: fire fighting foams, industrial surfactants, acid mist suppression, etc. (1.5 million lbs/year)

Why is PFOS a problem?

- PFOS is a PBT chemical:

  Persistent

  Bioaccumulative

  Toxic

- PFOS has been found in the blood of the general US population, in wildlife, and in people overseas

Why is PFOS a problem?

- Persistent:
  - PFOS is a very stable chemical that does not break down or degrade in the environment; *once it's there, it stays*
- Bioaccumulative:
  - PFOS can build up over time; *its half-life in human blood is about 4 years*
  - Higher-ups in the food chain are exposed to the full dose of what has built up in their food

Why is PFOS a problem?

- Toxicity:
  - PFOS is only moderately toxic via acute oral exposure; *rat LD_{50} of 251 mg/kg*
  - In repeat oral dose subchronic and reproductive toxicity studies, however, serious effects seen
    - *Post-natal deaths in rats at 3.2 and 1.6 mg/kg/day*
    - *In repeat-dose treated Rhesus monkeys, death within 3 weeks at 10 mg/kg/day; within 7 weeks at 4.5 mg/kg/day. Adverse effects in cynomolgus monkeys at 0.75 mg/kg/day*

Why is PFOS a problem?

- Detected in blood not only in workers handling the chemical, but in the general US population and in wildlife
  - *High as 12.83 ppm in manufacturing workers*
  - *In pooled serum from general population, 30-40 ppb; small sample of children, mean 54 ppb*
  - *In eagles, wild birds, and fish, in ppb range*

How did PFOS get in people?

- We don't know the precise exposure route, but studies are underway
- Possibilities include:
  - Dietary intake from food wrapped in papers treated with PFOS derivatives
  - Inhalation from aerosol applications
  - Inhalation, dietary, or dermal exposures during manufacturing, use, or disposal of chemicals and treated products

Why haven't PFOS problems been addressed before?

- PFOS was always known to be persistent, but much information on bioaccumulation and toxicity is recent
  - Improved detection technologies find PFOS at much lower levels in humans, wildlife
  - PFOS doesn't fit normal bioaccumulation model; *partitions to blood, not fat*
  - Newest toxicity tests raise greatest concerns

How big a risk is PFOS?

- EPA does not believe that the current situation presents an imminent health risk to the general US population; *blood levels low, concentration in surface-treated products (carpets/textiles) low*
- However, serious concern for potential future risk to humans and wildlife if PFOS continues to be produced, released, built up in the environment
- Studies underway to determine relationship of current blood levels to potential for adverse effects
- Questions/concerns on occupational exposures

What is being done about PFOS?

- 3M conducted studies, shared results with EPA, and discussed concerns
- On 5/16/2000, 3M publicly announced voluntary phase-out of perfluorooctanyl chemistries, most by end of 2000
- 3M submitted phase-out plan to EPA on 6/16/2000, amended on 7/7/2000
- 3M continues aggressive research program

What does the 3M PFOS phaseout plan involve?

- 3M will stop manufacture of PFOS for surface treatment products by 12/31/2000; *includes fabric/carpet/leather soil and stain resistance and paper coating products, including food contact*
- 3M will phase out manufacture of PFOS for performance products by 12/31/2002
- *Caveat:* May request permission for extended production for specific performance uses for which adequate substitutes do not exist or can't be qualified in time; *risk/risk tradeoffs, national security, technical performance issues*

What does EPA think of 3M's PFOS phaseout plan?

- EPA agrees that continued manufacture and use of PFOS represents an unacceptable technology that should be eliminated to protect human health and the environment from long term consequences
- 3M's voluntary phaseout will accomplish this goal more quickly than regulation could
- EPA may use regulation to "close the door" on PFOS after 3M's exit; *concerned parties will be able to comment and to dialogue with EPA*

What does this mean for fire fighters using PFOS foams?

- Fire fighting foams are in the performance category of products; continue through 2002
- 3M and EPA will be assessing health, safety and environmental implications of possible substitutes; *will welcome dialogue!*
- If qualified substitutes not available by end of 2002, 3M may request continued PFOS production for specific uses

What about using chemicals other than PFOS?

- Initial actions and phaseout apply to PFOS chemicals only
- EPA will be expanding review to assess other perfluorinated chemicals and related chemistries; *PFOA, telomers*
- Assessment activities will be international
- Industry group already proposing voluntary two-year research effort on some major telomers to begin 9/2000
- Too early to anticipate outcomes

How will EPA make decisions on PFOS issues?

- Toxic Substances Control Act (TSCA)
- Risk/benefit balancing requirements allow flexibility; *TSCA lets EPA take risk/risk tradeoffs, economic issues into account*
- Possible actions include:
  - Bans
  - Restrictions on uses
  - Production volume limits
  - Data collection and new testing requirements
  - Labeling, hazard communication

Where can I find information on PFOS and EPA actions?

- All documents on PFOS in public EPA Administrative Record, File AR-226
  - Includes all health studies submitted on PFOS
  - Available in hard copy or on CD-ROM
  - 401 M St, SW, Room NE B-607, Wash., DC, noon to 4 PM Eastern, Monday-Friday; telephone 202-260-7099
- Working on website; *not up yet, stay tuned*
- Interim EPA "Voice of PFOS:" Mary Dominiak, phone 202-260-7768; *dominiak.mary@epa.gov*

3M Light Water™ 6% AFFF FC-206CF

Technical Information

Description

Light Water FC-206CF 6% AFFF* is a synthetic firefighting foam concentrate designed for use on non-polar, hydrocarbon hazards. When proportioned with water and applied with conventional foam or water/fog equipment, Light Water 6% AFFF provides excellent control and extinguishment of Class B fires by spreading a vapor-sealing film over the liquid fuel. This vapor seal inhibits reflash even when the foam blanket is ruptured and also allows the product to be used to secure non-ignited spills. Light Water 6% AFFF provides excellent penetrating and wetting qualities when used on Class A fires. This is important when extinguishing deep-seated fires in wood, paper, rubber tires and [illegible] nbustibles.

Typical Pro

KENNETH E. CLARK, P.E.
ENVIRONMENTAL ENGINEER
ENVIRONMENTAL QUALITY DIVISION

Atlantic Division
Naval Facilities Engineering Command
1510 Gilbert Street
Norfolk, Virginia 23511-2699

OFFICE: (804) 322-4736
DSN: 262-4736
FAX: (804) 322-4805

. . . . 6%
. . . 1.024
. . . 8.54 lbs./gal.
. . . 1.8 centistokes
. . . 3.1 centistokes
. . . 35°F (1.7°C)
. . . 35°-120°F (1.7°-49°C)
. . 25°F (-4°C)
pH . . . 8
. . . . . Amber liquid

Applications

Light Water FC-206CF 6% AFFF can be used with conventional foam equipment with fresh, sea or brackish water. Self-educting foam nozzles and foam nozzles with in-line eductors are among the most common types of hardware for application.

In addition to its use in aspirating foam equipment, Light Water 6% AFFF can be dispensed effectively through non-aspirating equipment including fog nozzles, water spray devices and standard sprinklers. Light Water 6% AFFF exceeds U.S. Military specification MIL F24385F, supersedes E(SH) and is listed on the U.S. Military Q.P.L. (Qualified Products List). Light Water FC-206CF 6% AFFF is listed by UL.

Light Water 6% AFFF may be applied to fires simultaneously with dry chemical firefighting agents because the two are compatible.

Features

Effective: Rapid extinguishment reduces the chances of dangerous incidents and reduces the risk to property and equipment. Light Water 6% AFFF also prevents reflash and burnback, which are major causes of injuries. The securing action of Light Water 6% AFFF minimizes the fire hazard during cleanup of flammable liquid spills.

Reliable: Light Water 6% AFFF can be stored for virtually an indefinite period of time in approved equipment and systems. NFPA 11 recommends annual inspection of all foam systems.

*Aqueous Film Forming Foam

3M

Light Water™ 6% AFFF FC-206CF

Technical Information

Description

Light Water FC-206CF 6% AFFF* is a synthetic firefighting foam concentrate designed for use on non-polar, hydrocarbon hazards. When proportioned with water and applied with conventional foam or water/fog equipment, Light Water 6% AFFF provides excellent control and extinguishment of Class B fires by spreading a vapor-sealing film over the liquid fuel. This vapor seal inhibits reflash even when the foam blanket is ruptured and also allows the product to be used to secure non-ignited spills. Light Water 6% AFFF provides excellent penetrating and wetting qualities when used on Class A fires. This is important when extinguishing deep-seated fires in wood, paper, rubber tires and other ordinary combustibles.

