OILTECHNICS
FIRE FIGHTING
PRODUCTS

fire fighting foam update

C6 FOAMS

Q1:2017

INTRODUCTION TO C6 TECHNOLOGY UPDATE

Dear customer,

Over the last 15+ years, the Fire Fighting Foam Industry has been working to understand how environmental pollution arising from the use of non-C6 fluorinated AFFF concentrates can be removed.

As from February this year, the US EPA and the European Chemical Agency (ECHA) have approved fire fighting foams manufactured with fluorosurfactants using a maximum carbon chain of C6:

- In the USA, C6 technology has now been approved by the EPA and the military as the way forward for AFFFS.
- In the EU, the situation is a little more complicated.
- ECHA has now exempted C6 technology and allowed C6 AFFFs to be sold within the EU.
- In return, fluorotelomer manufacturers are being required to improve the quality of C6 fluorosurfactants by reducing the amount of impurities to:
  - less than 25ppb for PFOA;
  - less than 1000ppb for a combination of PFOA-related substances.
- When our flurosurfactant suppliers have achieved this target, we will supply our customers with Certificates of Conformity to demonstrate ECHA compliance.

The articles included in this newsletter will provide you with further information on these important issues, but should you have any questions do please send an email to david@firefightingfoam.com

Kind regards

David Evans
Managing Director, Aberdeen Foam

OILTECHNICS FIRE FIGHTING PRODUCTS

BACKGROUND TO C6 FIRE FIGHTING FOAMS

PFOS

Some fifteen years ago, concern was expressed that fire fighting foam using materials manufactured through electrochemical fluorination (ECF) could break down into perfluorooctanesulfonic acid (PFOS) which, in the environment, is:

> Persistent > Bioaccumulative > Toxic

PFOS-containing foams have been withdrawn from the market and are no longer used.

PFOA

Further investigation showed that existing perfluorinated surfactants used in other AFFFS could break down into perfluorooctanoic acid (PFOA) in the environment.

Research showed that the risk of breakdown into PFOA could be eliminated if the perfluorinated surfactant used in AFFFs was restricted from perfluorinated carbon chain lengths of C8 and greater to a C6 chain length.

By restricting the chain length to C6 perfluorinated surfactants:

> the process of producing PFOS is eliminated

> the process of degradation to environmentally harmful PFOA is avoided.

ABERDEEN FOAM

Our range of Aberdeen Foam concentrates:

> use only telomer-manufactured C6 perfluorinated surfactants

> have been tested to meet international standards including

> UL 162 > ICAO Levels B & C > EN 1568: 2008

C6 technology is now agreed as the way forward by international bodies

> EU ECHA > US EPA > Canadian EPA

Now that C6 fire fighting foams are approved and available, we take pleasure in enclosing a recent article released in January 2017 by the Fire Fighting Foam Coalition explaining the benefits of using C6 Fire Fighting Foam concentrates.

FIRE FIGHTING FOAM COALITION FACT SHEET

INTRODUCTION

Nearly 15 years after the end of production of PFOS-based AFFF agents, there is continued discussion within the fire protection industry on the environmental impact and efficacy of fire fighting foams. The discussion of environmental impact is usually focused on foams that contain fluorochemicals, while the discussion of efficacy is usually focused on foams that do not contain fluorochemicals. The Fire Fighting Foam Coalition (FFFC) has produced this fact sheet to provide you with accurate, up-to-date information about these issues.

