

Reducing the Environmental Impact of Fire Fighting Foams

***Tom Cortina
4th Reebok Foam Seminar
July 6-7, 2009***



Overview

- **Fire Fighting Foam Coalition (FFFC)**
- **Most Effective Agents**
- **Reduced Environmental Impacts**
- **EPA PFOA Global Stewardship Program**
- **Impact of Stewardship Program**
- **Summary**

Fire Fighting Foam Coalition

- **June 2001 - Industry meeting with US EPA and DoD to discuss the PFOS/PFOA issue and fire fighting foams**
- **Clear that the differences between PFOS-based and telomer-based foams were not well understood**
- **Speculation about future regulation of fire fighting foams was causing problems for the industry**
- **Industry formed the Fire Fighting Foam Coalition (FFFC)**

Fire Fighting Foam Coalition

- **FFFC is a non-profit corporation that was formed to represent the foam industry's interests on issues related to the environmental acceptability of fire fighting foams**
- **The coalition provides a focal point for industry technical reviews, development of industry positions, and interactions with relevant organizations such as environment agencies, militaries, approval agencies, standards bodies, etc.**
- **Members are foam manufacturers, fluorosurfactant manufacturers, and distributors**



Fire Fighting Foam Coalition

- Board members of FFFC:

Ansul (Tyco)

Chemguard

DuPont

Dynax

Kidde (UTC)



FFFC Activities

- **Information on foams to US Environmental Protection Agency (EPA), UK Department of Environment, Food and Rural Affairs (DEFRA), European Commission, Environment Canada, Canadian Department of National Defence, Belgian Environment Agency:**

Amount of fluorosurfactant actives used in the manufacture of AFFF in the US (EPA only)

Chemical structure of the fluorosurfactants used in major telomer-based AFFF formulations (EPA only)

Toxicity and environmental impacts of telomer-based AFFF

Mechanics of film formation

Groundwater monitoring data from DoD fire training areas

U.S. Inventory of PFOS-based and telomer-based AFFF

Overview of Foams, Market Channel, Environmental Fate

Most Effective Agents

- **Fire fighting foams that contain fluorosurfactants and fluorochemical foam stabilizers are the most effective agents currently available to fight flammable hydrocarbon and polar liquid fires in military, industrial and municipal settings**
- **Fluorinated surfactants provide required low surface tension and positive spreading coefficient that enables formation of an aqueous film on top of lighter hydrocarbon fuels**

Most Effective Agents

- **There can be implications for life safety and protection of high-value property to using less effective foams on flammable liquid fires**

More time to knockdown and extinguish fire

More foam needed to extinguish fire (more water)

- Implications for environment to using more foam and water

May require use of additional equipment (air-aspirating pipes and nozzles)

May require firefighters to get closer to fire

An unproven track record in fighting class B fires

Reduced Environmental Impacts

- Over the past decade there has been a significant reduction in the environmental impact of class B fire fighting foams

Elimination of PFOS (PBT)

- Regulations in US (2002), EU (2006), and Canada (2008) - Still being manufactured in China
- PFOS foams required to be removed from service in EU (2011) and Canada (2013)

Reduction in PFOA

Reduced Environmental Impacts

- **Over the past decade there has been a significant reduction in the environmental impact of class B fire fighting foams**

Increased focus on minimizing emissions through containment and treatment of discharges

Use of non-fluorosurfactant foams for training

Use of non-fluorosurfactant alternative test liquids for foam proportioning system testing

- **Field and SFT studies show multiple releases over many years result in contamination**
- **Not normal use pattern for fire fighting**

Reduced Environmental Impacts

- **2007 study by US Centers for Disease Control showed significant reductions in human blood levels of PFOS (32%) and PFOA (25%) from 1999-2000 to 2003-2004**



Jury backs 3M in landmark pollution case

5-year contaminated water lawsuit ends quickly in Washington County

By Bob Shaw
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The 3M Co. won a landmark court case Wednesday when a jury ruled against claims of Washington County residents suing the company over chemicals in their groundwater.