Typical Properties

(Not for specification purposes)

Nominal use concentration	6%
Specific gravity @ 77°F (25°C)	1.024
Density	8.54 lbs./gal.
Viscosity @ 77°F (25°C)	1.8 centistokes
40°F (4.4°C)	3.1 centistokes
Minimum use temperature	35°F (1.7°C)
Storage temperature	35°-120°F (1.7°-49°C)
Freeze point	25°F (-4°C)
pH @ 77°F (25°C)	8
Appearance	Amber liquid

Applications

Light Water FC-206CF 6% AFFF can be used with conventional foam equipment with fresh, sea or brackish water. Self-educting foam nozzles and foam nozzles with in-line eductors are among the most common types of hardware for application.

In addition to its use in aspirating foam equipment, Light Water 6% AFFF can be dispensed effectively through non-aspirating equipment including fog nozzles, water spray devices and standard sprinklers. Light Water 6% AFFF exceeds U.S. Military specification MIL-F24385F, supersedes E(SH) and is listed on the U.S. Military Q.P.L. (Qualified Products List). Light Water FC-206CF 6% AFFF is listed by UL.

Light Water 6% AFFF may be applied to fires simultaneously with dry chemical firefighting agents because the two are compatible.

Features

Effective: Rapid extinguishment reduces the chances of dangerous incidents and reduces the risk to property and equipment. Light Water 6% AFFF also prevents reflash and burnback, which are major causes of injuries. The securing action of Light Water 6% AFFF minimizes the fire hazard during cleanup of flammable liquid spills.

Reliable: Light Water 6% AFFF can be stored for virtually an indefinite period of time in approved equipment and systems. NFPA 11 recommends annual inspection of [illegible] systems.

*Aqueous Film Forming Foam

Features (cont.)

Economical: Light Water FC-206CF 6% AFFF offers faster extinguishment than protein based foams, so less agent is required in training and actual fire emergencies. Its wide range of applications reduces or eliminates the need to inventory other special type agents.

Environmental/ Toxicological Properties

Light Water FC-206CF 6% AFFF concentrates undergo a program of ongoing testing to assess the impact of 3M firefighting foam on the natural environment. Data indicate that:

3M AFFF products are low in toxicity to tested aquatic organisms. (Toxicity information is available from Product Environmental Data Sheets, Material Safety Data Sheets and Toxicity Summary Sheets for individual products.)

Aquatic life is not adversely affected when 3M AFFF products are used and disposed of properly.

3M AFFF products can be successfully treated in biological wastewater treatment systems. (Request Product Environmental Data Sheets and Disposal Recommendations from your 3M representative.)

Storage

Light Water FC-206CF 6% AFFF may be stored in its shipping container without change in its original physical or chemical characteristics. It does not show significant sedimentation or precipitation in storage or after temperature cycling. Freezing and thawing have no effect on performance and the concentrate proportions satisfactorily in ordinary equipment at temperatures above 32°F. Freeze-thaw cycling may cause slight stratification which may be overcome with moderate agitation. Premix solutions in fresh water may be stored long term for ready use at temperatures above freezing.

Packaging

Light Water 6% AFFF is available in 5 gallon pails or 55 gallon drums.

Representative Locations

3M Corporate Headquarters
Fire Protection Systems
3M Center, Building 223-6S-04
St. Paul, MN 55144-1000
1 800 360 6777
612 733 6791 (FAX - Orders Only)

Anchorage
11151 Calaska Circle
Anchorage, AK 99515
907 522 5200

Honolulu
4443 Malaai Street (96818)
PO Box 30048
Honolulu, HI 96820
808 422 2721

Canada
3M Canada Inc.
1840 Oxford Street
PO Box 5757
London, Ontario, Canada N6A 4T1
519 451 2500
519 452 6262 (FAX)

24 Hour Emergency Service
612 733 1110

3M

Fire Protection Systems
3M Specialty Chemicals Division
3M Center, Building 223-6S-04
St. Paul, MN 55144-1000

Printed on recycled paper.
Issued: 10/94

Printed in U.S.A. with 3M films, proofing systems and offset plates.

98-0211-8171-9(104.2)R2 IL

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

866

6%

MATERIAL SAFETY
DATA SHEET

3M

DIVISION: SPECIALTY CHEMICALS DIVISION
TRADE NAME:
FC-206CF LIGHT WATER Brand Aqueous Film Forming Foam

3M ID NUMBER/U.P.C.:	ZF-0002-0614-2	- - -	ZF-0002-0621-7	- - -	
	ZF-0002-0791-8	- - -	98-0211-5624-9	00-51135-10159-9	
	98-0211-5625-6	00-51135-10160-5	98-0211-5626-4	00-51135-10161-2	
	98-0211-5627-2	00-51135-10162-9	98-0211-5628-0	00-51135-10163-6	
	98-0211-5629-8	00-51135-10164-3	98-0211-5630-6	- - -	

ISSUED: NOVEMBER 13, 1995
SUPERSEDES: APRIL 14, 1995
DOCUMENT: 10-4323-1

1. INGREDIENT

INGREDIENT	C.A.S. NO.	PERCENT		
WATER	7732-18-5	78.0	-	81.0
ETHANOL,2-(2-BUTOXYETHOXY)-	112-34-5	9.5	-	10.5
UREA	57-13-6	3	-	7
ALKYL SULFATE SALTS(2) +(5809P, 5810P)	TradeSecret	1.0	-	5.0
AMPHOTERIC FLUOROALKYLAMIDE DERIVATIVE +(5807P)	TradeSecret	1	-	2
PERFLUOROALKYL SULFONATE SALTS(5) +(5808P)	TradeSecret	0.1	-	1
TRIETHANOLAMINE	102-71-6	0.1	-	1
1H-BENZOTRIAZOLE,METHYL-	29385-43-1	0	-	0.1

NOTE: New Jersey Trade Secret Registry Number (EIN) 04499600-+
The ingredients of this Product are included on TSCA.

THIS PRODUCT CONTAINS THE FOLLOWING TOXIC CHEMICAL OR CHEMICALS SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF TITLE III OF THE EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT OF 1986 AND 40 CFR PART 372:
ETHANOL,2-(2-BUTOXYETHOXY)-

2. PHYSICAL DATA

BOILING POINT:	ca. 100.00 C (Initial)
VAPOR PRESSURE:	ca. 30.4000 mmHg Calc. @ R.T.
VAPOR DENSITY:	ca. 0.62 Air = 1 Calc. @ R.T.
EVAPORATION RATE:	< 1.00 Butyl Acetate = 1
SOLUBILITY IN WATER:	Miscible
SP. GRAVITY:	ca. 1.000 Water = 1
PERCENT VOLATILE:	ca. 90.00 %
VOLATILE ORGANICS:	103 gms/liter
VOC LESS H2O & EXEMPT SOLVENT	559 gms/liter
pH:	ca. 8.50
VISCOSITY:	N/D
MELTING POINT	N/A
APPEARANCE AND ODOR:	Clear, amber colored liquid.

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

3M General Offices

3M Center
St. Paul, MN 55144-1000
612 733 1110

6% 867

MATERIAL SAFETY
DATA SHEET

3M

3. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT:..... Setaflash
None (Setaflash CC)
FLAMMABLE LIMITS - LEL: ..... N/A
FLAMMABLE LIMITS - UEL: ..... N/A
AUTOIGNITION TEMPERATURE: ... N/A
EXTINGUISHING MEDIA:
Product is a fire-extinguishing agent.
SPECIAL FIRE FIGHTING PROCEDURES:
Not applicable
UNUSUAL FIRE AND EXPLOSION HAZARDS:
See Hazardous Decomposition section for products of combustion.

4. REACTIVITY DATA

STABILITY: Stable
INCOMPATIBILITY - MATERIALS TO AVOID:
Not applicable.
HAZARDOUS POLYMERIZATION: Will Not Occur
HAZARDOUS DECOMPOSITION PRODUCTS:
Carbon Monoxide and Carbon Dioxide, Oxides of Nitrogen, Oxides of Sulfur, Hydrogen Cyanide, Hydrogen Fluoride, Ammonia
Thermal decomposition of usage concentrations does not present a hazard.