KEY FACTS

- All modern AFFF agents contain fluorotelomer-based fluorosurfactants.
- Fluorotelomer-based AFFF agents are the most effective foams currently available to fight flammable liquid fires in military, industrial, aviation, and municipal applications. They provide rapid extinguishment, burnback resistance, and protection against vapor release.
- Fire test results presented at international fire protection conferences in 2011, 2013 and 2016 all show that AFFF agents are significantly more effective at extinguishing flammable liquid fires than fluorine-free foams.
- Fluorotelomer-based foams do not contain or break down into PFOS (perfluorooctane sulfonate) or homologues of PFOS such as PFHxS (perfluorohexane sulfonate).
- Fluorotelomer-based foams are not made with PFOA (perfluorooctanoic acid) or any PFOA-based products, but may contain trace quantities as an unintended byproduct of the surfactant manufacturing process.
- The short-chain (C6) fluorosurfactants that have been the predominant fluorochemicals used in fluorotelomer-based AFFF for the last 25 years are low in toxicity and not considered to be bioaccumulative based on current regulatory criteria.
- Foam manufacturers have transitioned or are in the process of transitioning to the use of only short-chain (C6) fluorosurfactants in their fluorinated foam products.
- Proposed regulations on long-chain (≥ C8) perfluorinated chemicals (PFAS) in Canada, the European Union, and the United States allow for the use of short-chain (C6) fluorochemicals as alternatives to long-chains in foam and other applications. These regulations do not restrict the use of existing stocks of fluorotelomer-based foams.
- Foam and fluorochemical manufacturers are promoting the use of best practices in order to minimize emissions of fire fighting foams to the environment. Best practices include the containment and treatment of foam discharges and the use of non-fluorinated fluids and methods for training and the testing of foam equipment.

ENVIRONMENTAL IMPACT

The environmental impact of AFFF-type fluorosurfactants has been extensively studied and a large body of data is available in the peer-reviewed scientific literature. The bulk of this data continues to show that short-chain (C6) AFFF fluorosurfactants and their likely breakdown products are low in toxicity and not considered to be bioaccumulative or biopersistent according to current regulatory criteria.

Groundwater monitoring studies have shown the predominant breakdown product of the short-chain (C6) fluorosurfactants contained in fluorotelomer-based AFFF to be 6:2 fluorotelomer sulfonate (6:2 FTS) [6:2 being the ratio of carbon atoms to fluorine atoms][1]. A broad range of existing data on 6:2 FTS indicate that it is not similar to PFOS in either its physical or ecotoxicological properties[2,3,4,5]. Recent studies on AFFF fluorosurfactants likely to break down to 6:2 FTS show it to be generally low in acute, sub-chronic, and aquatic toxicity, and neither a genetic nor developmental toxicant. Both the AFFF fluorosurfactant and 6:2 FTS were significantly lower than PFOS when tested in biopersistence screening studies that provide a relative measure of biouptake and clearance[6].

Aerobic biodegradation studies of 6:2 FTS in activated sludge have been conducted to better understand its environmental fate[7]. These studies show that the rate of 6:2 FTS biotransformation was relatively slow and the yield of all stable transformation products was 19 times lower than 6:2 fluorotelomer alcohol (6:2 FTOH) in aerobic soil. In particular, it was shown that 6:2 FTS is not likely to be a major source of perfluorocarboxylic acids or polyfluorinated acids in wastewater treatment plants. Importantly neither 6:2 FTOH nor PFHpA (perfluoroheptanoic acid) were seen in this study.

PFHxA (perfluorohexanoic acid) is a possible breakdown product and contaminant that may be found in trace quantities in fluorotelomer-based AFFF. Extensive data on PFHxA presented in 2006 and 2007 gave a very favorable initial toxicology (hazard) profile[8,9,10,11]. Testing was done on four major toxicology end points: sub-chronic toxicity in rats, reproductive toxicity in rats, developmental toxicity in rats, and genetic toxicity. Results show that PFHxA was neither a selective reproductive nor a selective developmental toxicant. In addition it was clearly shown to be neither genotoxic nor mutagenic. In 2011 results were published from a 24-month combined chronic toxicity and carcinogenicity study, which demonstrated that under the conditions of this study PFHxA is not carcinogenic in rats and its chronic toxicity was low[12].

