From:	Ronald S. Sheinson
To:	Glover, Carl CIV CNIC HQ, N3; Berchtold, Brian D CIV NSWCCD Philadelphia, 6680; Bradley A. Williams
CC:	Davidson, Ross A CIV; Whalen, Shawn T LCDR NavAir 1.0, PMA251; Hunstad, Mary P CIV SEA 05; Barylski, Douglas J CIV SEA 05; John P. Farley
Sent:	11/6/2007 2:46:46 PM
Subject:	RE: EC Governance Council Meeting Summary Memo
Attachments:	MEETS 2003 AFFF Issues Williams&Sheinson.doc; Sheinson AFFF ONR Workshop.pdf

Carl & Brian,

First off, only 3M AFFF of all the QPL AFFF products contains PFOS. 3M is not making any more fire fighting foams, AFFF or other types. There is residual 3M AFFF stock in DoD and in place in foam systems aboard ships. The EPA limitations are on manufacture or importation of PFOS, not on AFFF usage. The EPA addresses PFOS, not AFFF. In fact, AFFF is a minor user of PFOS compared with other applications.

"Are we now in a more dire position regarding AFFF than we were at the Workshop in December 2004?" Not much has changed. 3M is out of the AFFF manufacturing business. Concerns are still present on AFFFs in general and restrictive regulations are increasing world-wide. Mary Dominiak's (EPA) statement that it would be prudent to investigate alternatives still holds. (I don't expect too much more from the EPA under the current administration.) But the other shoe has not dropped yet. We probably (I am not an International Law expert) can still use AFFF as long as we are not flagrant in releasing any into the littoral environment unless really needed for platform / life safety. Be careful within national coastal boundaries and transit waterways (e.g., straits and channels).

PFOS is unique and identifiable as a 3M product. It was easily singled out for legislation. That is not to say there are not limitations on AFFF release in general. There definitely are, within the US (including a patchwork of local restrictions on wastewater contamination), and by individual countries and international agreements, for 3M PFOS AFFF AND the other AFFF products. At the recent Buncefield fire in the UK, about 18 million gallons of foam / water "hazardous waste" from the extinguishment efforts had to be contained and processed. In fact, the fire fighting with foam could not even begin until containment dikes were first set up. And this was for foams NOT containing any PFOS.

For general information I am attaching a background briefing I presented at the two day December 2004 "Workshop on Fire Fighting Foams in the Military" which Brad Williams of my group ran for ONR. Also an older proceedings article from the Marine Environmental Engineering Technical Symposium (MEETS) 2003 Arlington, VA, 21-22 August 2003. You may already have these.

We are definitely interested in fire fighting foam developments but do not have active programs and have not been following recent legislative developments closely. While I had developed a roadmap for a comprehensive fire fighting foam development program which was POMed by NAVSEA, with other AFFFs on the QPL still allowed, no Operational Requirement for less environmentally damaging foam, and much more pressing claimants for Navy resources, that effort was dropped. The only task we currently have on fire fighting foam is a very small NAVSEA one supporting addressing the issue of hydrogen sulfide (H_2S) generation from stagnant AFFF-seawater mixtures in shipboard piping. Brad and I had investigated mitigation strategies and possible effects on AFFF performance. MPR in currently following through for shipboard implementation, including tests they are running at NRL CBD.

I do continue to interact with the Fire Fighting Foam Coalition whose web site you give as a reference for information. We have presented our work at their meetings and continue to attend doe discussions as appropriate. Do recognize they are an advocacy group, specifically not

including 3M, primarily of MilSpec AFFF and component surfactant producers. They were in large part formed in my opinion for damage control so that the PFOS issue with 3M AFFF (and it does apply directly only to 3M products) would not tar their products. They have cooperated with EPA, but I feel sometimes slowly. The way EPA initially approached the PFOS matter (in my opinion) was very heavy handed and indiscriminate. This was largely the result of an administrator basing the EPA 'ruling' on language from an EPA chemist who misconstrued a definition of telomers. I was unable to convince the EPA person otherwise, even with International Union of Pure and Applied Chemistry on-line definitions. It could have threatened DuPont's telomere processes which are widely used and would have fallout on a very large fraction of their product line, unrelated to PFOS or AFFF. They had to get into the issue.