5. ENVIRONMENTAL INFORMATION

SPILL RESPONSE:
Observe precautions from other sections. Ventilate area. Contain spill. Cover with absorbent material. Collect spilled material. Clean up residue with water. Place in an approved metal container. Seal the container.

RECOMMENDED DISPOSAL:
Discharge spent solutions to a wastewater treatment system. Reduce discharge rate if foaming occurs. Large quantities may adversely affect biological wastewater treatment systems. Incinerate in an industrial or commercial facility in the presence of a combustible material. Combustion products will include HF.

ENVIRONMENTAL DATA:
A 3M Product Environmental Data Sheet (PED) is available.

5-Day Biological Oxygen Demand (BOD5): 0.16 g/g; 20-Day Biological Oxygen Demand (BOD20): 0.18 g/g; Chemical Oxygen Demand (COD): 0.34 g/g; 20-Day BOD/COD: 0.53, 96-Hr LC50, Fathead minnow (Pimephales promelas): >1,000 mg/L; 48-Hr EC50, Daphnia magna: >1,000 mg/L; 96-Hr Static Algae (Selenastrum capricornutum): 254 mg/L (233-277); 30-Min. EC50, Photobacterium phosphoreum (Microtox System): 680 mg/L(610-750); 3-Hr EC50 (OECD METHOD #209): >1,000 mg/L.

REGULATORY INFORMATION:
Since regulations vary, consult applicable regulations or authorities

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

6%

868

MATERIAL SAFETY
DATA SHEET

3M

5. ENVIRONMENTAL INFORMATION (continued)

before disposal. In the event of an uncontrolled release of this material, the user should determine if the release qualifies as a reportable quantity. U.S. EPA Hazardous Waste Number = None (Not U.S. EPA Hazardous).

EPCRA HAZARD CLASS:
FIRE HAZARD: No **PRESSURE:** No **REACTIVITY:** No **ACUTE:** Yes **CHRONIC:** Yes

6. SUGGESTED FIRST AID

EYE CONTACT:
Immediately flush eyes with large amounts of water for at least 15 minutes. Get immediate medical attention.

SKIN CONTACT:
Flush skin with large amounts of water. If irritation persists, get medical attention.

INHALATION:
If signs/symptoms occur, remove person to fresh air. If signs/symptoms continue, call a physician.

IF SWALLOWED:
Drink two glasses of water. Call a physician.

7. PRECAUTIONARY INFORMATION

EYE PROTECTION:
Avoid eye contact with vapor, spray, or mist. Wear vented goggles.

SKIN PROTECTION:
Avoid skin contact. Wear appropriate gloves when handling this material. A pair of gloves made from the following material(s) are recommended: butyl rubber.

VENTILATION PROTECTION:
Use with adequate dilution ventilation.

RESPIRATORY PROTECTION:
Avoid breathing of vapors, mists or spray. Select one of the following NIOSH approved respirators based on airborne concentration of contaminants and in accordance with OSHA regulations: Half-mask organic vapor respirator with dust/mist prefilter.

PREVENTION OF ACCIDENTAL INGESTION:
Do not eat, drink or smoke when using this product. Wash exposed areas thoroughly with soap and water. Wash hands after handling and before eating.

RECOMMENDED STORAGE:
Store in a cool place. Store away from heat. Store out of direct

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

869

6 o/o

MATERIAL SAFETY
DATA SHEET

3M

7. PRECAUTIONARY INFORMATION (continued)

sunlight. Keep container dry. Keep container in well-ventilated area.

FIRE AND EXPLOSION AVOIDANCE:
Keep container tightly closed.

EXPOSURE LIMITS

INGREDIENTS	VALUE	UNIT	TYPE	AUTH	SKIN*
WATER	NONE	NONE	NONE	NONE	
ETHANOL,2-(2-BUTOXYETHOXY)-	35	ppm	TWA	CMRG	
UREA	10	mg/m3	TWA	AIHA	
ALKYL SULFATE SALTS(2) +(5809P, 5810P)	NONE	NONE	NONE	NONE	
AMPHOTERIC FLUOROALKYLAMIDE DERIVATIVE +(5807P)	NONE	NONE	NONE	NONE	
PERFLUOROALKYL SULFONATE SALTS(5) +(5808P)	0.1	mg/m3	TWA	3M	Y
TRIETHANOLAMINE	5	mg/m3	TWA	ACGIH	
1H-BENZOTRIAZOLE,METHYL-	NONE	NONE	NONE	NONE	

* **SKIN NOTATION:** Listed substances indicated with "Y" under SKIN refer to the potential contribution to the overall exposure by the cutaneous route including mucous membrane and eye, either by airborne or, more particularly, by direct contact with the substance. Vehicles can alter skin absorption.

SOURCE OF EXPOSURE LIMIT DATA:
- ACGIH: American Conference of Governmental Industrial Hygienists
- AIHA: American Industrial Hygine Assoc. Workplace Environmental Exposure Level
- 3M: 3M Medical Department Guideline
- CMRG: Chemical Manufacture Recommended Guidelines
- NONE: None Established

8. HEALTH HAZARD DATA

EYE CONTACT:
Moderate Eye Irritation: signs/symptoms can include redness, swelling, pain, tearing, and hazy vision.

SKIN CONTACT:
Mild Skin Irritation: signs/symptoms can include redness, swelling, and itching.

Prolonged or repeated exposure may cause:

May be absorbed through the skin in harmful amounts.

INHALATION:
Single overexposure, above recommended guidelines, may cause:

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

870

6%

MATERIAL SAFETY
DATA SHEET

3M

MSDS: FC-206CF LIGHT WATER Brand Aqueous Film Forming Foam
NOVEMBER 13, 1995

8. HEALTH HAZARD DATA (continued)

Central Nervous System Depression: signs/symptoms can include headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.

Irritation (upper respiratory): signs/symptoms can include soreness of the nose and throat, coughing and sneezing.

Prolonged or repeated overexposure, above recommended guidelines, may cause:

Blood disorders: signs/symptoms can include prolonged weakness and fatigue.

Bone Marrow Depression: signs/symptoms can include prolonged weakness and fatigue.

Kidney Effects: signs/symptoms can include reduced urine volume, blood in urine and back pain.

Liver Effects: signs/symptoms can include yellow skin(jaundice) and tenderness of upper abdomen.

Pulmonary Edema: signs/symptoms can include coughing, congestion, difficulty breathing, which can result in respiratory failure and death.

IF SWALLOWED:
Ingestion is not a likely route of exposure to this product.

OTHER HEALTH HAZARD INFORMATION:
A 3M Product Toxicity Summary Sheet is available.

SECTION CHANGE DATES

ENVIRON. DATA SECTION CHANGED SINCE APRIL 14, 1995 ISSUE

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

Product Environmental Data

3M

Environmental Laboratory
Environmental Engineering and Pollution Control
900 Bush Avenue
PO Box 33331
St. Paul, MN 55133-3331
612/778-4736

SPECIALTY CHEMICALS DIVISION
LIGHT WATER BRAND AQUEOUS FILM FORMING FOAM
FC-206CF

CHEMICAL FAMILY: Water-miscible fire extinguishing agents.

APPEARANCE: Clear, amber liquid.

INGREDIENTS:	% by Weight
Water	78.0 - 81.0
Ethanol, 2-(2-butoxyethoxy) -	9.5 - 10.5
Urea	3.0 - 7.0
Alkyl Sulfate Salts (2)	1.0 - 5.0
Amphoteric Fluoroalkylamide Derivative	1.0 - 2.0
Perfluoroalkyl Sulfonate Salts (5)	0.1 - 1.0
Triethanolamine	0.1 - 1.0
1H-Benzotriazole, methyl-	0 - 0.1

USAGE:

Foams, containing 6% FC-206CF in water, cover and thus extinguish hydrocarbon liquid-based fires. For more detailed usage information, see your technical service representative.

WASTE DISCHARGE:

Facilities which use LIGHT WATER AFFF agents in actual or simulated firefighting activities usually direct the resulting wastes to wastewater treatment systems. Whenever possible, 3M recommends disposing of FC-206CF wastes in this manner. However, aquatic and soil environments sometimes receive these wastes untreated.