In 2014 an independent report was published that assessed several short-chain (C6) fluorinated chemicals with regard to the criteria used to define persistent organic pollutantants (POPs)[13]. The report assessed these chemicals based on the four criteria that must be met to be considered a POP under the Stockholm Convention: persistence, bioaccumulation, potential for long-range transport, and adverse effects (toxicity and ecotoxicity). It concludes that none of the chemicals meets the criteria to be considered a POP, and at most they only meet one of the four criterion. The report also concluded that the three short-chain (C6) flurotelomer intermediates and PFHxA "are rapidly metabolized and eliminated from mammalian systems.

None of these materials appear top bioaccumulate of biomagnify based on laboratory data and aviailiable field moniotoring data, and none show severe toxicity of the types that would warrant designation as POP."[13]

CONCLUSIONS

- Fluorotelomer-based AFFF agents are the most effective agents currently available to fight class B, flammable liquid fires.
- They do not contain or breakdown into PFOS and are not likely to be a significant source of long-chain perfluorochemicals.
- They do contain fluorosurfactants that are persistent, but are not generally considered to be environmental toxins.
- AFFF and fluorochemical manufacturers are in position to meet the requirements of upcoming regulations with short-chain (C6) fluorosurfactants that provide the same fire protection characteristics with reduced environmental impacts.

The above is an edited version of a document, published by the FFFC on the 14th February 2017.

REFERENCES

1 Quantitative Determination of Fluorotelomer Sulfonates in Groundwater by LC MS/MS, Melissa M. Schultz, Douglas F. Barofsky and Jennifer Field, Environmental. Sci. Technol. 2004, 38, 1828-1835

2 DuPont 2007a. H-27901: Static, Acute 96-Hour Toxicity Test with Rainbow Trout, Oncorhynchus mykiss. Unpublished report, DuPont-21909.

3 DuPont 2007b. H-27901: Static, Acute 48-Hour Toxicity Test with Daphnia magna. Unpublished report, DuPont-21910

4 DuPont 2007c. H-27901: Static, 72-Hour Growth Inhibition Toxicity Test with the Green Alga, Pseudokirchneriella subcapitata. Unpublished report, DuPont-22048.

5 DuPont 2007d. H-27901: Early Life-Stage Toxicity to the Rainbow Trout, Oncorhynchus mykiss. Unpublished report, DuPont 22219

6 Serex, T. et al, 2008. Evaluation of Biopersistence Potential Among Classes of Polyfluorinated Chemicals using a Mammalian Screening Method. SOT 2008 Poster #958

7 6:2 Fluorotelomer sulfonate aerobic biotransformation in activated sludge of waste water treatment plants, Ning Wang, Jinxia Liu, Robert C. Buck, Stephen H Korzeniowski, Barry W. Wolstenholme, Patrick W. Folsom, Lisa M. Sulecki, Chemosphere 2011, 82(6), 853-858

8 Chengalis, C.P., Kirkpatrick, J.B., Radovsky, A., Shinohara, M., 2009a A 90-day repeated dose oral gavage toxicity study of perfluorohexanoic acid (PFHxA) in rats (with functional observational battery and motor activity determinations). Reprod. Toxicol. 27, 342-351

9 Chengalis, C.P., Kirkpatrick, J.B., Myers, N.R., Shinohara, M., Stetson, P.I., Sved, D.W., 2009b Comparison of the toxicokinetic behavior of perfluorohexanoic acid (PFHxA) and nonafluorobutane -1-sulfonic acid (PFBS) in monkeys and rats. Reprod. Toxicol. 27, 400-406

10 Loveless, S.E., Slezak, B., Serex, T., Lewis, J., Mukerji, P., O'Connor, J.C., Donner, E.M., Frame, S.R., Korzeniowski, S.H., Buck, R.C., Toxicological evaluation of sodium perfluorohexanoate. Toxicology 264 (2009) 32–44

11 A 24-Month Combined Chronic Toxicity/Carcinogenicity Study of Perfuorohexanoic Acid (PFHxA) in Rats, H. Iwai, M. Shinohara, J. Kirkpatrick, J.E. Klaunig, Poster Session, Society of Toxicologic Pathology, June 2011

12 Assessment of POP Criteria for Specific Short-Chain Perfluorinated Alkyl Substances, Environ International Report, January 2014, Update published in December 2014

13 An extensive compilation of peer-reviewed and other relevant available data can be found at the following link: https://fluorocouncil.com/resources/search/

EU ECHA STATEMENT OF EXEMPTION

PFOA restriction gets green light from REACH committee.