3M used an electroforming process to generate their foams. It resulted in a mixture of sulfur containing fluorosurfactants of the general class PFOS. There are probably about 90 different components. "PF" is for "perfluoro" which means all the fluorines that were possible, as opposed to other elements such as hydrogen, on the carbon structure. With only fluorines exposed around the carbon molecular backbone, these compounds are extremely resistant to degradation, and thus their long life in the environment. The other foam manufacturers use a different polymerization process (telomerization) which makes perfluorosurfactants, but does not make PFOS. It is also a more expensive process, which is probably why 3M with their patented process) had the DoD contracts so long.

3M as the only manufacturer and marketer of PFOS products saw PFOS in the environment all over the world, and knew it came from them. Think Tobacco liability. So they got out of the business. The "O" in PFOS is for octyl, meaning eight. The carbon molecular skeleton of the perfluoro part of the surfactant is eight carbon atoms long, called C-8. The 'other' foam manufacturers and the FFFC have made much of the fact that the 'other' non-PFOS foams are not C-8, but are C-6 (six carbon atoms long). (That is largely true, but they do contain a carbon chain length spread and do include perhaps 5-15% C-8 surfactants.) To some extent, the C-8 issue is an overblown 'red herring'. The larger issue in my mind is that the telomere foams, while not purposefully containing perfluoroalkyl acid compounds, can still probably make them as degradation products. Although they are likely primarily C-6 products, (and some C-8), and are thus PFHxA (a C-6 compound, Hexyl for six) and not PFOA (a C-8 compound), they still have some as yet not completely quantitated hazard properties.

3M Australia did later develop non-fluorosurfactant fire fighting foams which we evaluated for NAVFAC. While they were not up to DoD AFFF MilSpec fire suppression performance requirements, one product was quite good and closest to it by far than any other environmentally friendly AFFF attempt. Our thought was that a product with slightly less capability, and far less environmental baggage, could be appropriate for protection needs not involving platform survivability or sailor life safety from rapidly developing large scale fires involving ordnance. This would include many land based facilities. However, after 3M started marketing the product in Asia, they made a corporate defensive decision to totally disengage from such products designed to be released into the environment. They may have sold or licensed the technology since then.

Other potential fire protection approaches: There are other commercial products existing or developable related to AFFF for possible future interest. This includes the possibility of MilSpec qualified AFFF at 1% concentration for better space / weight / logistics, and alcohol resistant and high expansion (HiEx)foams, for which there are not military standards.

The topic of high expansion foams is very interesting as AFFF is effective for two dimensional fuel spill / pool fires, but not effective for three dimensional fires. HiEx may serve as a total flooding mechanism for delivering water in thin films that would rapidly evaporate and efficiently attack fires both via energy abstraction and air flow obstruction. Water mist is being used as a total flooding agent in the LPD 17 Class machinery

spaces, and it would be advantageous to be able to use water mist in other types of spaces and fire threat scenarios, including replacing the halon replacement systems I was instrumental in developing. The LPD 17 system was designed empirically aboard the NRL ex-USS Shadwell. The design carries over for many, but not all types, of spaces. It is difficult to see how to optimize water mist to enable it to have acceptable performance in very obstructed spaces. HiEx is essentially low density water but still higher concentrations of water than can be achieved with small drop water mist. And it flows between and around obstacles. It should work well in cluttered spaces such as flammable liquid storage rooms and be an alternative to halon replacements such as HFP.

HiEx fire protection dynamics are not well characterized. The Air Force uses commercial HiEx foam systems for hanger protection. But they employ a safety factor of from 2.5 to 4 on commercial systems to cover uncertainties. Better HiEx foam suppression mechanism and dynamics characterization should allow more optimum system design for reduced impact shipboard systems.

And HiEx foams do not need to contain fluorosurfactants. No PFOA or PFOS issues.

Ron Sheinson

-----Original Message-----
From: Glover, Carl CIV CNIC HQ, N3 [mailto:carl.glover@navy.mil]
Sent: Tuesday, November 06, 2007 6:54 AM
To: Berchtold, Brian D CIV NSWCCD Philadelphia, 6680; Ronald S. Sheinson; Bradley A. Williams
Cc: Davidson, Ross A CIV; Whalen, Shawn T LCDR NavAir 1.0, PMA251; Hunstad, Mary P CIV SEA 05; Barylski, Douglas J CIV SEA 05; John P. Farley
Subject: RE: EC Governance Council Meeting Summary Memo

All, as we understand the issue, we currently do not have a general plan regarding the elimination of PFOS AFFF. To date, it has only been an issue in EU...they want it use be phased out within 5 years.