BIODEGRADATION:

5-day BOD	0.16 g/g
10-day BOD	0.17 g/g
20-day BOD	0.18 g/g
COD	0.34 g/g
20-day BOD/COD: 0.53	

Product Environmental Data

3M

Environmental Laboratory
Environmental Engineering and Pollution Control
900 Bush Avenue
PO Box 33331
St. Paul, MN 55133-3331
612/778 4736

SPECIALTY CHEMICALS DIVISION
LIGHT WATER BRAND AQUEOUS FILM FORMING FOAM
FC-206CF (CON'T)

AQUATIC TOXICITY DATA:

Organism	Test Condition	Toxicity Value
Fathead minnow (Pimephales promelas)	24-hr LC50	>1,000 mg/L
	48-hr LC50	>1,000 mg/L
	72-hr LC50	>1,000 mg/L
	96-hr LC50	>1,000 mg/L
		24-Hr. EC50
Water Flea (Daphnia magna)	Static	>1,000 mg/L
		48-Hr. EC50
	Static	>1,000 mg/L
	Exposure	EC50 mg/L
Algae (Selenastrum capricornutum)	24-hour Static	332 (279 - 403)
	48-hour Static	199 (177 - 223)
	72-hour Static	203 (183 - 225)
	96-hour Static	254 (233 - 277)

MICROTOX SYSTEM:
Photobacterium phosphoreum using Microtox (TM) analyzer

Exposure	EC50mg/L
5 minutes	>1,000
15 minutes	890 (730 - 1,000)
30 minutes	680 (610 - 750)

ACTIVATED SLUDGE RESPIRATION INHIBITION (OECD METHOD #209):

3 Hour Exposure at 20oC — EC50 >1,000 mg/L

Date:

Product Environmental Data

3M

Environmental Laboratory
Environmental Engineering and Pollution Control
900 Bush Avenue
PO Box 33331
St. Paul, MN 55133-3331
612/778 4736

SPECIALTY CHEMICALS DIVISION
LIGHT WATER BRAND AQUEOUS FILM FORMING FOAM
FC-206CF (Con't)

DISPOASL RECOMMENDATION:

Bleed spent solutions and small product quantities, generally <5 gal.,(19L) to a wastewater treatment system. Reduce discharge rate if foaming occurs. Incinerate bulk product in an industrial or commercial incinerator. 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

Date: 3/11/94 (Supersedes 8/6/93)

Product Toxicity Summary Sheet

Form 15684-G · PWO

Product Name	Issue Date
FC-206CF LIGHT WATER Brand AFFF	August 30, 1993

Below is a summary of the study data giving an indication of the relative toxicity of the product. (Definitions of test procedures are found on the reverse side of this sheet.) This summary is the data for the precautionary use information provided with the product.

Relative toxicity of a material is only one factor that is important in determining the degree of hazard in handling a chemical or product. Other considerations to include are physical properties of the chemical, extent and frequency of use or exposure, intended use, and possible misuse of the product. For additional information regarding safe handling of the product, please reference the Material or Product Safety Data Sheet.

25816-10 Supersedes February 4, 1991

ACUTE ORAL TOXICITY (RAT): PRACTICALLY NON-TOXIC. Ten albino rats (Sprague-Dawley strain, 5 males, 5 females) weighing between 242 and 296 grams, each received an oral dose of FC-206CF equivalent to 5.0 grams (4.95 milliliters) per kilogram of body weight. This study was conducted according to the Organization of Economic Cooperation and Development's Guidelines for Testing Chemicals. Clinical signs were limited to audible breathing in 1 female rat; this was noted from 1 hour to day 3. No mortalities occurred. In all males and 2 females there were weight gains at the 7 and 14 day evaluations. Three female rats either had no weight gain at day 7 compared to initial weight or had no weight gain at day 14 compared to day 7. At necropsy no visible lesions were observed. The acute oral LD50 in the albino rats of FC-206CF is greater than 5.0 grams per kilogram of body weight. FC-206CF is considered practically non-toxic orally under the conditions of this study.
(Hazleton Wisconsin; January 4, 1991; HWI No. 01102302)

ACUTE DERMAL TOXICITY (RABBIT): PRACTICALLY NON-TOXIC. Ten rabbits (New Zealand White strain, 5 males, 5 females) weighing between 2,088 and 2,492 grams each received a dermal application of FC-206CF equivalent to 2.0 grams per kilogram of body weight. This study was conducted according to the Organization of Economic Cooperation and Development's Guidelines for Testing Chemicals. No abnormal clinical signs were noted during the 14 day study. Dermal irritation observed after the 24 hour occlude contact consisted of only slight erythema in 2 animals on day 1. Weight gains were observed in all animals at the 7 and 14 day weighing. No mortalities occurred. No visible lesions were noted in 9 animals at necropsy on day 14. In 1 female rabbit the left kidney had a large pelvis which was considered incidental and unrelated to the test material. The same animal was noted to have thickening of the skin of the treatment area; this was possibly the result of an inflammatory reaction caused by the test material. FC-206CF is considered practically non-toxic dermally under the conditions of this study.
(Hazleton Wisconsin; January 14, 1991; HWI No. 01102303)

PRIMARY DERMAL IRRITATION: NON-IRRITATING. Three albino rabbits (New Zealand White strain) each received 0.5 milliliter applications of FC-206CF to an intact skin test site. The study was conducted according to the Organization for Economic Cooperation and Development's Guidelines for Testing Chemicals. The test sites were covered for 4 hours with a semi-occlusive dressing. The sites were evaluated for irritation at 30 minutes, 24, 48 and 72 hours after removal of the test material. No signs of dermal irritation were observed during the study. FC-206CF is considered non-irritating to the skin under the conditions of this study. Note, however, in the acute dermal toxicity summary that erythema was observed at two test sites after 24 hour occluded contact.
(Hazleton Wisconsin; December 27, 1990; HWI No. 01102304)

Product Toxicity Summary Sheet

Form 15594 - G - PWO

3M

Product Name	Issue Date
FC-206CF LIGHT WATER Brand AFFF	August 30, 1993

Below is a summary of the study data giving an indication of the relative toxicity of the product. (Definitions of test procedures are found on the reverse side of this sheet.) This summary is the data for the precautionary use information provided with the product.

Relative toxicity of a material is only one factor that is important in determining the degree of hazard in handling a chemical or product. Other considerations to include are physical properties of the chemical, extent and frequency of use or exposure, intended use, and possible misuse of the product. For additional information regarding safe handling of the product, please reference the Material or Product Safety Data Sheet.

25816-10 Supersedes February 4, 1991

PRIMARY OCULAR IRRITATION: MODERATELY IRRITATING. Three albino rabbits (New Zealand White strain) each received 0.1 milliliters of FC-206CF in the conjunctival sac of one eye. The contralateral eye served as an untreated control. The study was conducted according to the Organization of Economic Cooperation and Development's Guidelines for Testing Chemicals. The eyes were evaluated for irritation at 1, 24, 48, 72 and 96 hours and at 7, 14 and 21 days after treatment. At the 72 hour and 7, 14 and 21 day evaluations, sodium fluorescein was used to aid in revealing possible corneal injury. FC-206CF elicited corneal opacity, iridal effects and conjunctival irritation consisting of diffuse beefy redness, obvious swelling of the lid, and well defined discharge at the 1, 24, 48, 72 and 96 hour evaluations. Corneal opacity and conjunctival irritation were observed in 1 test eye at days 7, 14 and 21. Two of 3 test animals were observed to exhibit vocal signs of a pain response on instillation of the test substance; they also pawed at the treated eye. Sodium fluorescein examinations were negative in 2 test eyes, but positive in 1 test eye at 72 hours and at days 7, 14 and 21. A maximum primary eye irritation score of 41.7 of a possible 110.0 was assigned at the 1 hour evaluation. FC-206CF is considered moderately irritating to the eyes under the conditions of this study. FC-206CF may cause permanent eye damage if unlimited contact is allowed.
(Hazleton Wisconsin; January 25, 1991; HWI No. 01102305)

(PTSS125-FC206CF)

3M Specialty Chemicals Division

3M

Light Water™
3% AFFF
FC-203CF

Technical Information

Description

Light Water FC-203CF 3% AFFF* is a synthetic firefighting foam concentrate designed for hydrocarbon hazards. When proportioned with water and applied with low energy equipment, Light Water 3% AFFF provides fires by spreading a vapor even when the foam are non-ignited spills ng qualities when ep-seated fires in wo

KENNETH E. CLARK, P.E.
ENVIRONMENTAL ENGINEER
ENVIRONMENTAL QUALITY DIVISION
Atlantic Division
Naval Facilities Engineering Command
1510 Gilbert Street
Norfolk, Virginia 23511-2699
OFFICE: (804) 322-4736
DSN: 262-4736
FAX: (804) 322-4805

Typical Properties

(

Nominal ...
Specific gravity .... 5°C): 1.027
Density ..... gal.
Viscosity ..... (25°C): 3.5 centistokes
(4.4°C): 5.3 centistokes
Minimum use temperature ..... 35°F (1.7°C)
Storage temperature ..... 35° - 120°F (1.7° - 49°C)
Freeze point ..... 25°F (-4°C)
pH ..... @ 77°F (25°C): 8
Appearance ..... Amber liquid

Applications

Light Water FC-203CF 3% AFFF can be used with conventional foam equipment with fresh, sea or brackish water. Self-educting foam nozzles and foam nozzles with in-line eductors are among the most common types of hardware for application.