INTRODUCTION

A large majority of EU member states have backed a draft Regulation setting out a proposed restriction on the manufacture and marketing of perfluorooctanoic acid (PFOA).

The restriction, which also covers PFOA's salts and related substances, will come into force three years after the Regulation is published.

However, discussing the proposal at the 7 December REACH Committee meeting, a majority of member states rejected France's proposal to shorten the transition period to 30 months.

The restriction would apply to the use of PFOA, its salts and related substances in the production of or marketing in another substance as a constituent, a mixture, or an article at concentrations above 25 parts per billion (ppb) of PFOA, including its salts; or 1,000ppb of one, or a combination of, PFOA-related substances.

The original proposal from Germany and Norway suggested a 2ppb limit for PFOA. However, Echa's committees for risk assessment (Rac) and socio-economic analysis (Seac) proposed the higher limits that made it into the proposed Regulation. At the time, NGOs accused the committees of "rubber stamping" industry proposals.

REACH COMMITTEE MEETING

At the recent REACH Committee meeting, member states agreed the proposed restriction should apply to latex printing inks and equipment for making semiconductors five years after the date of the Regulation's entry into force.

They also agreed a six-year transition period for its application to:

> textiles for the protection of workers from risks to their health and safety
> membranes intended for use in medical textiles, filtration in water treatment, production processes and effluent treatment

Medical devices other than implantable medical devices will have a 15-year transition period.

Some uses are exempted - these include:

> perfluorooctane sulfonic acid and its derivatives
> byproducts formed during the manufacture of C6 fluorochemicals
> photographic coatings applied to films, papers and printing plates
> photolithographic processes for semi-conductors
> **firefighting foams placed on the market before the three-year transition period after entry into force of this Regulation.**

The above is an edited version of an article by Luke Buxton, Europe Desk Editor of www.chemicalwatch.com. The original article can be found online at https://chemicalwatch.com/51663/pfoa-restriction-gets-green-light-from-reach-committee

NEW

WORLDWIDE FOAM TESTING SERVICE NOW AVAILABLE!

Getting your fire fighting foam tested can be expensive, complicated and time consuming - but it doesn't have to be!

Our new International Foam Testing Service makes foam testing simple - no matter where you are in the world, getting your foam tested is now as easy as **1**,**2**,**3**:

1 **Order your Foam Test Report online**

Prices include testing, reports and even pick up of your samples! You can also request your FREE Foam Test Box, including easy to follow instructions plus all the bottles and labels you need to collect and package up your samples.

2 **Let us know your samples are ready**

When your samples are ready, let us know when and where to collect your samples - we'll arrange everything else!

3 **Get your Foam Test Report**

Your Foam Test Report will be ready and sent to you within 5 working days of receipt of your samples - or earlier if you require it!

That's it! Now Foam Testing has never been so easy!

Find out more today at www.foamtestbox.com

www.firefightingfoam.com
www.foamtesting.com

Oil Technics (Fire Fighting Products) **Ltd**
Linton Business Park, Gourdon,
Aberdeenshire, Scotland UK DD10 0NH
T: +44 (0) 1561 361515 **F:** +44 (0) 1561 361001
E: info@firefightingfoam.com **W:** www.firefightingfoam.com

Fire Sector Federation JOIFF Achilles FPAL REGISTERED Supplier No. 10050093 bsi. ISO 9001 Quality Management ISO 14001 Environmental Management FM 26816 EMS 575801 Part of the OTL Group of Companies the otl GROUP

Rev.070317