Is the problem only with 3M AFFF, not the other manufacturers. New AFFF (after 2002) is not PFOS AFFF?

An excellent site for information about AFFF is at http://www.fffc.org/afff.html. They have lots of great information.

Good discussion topics

Carl B. Glover, Jr.
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-----Original Message-----
From: Berchtold, Brian D CIV NSWCCD Philadelphia, 6680
Sent: Monday, November 05, 2007 18:17
To: sheinson@code6185.nrl.navy.mil; Brad Williams
Cc: Glover, Carl CIV CNIC HQ, N3; Davidson, Ross A CIV; Whalen, Shawn T LCDR NavAir 1.0, PMA251; Hunstad, Mary P CIV SEA 05; Barylski, Douglas J CIV SEA 05; John Farley
Subject: FW: EC Governance Council Meeting Summary Memo

Brad and Ron,

Were you aware of the attached actions at the Emerging Contaminants Governance Council Meeting? If so, are there copies of supporting documents available? To your knowledge, are we now in a more dire position regarding AFFF than we were at the Workshop in December 2004?

Any additional info would really be appreciated.

Thanks in advance.

Brian

Brian Berchtold

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-----Original Message-----
From: Glover, Carl CIV CNIC HQ, N3
Sent: Monday, November 05, 2007 7:03
To: Berchtold, Brian D CIV NSWCCD Philadelphia, 6680; Davidson, Ross A CIV; Whalen, Shawn T LCDR NavAir 1.0, PMA251
Cc: Brockman, Ricky N CIV CNIC HQ
Subject: FW: EC Governance Council Meeting Summary Memo

Brian, I seem to remember you had someone who was participating in the EPA group a year or so back on the PFOA issue?? Please review attached and comment.

Ross and Shawn ... FYI

Thanks Carl

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-----Original Message-----
From: Kaminski, Art, OSD-ATL [mailto:Art.Kaminski@osd.mil]
Sent: Monday, November 05, 2007 6:41
To: AF1; AF2; Army1; Bouley GS14 Paul J; DLA1; DLA2; DUSD(I&E); Fire Academy; Kaminski, Art, OSD-ATL; Means, Dale F Mr IMCOM/MPRI; Glover, Carl CIV CNIC HQ, N3; Brockman, Ricky N CIV CNIC HQ; Roush Allen Ctr AF/A7CXR; Ruffini GS14 Thomas A; USMC-mil2
Subject: FW: EC Governance Council Meeting Summary Memo

- Please note section on PFOA

- What are we doing in Services to phase out ? limited training etc?

Thanks - Art

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"Eliminate Illness & Injury from DoD"

-----Original Message-----
From: Yaroschak, Paul, Mr, OSD-ATL
Sent: Thursday, November 01, 2007 12:24 PM
To: Smith, Bradley, Mr, OSD-ATL; Marqusee, Jeffrey, Dr, OSD-ATL; Seibert, John, Mr, OSD-ATL; Asiello, David, Mr, OSD-ATL; Bowling, Curtis, Mr, OSD-ATL; Choudhury, Shah, Mr, OSD-ATL; Thomas, Jonathan, LtCol, OSD-ATL; Ann Engelberger (Ann.Engelberger@dla.mil); Morefield, Deborah A CIV OASN (I&E), ODASN (E); Harrell, Rob A CIV OPNAV, CNO N45; Leblanc, Carole Ms OSD ATL; Mach, Richard G CIV OASN (I&E); Indermark Michele Civ SAF/IEE; Misha Turner (CMC); Moore, Wendell A COL ASA(I&E); Newsome, Richard E Mr ASA-I&E; Ross Elaine Civ AF/A7CAR; Jossell, Stanley J CDR USN, ODASN (Safety); Weisman Wade Lt Col SAF/IE
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Subject: EC Governance Council Meeting Summary Memo

Colleagues: Attached FYI. Paul