In addition to its use in aspirating foam equipment, Light Water 3% AFFF can be dispensed effectively through non-aspirating equipment including fog nozzles, water spray devices and standard sprinklers. Light Water 3% AFFF exceeds U.S. Military specification MIL F24385F, supersedes F(SH) and is listed on the U.S. Military Q.P.L. (Qualified Product List). Light Water FC-203CF 3% AFFF is listed by UL and approved by Factory Mutual Research Corporation (FM).

Light Water 3% AFFF may be applied to fires simultaneously with dry chemical firefighting agents because the two are compatible.

Features

Effective: Rapid extinguishment reduces the chances of dangerous incidents and reduces the risk to property and equipment. Light Water 3% AFFF also prevents reflash and burnback, which are major causes of injuries. The securing action of Light Water 3% AFFF minimizes the fire hazard during clean up of flammable liquid spills.

Reliable: Light Water 3% AFFF can be stored for virtually an indefinite period of time in approved equipment and systems. NFPA 11 recommends annual inspection of all foam systems.

* Aqueous Film Forming Foam

3M

Light Water™
3% AFFF
FC-203CF

Technical Information

Description

Light Water FC-203CF 3% AFFF* is a synthetic firefighting foam concentrate designed for use on non-polar, hydrocarbon hazards. When proportioned with water and applied with conventional foam or water/fog equipment, Light Water 3% AFFF provides excellent control and extinguishment of Class B fires by spreading a vapor-sealing film over the liquid fuel. This vapor seal inhibits reflash even when the foam blanket is ruptured and also allows the product to be used to secure non-ignited spills. Light Water 3% AFFF provides excellent penetrating and wetting qualities when used on Class A fires. This is important when extinguishing deep-seated fires in wood, paper, rubber tires and other ordinary combustibles.

Typical Properties

(Not for specification purposes)

Nominal use concentration	3%
Specific gravity	@ 77°F (25°C): 1.027
Density	8.56 lbs./gal.
Viscosity	@ 77°F (25°C): 3.5 centistokes @ 40°F (4.4°C): 5.3 centistokes
Minimum use temperature	35°F (1.7°C)
Storage temperature	35° - 120°F (1.7° - 49°C)
Freeze point	25°F (-4°C)
pH	@ 77°F (25°C): 8
Appearance	Amber liquid

Applications

Light Water FC-203CF 3% AFFF can be used with conventional foam equipment with fresh, sea or brackish water. Self-educting foam nozzles and foam nozzles with in-line eductors are among the most common types of hardware for application.

In addition to its use in aspirating foam equipment, Light Water 3% AFFF can be dispensed effectively through non-aspirating equipment including fog nozzles, water spray devices and standard sprinklers. Light Water 3% AFFF exceeds U.S. Military specification MIL F24385F, supersedes F(SH) and is listed on the U.S. Military Q.P.L. (Qualified Product List). Light Water FC-203CF 3% AFFF is listed by UL and approved by Factory Mutual Research Corporation (FM).

Light Water 3% AFFF may be applied to fires simultaneously with dry chemical firefighting agents because the two are compatible.

Features

Effective: Rapid extinguishment reduces the chances of dangerous incidents and reduces the risk to property and equipment. Light Water 3% AFFF also prevents reflash and burnback, which are major causes of injuries. The securing action of Light Water 3% AFFF minimizes the fire hazard during clean up of flammable liquid spills.

Reliable: Light Water 3% AFFF can be stored for virtually an indefinite period of time in approved equipment and systems. NFPA 11 recommends annual inspection of all foam systems.

* Aqueous Film Forming Foam

Features (cont.)

Economical: Light Water FC-203CF 3% AFFF offers faster extinguishment than protein based foams, so less agent is required in training and actual fire emergencies. Its wide range of applications reduces or eliminates the need to inventory other special type agents.

Environmental/ Toxicological Properties

Light Water FC-203CF 3% AFFF concentrates undergo a program of ongoing testing to assess the impact of 3M firefighting foam on the natural environment. Data indicate that:

3M AFFF products are low in toxicity to tested aquatic organisms. (Toxicity information is available from Product Environmental Data Sheets, Material Safety Data Sheets and Toxicity Summary Sheets for individual products.)

Aquatic life is not adversely affected when 3M AFFF products are used and disposed of properly.

3M AFFF products can be successfully treated in biological waste water treatment systems. (Request Product Environmental Data Sheets and Disposal Recommendations from your 3M representative.)

Storage

Light Water FC-203CF 3% AFFF may be stored in its shipping container without change in its original physical or chemical characteristics. It does not show significant sedimentation or precipitation in storage or after temperature cycling. Freezing and thawing have no effect on performance and the concentrate proportions satisfactorily in ordinary equipment at temperatures above 32°F. Freeze-thaw cycling may cause slight stratification which may be overcome with moderate agitation. Premix solutions in fresh water may be stored long-term for ready use at temperatures above freezing.

Packaging

Light Water 3% AFFF is available in 5 gallon pails or 55 gallon drums.

Representative Locations

3M Corporate Headquarters
Fire Protection Systems
3M Center, Building 223-6S-04
St. Paul, MN 55144-1000
1 800 360 6777
612 733 6791 (FAX – Orders Only)

Anchorage
11151 Calaska Circle
Anchorage, AK 99515
907 522 5200

Honolulu
4443 Malaai Street (96818)
PO Box 30048
Honolulu, HI 96820
808 422 2721

Canada
3M Canada Inc.
1840 Oxford Street
PO Box 5757
London, Ontario, Canada N6A 4T1
519 451 2500
519 452 6262 (FAX)

24 Hour Emergency Service
612 733 1110

Important Notice to Purchaser: *All statements, technical information and recommendations herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed, and the following is made in lieu of all warranties, expressed or implied, including the implied warranties of merchantability and fitness for purpose: Seller's and manufacturer's only obligation shall be to replace such quantity of the product proved to be defective. Before using, user shall determine the suitability of the product for its intended use, and user assumes all risk and liability whatsoever in connection therewith. NEITHER SELLER NOR MANUFACTURER SHALL BE LIABLE EITHER IN TORT OR IN CONTRACT FOR ANY LOSS OR DAMAGE, DIRECT, INCIDENTAL, OR CONSEQUENTIAL, ARISING OUT OF THE USE OF OR THE INABILITY TO USE THE PRODUCT. No statement or recommendation not contained herein shall have any force or effect unless in an agreement signed by officers of seller and manufacturer.*

3M

Fire Protection Systems
3M Specialty Chemicals Division
3M Center, Building 223-6S-04
St. Paul, MN 55144-1000

Printed on recycled paper.
Issued: 3/95

Printed in U.S.A. with 3M films, proofing systems and offset plates.

 98-0211-8265-8(35.5)R2 JL

3M General Offices

3M Center
St. Paul, MN 55144-1000
612 733 1110

409

3%

3%

MATERIAL SAFETY
DATA SHEET

3M

DIVISION: SPECIALTY CHEMICALS DIVISION
TRADE NAME:
FC-203CF LIGHT WATER Brand Aqueous Film Forming Foam

3M ID NUMBER/U.P.C.:

ZF-0002-0620-9	- - -	ZF-0002-0789-2	- - -
98-0211-5617-3	00-51135-10152-0	98-0211-5618-1	00-51135-10153-7
98-0211-5619-9	00-51135-10154-4	98-0211-5620-7	00-51135-10155-1
98-0211-5621-5	00-51135-10156-8	98-0211-5622-3	00-51135-10157-5
98-0211-5623-1	- - -		

ISSUED: NOVEMBER 13, 1995
SUPERSEDES: SEPTEMBER 19, 1995
DOCUMENT: 10-4322-3

1. INGREDIENT

INGREDIENT	C.A.S. NO.	PERCENT		
WATER	7732-18-5	69.0	-	71.0
ETHANOL,2-(2-BUTOXYETHOXY)-	112-34-5	19	-	21
ALKYL SULFATE SALTS(2) +(5805P, 5806P)	TradeSecret	4.0	-	6.0
AMPHOTERIC FLUOROALKYLAMIDE DERIVATIVE +(5803P)	TradeSecret	1	-	5
TRIETHANOLAMINE	102-71-6	0.5	-	1.5
PERFLUORDALKYL SULFONATE SALTS(5) +(5804P)	TradeSecret	0.5	-	1.5
1H-BENZOTRIAZOLE,METHYL-	29385-43-1	0	-	0.1

NOTE: New Jersey Trade Secret Registry Number (EIN) 04499600-+
The components of this product are included on TSCA, ELINCS, MITI.