For 3M, it was a triumphant end to a five-year case that once loomed as one of the largest environmental lawsuits in Minnesota history.

“Obviously, we are pleased with the verdict. It was supported by the evidence,” 3M spokesman Bill Nelson said.

The jury delivered the unanimous verdict with surprising speed — deliberating four hours to decide a case that involved five weeks in court, 35 witnesses, eight law firms and more than 300 exhibits.

It is not known if the verdict will be appealed. The plaintiffs and their lawyers could not be reached Wednesday afternoon.

Lawyers for four plaintiffs — Gary and Karen Paulson, Brad Krank and Bill Henry — argued that 3M negligently allowed chemicals to seep into

3M RULING, 2A >

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H



**Ruling for 3M
on the 17th
of this month
(June 09)**

It was calculated that a Woodbury resident would have had to drink 500,000 glasses (over 100,000 litres) of the water at once to get a PFC dose at the level believed to be harmful in mice.

Reduced Environmental Impacts

- **Telomer-based foam agents provide a significant reduction in environmental risk compared to PFOS-based agents**

Do not contain or breakdown into PFOS

Are not made with PFOA or PFOA-based products

Contain 30-50% less fluorosurfactant

Reduced Environmental Impacts

- **Telomer-based foam agents provide a significant reduction in environmental risk compared to PFOS-based agents**

Contain fluorosurfactants that are:

- **Low in acute and sub-chronic toxicity**
- **Low in aquatic toxicity**
- **Negative for genetic and developmental toxicity**
- **Not bioaccumulative according to regulatory criteria**
- **Much lower than PFOS in biopersistence**

EPA PFOA Stewardship Program

- **Environmental impact of telomer-based products will be reduced even more under the EPA PFOA Global Stewardship Program**
- **Under the program, telomer manufacturers will reduce PFOA, PFOA precursors, and related higher homologue chemicals from plant emissions and finished products by 95% by year-end 2010 and work to eliminate them by 2015**
- **Confirms FFFC message of last 8 years that EPA was unlikely to ban or severely restrict the use of telomer-based products such as fire fighting foams**

Impact of Stewardship Program

- EPA stewardship program is focused on eliminating telomers with eight or more carbons (C8 or above)
- The majority (over 75%) of the fluorosurfactants used in telomer-based AFFF are derived from six-carbon molecules (C6)
- Some current AFFF formulations contain over 95% C6 fluorosurfactants, but others contain a higher percentage of C8 and above

Impact of Stewardship Program

- **Manufacturers will be introducing reformulated products over the next few years that contain only C6 fluorosurfactants**
- **Because there are already foam agents that meet the toughest specifications that contain >95% C6 fluorosurfactants, manufacturers are confident that the new products will retain same fire suppression capabilities as existing foam agents**
- **Changes to formulations may require products to be re-qualified under the various specifications**

Impact of Stewardship Program

- Higher homologue chemicals can provide some positive characteristics related to foam effectiveness
- Incorporating pure C6 fluorosurfactants may require changes to other components of the formulation (not “drop in” replacements)

Summary

- **Fire fighting foams that contain fluorosurfactants and fluorochemical foam stabilizers are the most effective agents currently available to fight flammable liquid fires**
- **Significant reduction in environmental risk by replacing PFOS-based foam agents with telomer-based foam agents**
- **Increased focus on minimizing emissions through containment and treatment of foam discharges, and increased use of non-fluorosurfactant foams for training and as alternative test liquids**

Summary

- **Environmental impact of telomer-based foam agents will be reduced even more under the EPA Global Stewardship Program**
- **C6 telomer-based fluorosurfactants are low in toxicity and behave differently than PFOS in both biological and environmental systems**
- **Incorporating pure C6 fluorosurfactants will require changes to formulations and some re-approvals**
- **Foam agents are expected to retain same fire suppression capabilities**

Conclusion

- **Responsible use of telomer-based foams that comply with the EPA PFOA Global Stewardship Program strikes the correct balance between the need for effective fire suppression agents and the requirement to protect the environment**

- **FFFC is pleased to provide information on fire fighting foams:**

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