THIS PRODUCT CONTAINS THE FOLLOWING TOXIC CHEMICAL OR CHEMICALS SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF TITLE III OF THE EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT OF 1986 AND 40 CFR PART 372:
ETHANOL,2-(2-BUTOXYETHOXY)-

2. PHYSICAL DATA

BOILING POINT:	100 C (Typical)
VAPOR PRESSURE:	17 mmHg Calc @ 20C
VAPOR DENSITY:	0.77 Air = 1 Calc @ 20C
EVAPORATION RATE:	< 1.0 Butyl Acetate = 1
SOLUBILITY IN WATER:	Miscible
SP. GRAVITY:	1.0 Water = 1
PERCENT VOLATILE:	90.% by wt
VOLATILE ORGANICS:	200 gms/liter SCAQMD (Gm/Liter of Product)
VOC LESS H2O & EXEMPT SOLVENT	N/A
pH:	8.5
VISCOSITY:	N/D
MELTING POINT	N/A
APPEARANCE AND ODOR:	Clear, amber colored liquid.

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

3M General Offices

3M Center
St. Paul, MN 55144-1000
612 733 1110

410

3%

MATERIAL SAFETY
DATA SHEET

3M

3. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT:..... Setaflash
None (Setaflash CC)
FLAMMABLE LIMITS - LEL: ..... N/A
FLAMMABLE LIMITS - UEL: ..... N/A
AUTOIGNITION TEMPERATURE: ... N/A
EXTINGUISHING MEDIA:
Product is a fire-extinguishing agent.
SPECIAL FIRE FIGHTING PROCEDURES:
Not applicable
UNUSUAL FIRE AND EXPLOSION HAZARDS:
See Hazardous Decomposition section for products of combustion.

4. REACTIVITY DATA

STABILITY: Stable
INCOMPATIBILITY - MATERIALS TO AVOID:
Not applicable.
HAZARDOUS POLYMERIZATION: Will Not Occur
HAZARDOUS DECOMPOSITION PRODUCTS:
Carbon Monoxide and Carbon Dioxide, Oxides of Nitrogen, Oxides of Sulfur, Hydrogen Fluoride
Thermal decomposition of usage concentrations does not present a hazard.

5. ENVIRONMENTAL INFORMATION

SPILL RESPONSE:
Observe precautions from other sections. Ventilate area. Contain spill. Cover with absorbent material. Collect spilled material. Clean up residue with water. Place in an approved metal container. Seal the container.

RECOMMENDED DISPOSAL:
Discharge spent solutions to a wastewater treatment system. Reduce discharge rate if foaming occurs. Large quantities may adversely affect biological wastewater treatment systems. Incinerate in an industrial or commercial facility in the presence of a combustible material. Combustion products will include HF.

ENVIRONMENTAL DATA:
A 3M Product Environmental Data Sheet (PED) is available.

5-Day Biochemical Oxygen Demand (BOD5): 0.35 g/g; 20-Day Biochemical Oxygen Demand (BOD20): 0.75 g/g; 20-Day BOD/COD: 0.96; Chemical Oxygen Demand (COD): 0.75 g/g; 96-Hr LC50, Fathead minnow (Pimephales promelas): >1,000 mg/L; 48-Hr EC50, Water flea,(Daphnia magna): >1,000 mg/L; 96-Hr EC50, Algae (Selenastrum capricornutum): 143 mg/L (130-156); 30-Min EC50, Photobacterium phosphoreum (Microtox System): 280 mg/L (260-300); 3-Hr, 20C EC50, Activated Sludge Respiration (OECD Method #209): >1,000 mg/L.

REGULATORY INFORMATION.
[illegible] consult applicable regulations or authorities

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

3M General Offices

3M Center
St. Paul, MN 55144-1000
612 733 1110

3%

411

MATERIAL SAFETY
DATA SHEET

3M

5. ENVIRONMENTAL INFORMATION (continued)

before disposal. In the event of an uncontrolled release of this material, the user should determine if the release qualifies as a reportable quantity. U.S. EPA Hazardous Waste Number = None (Not U.S. EPA Hazardous).

EPCRA HAZARD CLASS:
FIRE HAZARD: No **PRESSURE:** No **REACTIVITY:** No **ACUTE:** Yes **CHRONIC:** Yes

6. SUGGESTED FIRST AID

EYE CONTACT:
Immediately flush eyes with large amounts of water for at least 15 minutes. Get immediate medical attention.

SKIN CONTACT:
Flush skin with large amounts of water. If irritation persists, get medical attention.

INHALATION:
If signs/symptoms occur, remove person to fresh air. If signs/symptoms continue, call a physician.

IF SWALLOWED:
Drink two glasses of water. Call a physician.

7. PRECAUTIONARY INFORMATION

EYE PROTECTION:
Avoid eye contact with vapor, spray, or mist. Wear vented goggles.

SKIN PROTECTION:
Avoid skin contact. Wear appropriate gloves when handling this material. A pair of gloves made from the following material(s) are recommended: butyl rubber.

VENTILATION PROTECTION:
Use with adequate dilution ventilation.

RESPIRATORY PROTECTION:
Avoid breathing of vapors, mists or spray. Select one of the following NIOSH approved respirators based on airborne concentration of contaminants and in accordance with OSHA regulations: Half-mask organic vapor respirator with dust/mist prefilter.

PREVENTION OF ACCIDENTAL INGESTION:
Do not eat, drink or smoke when using this product. Wash exposed areas thoroughly with soap and water. Wash hands after handling and before eating.

RECOMMENDED STORAGE:
Store away from heat. Keep container closed when not in use.

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

3M General Offices

3M Center
St. Paul, MN 55144-1000
612 733 1110

412

3%

MATERIAL SAFETY
DATA SHEET

3M

7. PRECAUTIONARY INFORMATION (continued)

FIRE AND EXPLOSION AVOIDANCE:
Not applicable.

EXPOSURE LIMITS

INGREDIENTS	VALUE	UNIT	TYPE	AUTH	SKIN*
WATER	NONE	NONE	NONE	NONE	
ETHANOL,2-(2-BUTOXYETHOXY)-	35	ppm	TWA	CMRG	
ALKYL SULFATE SALTS(2) +(5805P, 5806P)	NONE	NONE	NONE	NONE	
AMPHOTERIC FLUOROALKYLAMIDE DERIVATIVE +(5803P)	NONE	NONE	NONE	NONE	
TRIETHANOLAMINE	5	mg/m3	TWA	ACGIH	
PERFLUOROALKYL SULFONATE SALTS(5) +(5804P)	0.1	mg/m3	TWA	3M	Y
1H-BENZOTRIAZOLE,METHYL-	NONE	NONE	NONE	NONE	

* **SKIN NOTATION:** Listed substances indicated with "Y" under SKIN refer to the potential contribution to the overall exposure by the cutaneous route including mucous membrane and eye, either by airborne or, more particularly, by direct contact with the substance. Vehicles can alter skin absorption.

SOURCE OF EXPOSURE LIMIT DATA:
- ACGIH: American Conference of Governmental Industrial Hygienists
- AIHA: American Industriel Hygine Assoc. Workplace Environmental Exposure Level
- 3M: 3M Medical Department Guideline
- CMRG: Chemical Manufacture Recommended Guidelines
- NONE: None Established

8. HEALTH HAZARD DATA

EYE CONTACT:
Moderate Eye Irritation: signs/symptoms can include redness, swelling, pain, tearing, and hazy vision.

SKIN CONTACT:
Moderate Skin Irritation (after prolonged or repeated contact): signs/symptoms can include redness, swelling, itching, and dryness.

Prolonged or repeated exposure may cause:

May be absorbed through the skin in harmful amounts.

INHALATION:
Single overexposure, above recommended guidelines, may cause:

Central Nervous System Depression: signs/symptoms can include headache, dizziness, drowsiness, incoordination, slowed reaction

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

3M General Offices

3M Center
St. Paul, MN 55144-1000
612 733 1110

413

3%

MATERIAL SAFETY
DATA SHEET

3M

MSDS: FC-203CF LIGHT WATER Brand Aqueous Film Forming Foam
NOVEMBER 13, 1995

8. HEALTH HAZARD DATA (continued)

time, slurred speech, giddiness and unconsciousness.

Irritation (upper respiratory): signs/symptoms can include soreness of the nose and throat, coughing and sneezing.

Prolonged or repeated overexposure, above recommended guidelines, may cause:

Blood disorders: signs/symptoms can include prolonged weakness and fatigue.

Bone Marrow Depression: signs/symptoms can include prolonged weakness and fatigue.

Kidney Effects: signs/symptoms can include reduced urine volume, blood in urine and back pain.

Liver Effects: signs/symptoms can include yellow skin(jaundice) and tenderness of upper abdomen.

Pulmonary Edema: signs/symptoms can include coughing, congestion, difficulty breathing, which can result in respiratory failure and death.

IF SWALLOWED:
Ingestion is not a likely route of exposure to this product.

OTHER HEALTH HAZARD INFORMATION:
A 3M Product Toxicity Summary Sheet is available.

SECTION CHANGE DATES

ENVIRON. DATA SECTION CHANGED SINCE SEPTEMBER 19, 1995 **ISSUE**

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

Product Environmental Data

3M

Environmental Laboratory
Environmental Engineering and Pollution Control
900 Bush Avenue
PO Box 33331
St. Paul, MN 55133-3331
612/778 4736

SPECIALTY CHEMICALS DIVISION
LIGHT WATER BRAND AQUEOUS FILM FORMING FOAM
FC-203CF

CHEMICAL FAMILY: Water-miscible fire extinguishing agents.

APPEARANCE: Clear, amber liquid.

INGREDIENTS:	% by Weight
Water	69.0 - 71.0
Ethanol, 2-(2-butoxyethoxy) -	19.0 - 21.0
Alkyl Sulfate Salts (2)	4.0 - 6.0
Amphoteric Fluoroalkylamide Derivative	1.0 - 5.0
Triethanolamine	0.5 - 1.5
Perfluoroalkyl Sulfonate Salts (5)	0.5 - 1.5
1H-Benzotriazole, methyl-	0 - 0.1

USAGE:

Foams, containing 3% FC-203CF in water, cover and thus extinguish hydrocarbon liquid-based fires. For more detailed usage information, see your technical service representative.

WASTE DISCHARGE:

Facilities which use LIGHT WATER AFFF agents in actual or simulated firefighting activities usually direct the resulting wastes to wastewater treatment systems. Whenever possible, 3M recommends disposing of FC-203CF wastes in this manner. However, aquatic and soil environments sometimes receive these wastes untreated.

BIODEGRADATION:

5-day BOD	0.35 g/g
10-day BOD	0.40 g/g
20-day BOD	0.72 g/g
COD	0.75 g/g
20-day BOD/COD: 0.96	

Product Environmental Data

3M

Environmental Laboratory
Environmental Engineering and Pollution Control
900 Bush Avenue
PO Box 33331
St. Paul, MN 55133-3331
612/778 4736

SPECIALTY CHEMICALS DIVISION
LIGHT WATER BRAND AQUEOUS FILM FORMING FOAM
FC-203CF (CON'T)

AQUATIC TOXICITY DATA:

Organism	Test Condition	Toxicity Value
Fathead minnow (Pimephales promelas)	24-hr LC50	>1,000 mg/L
	48-hr LC50	>1,000 mg/L
	72-hr LC50	>1,000 mg/L
	96-hr LC50	>1,000 mg/L
Water Flea (Daphnia magna)		24-Hr. EC50
	Static	>1,000 mg/L
		48-Hr. EC50
	Static	>1,000 mg/L
Algae (Selenastrum capricornutum)	Exposure	EC50 mg/L
	24-hour Static	212 (182 - 244)
	48-hour Static	156 (140 - 174)
	72-hour Static	130 (120 - 141)
	96-hour Static	143 (130 - 156)

MICROTOX SYSTEM:
Photobacterium phosphoreum
using Microtox (TM) analyzer

Exposure	EC50mg/L
5 minutes	470 (420 - 520)
15 minutes	360 (330 - 390)
30 minutes	280 (260 - 300)

ACTIVATED SLUDGE RESPIRATION INHIBITION (OECD METHOD #209):

3 Hour Exposure at 20 C EC50 >1,000 mg/L

8/6/93 (Supersedes 6/29/92) Page 2 of 2

Re:

Product Toxicity Summary Sheet

Form 15594 - G - PWO

3M

Product Name	Issue Date
FC-203CF Light Water Brand AFFF	March 29, 1993

Below is a summary of the study data giving an indication of the relative toxicity of the product. (Definitions of test procedures are found on the reverse side of this sheet.) This summary is the data for the precautionary use information provided with the product.

Relative toxicity of a material is only one factor that is important in determining the degree of hazard in handling a chemical or product. Other considerations to include are physical properties of the chemical, extent and frequency of use or exposure, intended use, and possible misuse of the product. For additional information regarding safe handling of the product, please reference the Material or Product Safety Data Sheet.

25815-10 Supersedes December 17, 1992

ACUTE ORAL TOXICITY (RAT): PRACTICALLY NON-TOXIC. Ten albino rats (Sprague-Dawley strain, 5 males, 5 females) weighing between 244 and 296 grams, each received an oral dose of FC-203CF equivalent to 5.0 grams (4.90 milliliters) per kilogram of body weight. This study was conducted according to the Organization of Economic Cooperation and Development's Guidelines for Testing Chemicals. Clinical signs included red stained face in one male and one female rat and audible breathing in 2 female rats. Signs were noted between 1 hour and day 3 of the study. No mortalities occurred. Weight gains were noted at days 7 and 14 in all test animals. At necropsy no visible lesions were observed. The acute oral LD50 in the albino rats of FC-203CF is greater than 5.0 grams per kilogram of body weight. FC-203CF is considered practically non-toxic orally under the conditions of this study.
(Hazleton Wisconsin; January 4, 1991; HWI Number 01102298)

ACUTE DERMAL TOXICITY (RABBIT): PRACTICALLY NON-TOXIC. Ten rabbits (New Zealand White strain, 5 males, 5 females) weighing between 2,082 and 2,392 grams each received a dermal application of FC-203CF equivalent to 2.0 grams per kilogram of body weight. This study was conducted according to the Organization of Economic Cooperation and Development's Guidelines for Testing Chemicals. No abnormal clinical signs were noted during the 14 day study. Dermal irritation observed after 24 hour occluded contact consisted of slight to severe erythema, slight to moderate edema and slight atonia and fissuring. Weight gains were observed in all animals at the 7 and 14 day weighing. No mortalities occurred. No visible lesions were noted on 9 animals at necropsy on day 14. A single clear fluid-filled cyst on each oviduct was observed in 1 female rabbit; this was considered incidental and unrelated to the test material. FC-203CF is considered practically non-toxic dermally under the conditions of this study.
(Hazleton Wisconsin; January 14, 1991; HWI Number 01102299)

PRIMARY DERMAL IRRITATION: NON-IRRITATING. Three albino rabbits (New Zealand White strain) each received 0.5 milliliter applications of FC-203CF to an intact skin test site. The study was conducted according to the Organization for Economic Cooperation and Development's Guidelines for Testing Chemicals. The test sites were covered for 4 hours with a semi-occlusive dressing. The sites were evaluated for irritation at 30 minutes, 24, 48, and 72 hours after removal of the test material. No signs of dermal irritation were noted. FC-203CF is considered non-irritating to the skin under the conditions of this study. Note, however, in the acute dermal toxicity summary that dermal irritation was observed after 2 hour occluded contact.
(Hazleton Wisconsin; December 27, 1990; HWI Number 01102300)

Product Toxicity Summary Sheet

Form 15594-G-PWO

3M

Product Name	Issue Date
FC-203CF Light Water Brand AFFF	March 29, 1993

Below is a summary of the study data giving an indication of the relative toxicity of the product. (Definitions of test procedures are found on the reverse side of this sheet.) This summary is the data for the precautionary use information provided with the product.

Relative toxicity of a material is only one factor that is important in determining the degree of hazard in handling a chemical or product. Other considerations to include are physical properties of the chemical, extent and frequency of use or exposure, intended use, and possible misuse of the product. For additional information regarding safe handling of the product, please reference the Material or Product Safety Data Sheet.

25815-10

Supersedes December 17, 1992

PRIMARY OCULAR IRRITATION: MODERATELY IRRITATING. Three albino rabbits (New Zealand White strain) each received 0.1 milliliters of FC-203CF in the conjunctival sac of one eye. The contralateral eye served as an untreated control. The study was conducted according to the Organization of Economic Cooperation and Development's Guidelines for Testing Chemicals. The eyes were evaluated for irritation at 1, 24, 48, 72 and 96 hours and at 7 days after treatment. At the 72 hour and 7 day evaluations, sodium fluorescein was used to aid in revealing possible corneal injury. FC-203CF elicited corneal opacity iridal effects including injected iris, conjunctival irritation consisting of redness, chemosis and/or discharge in some test eyes at the 1, 24, 48 and 72 hour observations. Signs of irritation were limited to conjunctival redness at 96 hours. All test eyes were clear to day 7. The sodium fluorescein examination was positive in 1 of 3 test eyes at 72 hours, but negative in all three test eyes at day 7. A maximum primary eye irritation score of 29.0 of a possible 110.0 was assigned at the 1 hour observation. FC-203CF is considered moderately irritating to the eyes under the conditions of this study. (Hazleton Wisconsin; January 17, 1991; HWI Number 01102301)

(PTSS120-FC203CF)

3M Specialty Chemicals Division

Product Environmental Data

3M

Environmental Laboratory
3M Environmental Engineering and Pollution Control
900 Bush Avenue
PO Box 33331
St. Paul, MN 55133-3331
612/778 4736

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 from the separator should be incinerated in a facility designed to accept such wastes. Disposal of the aqueous fraction from the oil/water separator or the entire waste, when pretreatment by oil/water separation is not possible, requires special considerations. A qualified individual should evaluate these wastes to determine if volatile flammable materials are present at hazardous concentrations and to review the applicability of sewer code restrictions. If volatile flammable materials in the waste present an explosion hazard, it should not be discharged to a sewer. Such wastes should be further treated to remove the hazard or they should be incinerated in a facility designed to accept such wastes.

If qualified individuals determine that the waste meets sewer codes and that flammable materials are not present in the waste at concentrations that presents a risk of explosion in the sewer, the waste may be metered into a sewer that flows to a wastewater treatment system. Meter such wastes into the sewage system at a rate sufficiently low so

Date:

Product Environmental Data

3M

Environmental Laboratory
3M Environmental Engineering and Pollution Control
900 Bush Avenue
PO Box 33331
St. Paul, MN 55133-3331
612/778 4736

3M LIGHT WATER BRAND AQUEOUS
FILM FORMING FOAM (AFFF)
DISPOSAL RECOMMENDATIONS AND HAZARD EVALUATION
(CON'T)

that the AFFF will not cause excessive foaming in the aeration basin of the wastewater treatment system. Appropriate discharge rates will be determined by individual circumstances and should follow applicable regulations. Since regulations vary, consult regulations or authorities before discharge. In addition, wastewater treatment plant operators should be contacted to determine the capacity of the treatment system and sewage flow rates into the system so that appropriate AFFF waste discharge rates can be determined.

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 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 treatment 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 for up to 3 hours. The effectiveness of antifoaming agents, however, will be determined by the specific conditions in the aeration basin in individual wastewater treatment systems. In addition, some antifoamers may become less effective at controlling excessive foaming as time passes. Therefore, foaming should be closely monitored over time and additional antifoamer should be added to the aeration basin as needed.

Product Environmental Data

3M

Environmental Laboratory
3M Environmental Engineering and Pollution Control
900 Bush Avenue
PO Box 33331
St. Paul, MN 55133-3331
612/778 4736

3M LIGHT WATER BRAND AQUEOUS
FILM FORMING FOAM (AFFF)
DISPOSAL RECOMMENDATIONS AND HAZARD EVALUATION
(CON'T)

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
Wacker Silicones 1-800-248-0063	Antifoam Agent SE-36 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%.

Product Environmental Data

3M

Environmental Laboratory
3M Environmental Engineering and Pollution Control
900 Bush Avenue
PO Box 33331
St. Paul, MN 55133-3331
612/778 4736

3M LIGHT WATER BRAND AQUEOUS
FILM FORMING FOAM (AFFF)
DISPOSAL RECOMMENDATIONS AND HAZARD EVALUATION
(CON'T)

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 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.

Determination of the approximate antifoam concentration from the table is best explained by an example. Suppose that AFFF usage waste is to be discharged at a rate that will result in a concentration of FC-203CF of 700 mg/L in the aeration basin of a wastewater treatment system. The approximate antifoam concentrations needed to control foaming at this AFFF concentration are listed in the "700" column of the table. The numbers in this column are the approximate concentrations of antifoam products needed to control foaming caused by FC-203CF at 700 mg/L. Each row gives the approximate antifoam concentration for the product listed on the left side of the table. If you intend to use Henkel Foammaster™ DS for foam control, read down the column under the heading "700" until you reach the row for Henkel Foammaster™ DS. The number in the table is "430" which means that Henkel Foammaster™ DS should be added to the aeration basin at approximately 430 mg/L to control foaming caused by FC-203CF at 700 mg/L. Another possible antifoamer for controlling foaming by FC-203CF at 700 mg/L is Wacker Silicones SE-36. Reading from the table under the "700" column at the Wacker Silicones SE-36 row gives "580" which means that to control

Product Environmental Data

3M

Environmental Laboratory
3M Environmental Engineering and Pollution Control
900 Bush Avenue
PO Box 33331
St. Paul, MN 55133-3331
612/778 4736

3M LIGHT WATER BRAND AQUEOUS FILM FORMING FOAM (AFFF)
DISPOSAL RECOMMENDATIONS AND HAZARD EVALUATION
(CON'T)

foaming of FC-203CF at 700 mg/L with Wacker Silicones SE-36, you will need to add Wacker Silicones SE-36 so that its concentration is approximately 580 mg/L. As you can see from the table, Henkel WB-209, Wacker Silicones SWS-214, and Union Carbide SAG 2001 are not recommended for controlling foaming from an FC-203CF concentration of 700 mg/L. The absence of a value for these products in the "700" column indicates these three products are not recommended for controlling foam at an FC-203CF concentration of 700 mg/L.

	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.

Product Environmental Data

3M

Environmental Laboratory
3M Environmental Engineering and Pollution Control
900 Bush Avenue
PO Box 33331
St. Paul, MN 55133-3331
612/778 4736

3M LIGHT WATER BRAND AQUEOUS FILM FORMING FOAM (AFFF) 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 because 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 system. 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%).

Product Environmental Data

3M

Environmental Laboratory
3M Environmental Engineering and Pollution Control
900 Bush Avenue
PO Box 33331
St. Paul, MN 55133-3331
612/778 4736

3M LIGHT WATER BRAND AQUEOUS FILM FORMING FOAM (AFFF)
DISPOSAL RECOMMENDATIONS AND HAZARD EVALUATION (CON'T)

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. This is the pass level for respirometric ready-biodegradability tests established by the Organization for Economic Cooperation and Development (OECD). 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 these 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, wastewater 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.

Date:

Product Environmental Data

3M

Environmental Laboratory
3M Environmental Engineering and Pollution Control
900 Bush Avenue
PO Box 33331
St. Paul, MN 55133-3331
612/778 4736

3M LIGHT WATER BRAND AQUEOUS FILM FORMING FOAM (AFFF) DISPOSAL RECOMMENDATIONS AND HAZARD EVALUATION (CON'T)

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 sewer 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 once 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).

Product Environmental Data

3M

Environmental Laboratory
3M Environmental Engineering and Pollution Control
900 Bush Avenue
PO Box 33331
St. Paul, MN 55133-3331
612/778 4736

3M LIGHT WATER BRAND AQUEOUS FILM FORMING FOAM (AFFF) DISPOSAL RECOMMENDATIONS AND HAZARD EVALUATION (CON'T)

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 judged 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.

Date: