SUBMISSION TO
DEPARTMENT OF ENVIRONMENT AND HERITAGE PROTECTION

30 MARCH 2015

FFFC SUBMISSION

RESPONSE TO DRAFT POLICY ON THE MANAGEMENT OF FIREFIGHTING FOAM

PREPARED WITH THE ASSISTANCE OF ACIL ALLEN CONSULTING

FFFC Fire Fighting Foam Coalition

Contents

Overview

The Fire Fighting Foam Coalition (FFFC), a non-profit trade association representing manufacturers of fire fighting foam agents and their fluorochemical components, fully supports the goal of minimising the environmental impact of firefighting foam.

It is currently working with the US Environmental Protection Agency (EPA) to finalise best practice guidance on foam use, and in 2013 submitted proposed revisions to international foam standards focused on proper containment and treatment of foam discharges and the use of non-fluorinated alternatives for training and testing. At the same time FFFC members are working diligently to reformulate all of their fluorinated foam products to use pure short-chain (C_6) fluorosurfactants with reduced environmental impacts in response to the EPA PFOA Stewardship Program.

Our Coalition holds very serious concerns about the evidence base the Department of Environment and Heritage Protection has identified and applied to develop the Draft Policy on the Management of Firefighting Foam. It is of the view that there have been significant shortcomings in industry consultation and stakeholder engagement in the course of developing the Draft Policy.

ACIL Allen Consulting, an independent public policy, economic and regulatory affairs consulting firm, has advised the FFFC that they have also identified significant shortcomings and gaps in the evidence base and consultation processes that the Department has employed to underpin the Draft Policy.

Our Coalition believes the Draft Policy goes well beyond what is reasonable based on current information and would have an extremely negative impact on fire safety in Australia.

Our concerns include but are not limited to the following:

- The Draft Policy incorrectly labels all fluorinated organic compounds contained in foam as posing significant environmental risks, despite clear differences in chemistry, toxicity, and bioaccumulation potential between long-chain perfluorochemicals such as PFOS and PFOA, and short-chain (C_6) fluorotelomers.
- The restrictions placed on foams that contain pure short-chain (C_6) fluorotelomers would effectively prohibit their use.
- The Draft Policy ignores the most critical issue in choosing foam - the firefighting performance of the foam for the intended application. The restrictive measures in the policy would leave foam users in Queensland with foam options that are less effective, or possibly ineffective, to fight fires in major applications such as military, petrochemical, and aircraft rescue and firefighting.
- The Draft Policy lacks a regulatory and environmental impact assessment and detailed cost benefit analysis to justify the high cost to industry of implementation.
- The two-year timeframe for implementation is unrealistic and would place a huge burden on foam users to comply.

Introduction

The Fire Fighting Foam Coalition (FFFC) is providing this submission in response to the release by the Department of Environment and Heritage on 18 December 2014 of a Draft Policy on the Management of Firefighting Foam. The Coalition is a non-profit trade association whose members are manufacturers of firefighting foam agents and their chemical components.

The covering letter from the Department requested comments by 9 February 2015. This was extended to 30 March 2015 following representations by members of the industry. The Fire Fighting Foam Coalition has requested a six month extension of time to submit comments given the complex issues that the Draft Policy raises and the need for consultation within industry and with relevant firefighting agencies in Government.

Inadequate consultation

Our Coalition holds concerns about the manner in which the Department has consulted and engaged stakeholders on the Draft Policy.

Our previous correspondence to the Department of Environment and Heritage Protection requested an extension of the deadline to provide comments on the Draft Policy to allow for proper and appropriate consideration of the risks, costs and benefits of the Draft Policy, as well as for a more comprehensive submission of established technical information by multiple stakeholder entities, including those in industry and emergency services.

The lack of meaningful stakeholder consultation has meant that data, expertise and insights from emergency services entities, industry and facilities managing firefighting foam use, containment and treatment, has not been available to the Department to contribute to its analysis and deliberations.

Of particular concern is the apparent lack of reference to consultation with the Emergency Services Advisory Council established under the *Fire and Emergency Services Act 1990.* This Council is responsible for advising on the extent to which the policies and practices of the Queensland Fire and Emergency Services meets community needs and impacts on the environment among other things.

Overall, our Coalitions believes the manner in which the Department has consulted and engaged stakeholders on the Draft Policy has been cursory, especially given the very significant regulatory change proposed in the Draft Policy.

We are also concerned that substantive issues raised by industry stakeholders in response to the initial draft policy were not addressed in the second draft.

Establishing a robust evidence base

The FFFC considers that the Draft Policy is not based on a robust evidence base. These points are discussed below.

Environmental Impact of Short-chain (C_6) Fluorotelomer Foams

The Draft Policy incorrectly labels all fluorinated organic compounds contained in foam as posing significant environmental risks, despite clear differences in chemistry, toxicity, and bioaccumulation potential between long-chain perfluorochemicals such as PFOS and PFOA, and short-chain (C_6) fluorotelomers.

A recent report on firefighting foams with perfluorochemicals by Dr. Jimmy Seow of the Western Australia Department of Environment and Conservation confirms these differences[i]. One of the six main recommendations contained in the report concludes that short-chain (C_6) fluorotelomer foams are of "low toxicity, low biopersistence, and are not bioaccumulative."

This conclusion is supported by the large body of data available in the peer-reviewed scientific literature on the environmental impacts of AFFF-type fluorosurfactants and their potential degradation products. The bulk of this data continues to show that C_6-based AFFF fluorosurfactants and their likely breakdown products are low in toxicity and not considered to be bioaccumulative or biopersistent.

In its February 2014 submission to Department of Environment and Heritage Protection in response to the initial draft of the foam policy, FFFC provided a summary of this data along with an extensive list of published references. In April 2014 FFFC submitted to the Department additional published data along with an independent report that assesses several short-chain (C_6) fluorinated chemicals with regard to criteria used to define persistent organic pollutants (POPs)[ii].

The report assesses 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 concludes that the three short-chain (C_6) fluorotelomer intermediates and PFHxA "are rapidly metabolized and eliminated from mammalian systems. None of these materials appear to bioaccumulate or biomagnify based on laboratory data and available field monitoring data, and none show severe toxicity of the types that would warrant designation as POP."

Short-chain (C_6) Fluorotelomer Foams are Effectively Banned

The restrictions placed on foams that contain pure short-chain (C_6) fluorotelomers by the Draft Policy would effectively prohibit their use. They include the requirement that all discharges are fully and completely contained, which is virtually impossible to achieve, in addition to requiring treatment and disposal as regulated hazardous waste (see below). These restrictions go well beyond any action taken on short-chain fluorochemicals anywhere in the world for any application that we are aware of, including by the US Environmental Protection Agency (EPA), the European Commission, the UK Environment Agency, and Environment Canada.

The restrictions on short-chain (C_6) fluorotelomers proposed in the Draft Policy cannot be justified by the current science, as noted above, or even by the precautionary principle. They are in direct conflict with national law in their treatment of a product as regulated hazardous waste that has been approved for use in Australia by the National Industrial Chemicals Notification and Assessment Scheme (NICNAS). The National Waste Policy that sets Australia's waste management and resource recovery direction, for example, relies on the Basel Convention definition of hazardous waste. Neither the Basel Convention nor the European Union water directives list C_6 fluorotelomer surfactants as controlled hazardous substances. Hazardous substances are clearly defined in Australia under the National Occupational Health and Safety Commission's Approved Criteria for Classifying Hazardous Wastes (NOHSC:1008, 2004) and the Hazardous Substances Information System's (HSIS) Consolidated List, which only includes PFOS as a hazardous fluorinated substance.

As the Draft Policy acknowledges, all foams regardless of whether or not they contain fluorochemicals have negative environmental impacts. As the Draft Policy also acknowledges, firewater or runoff is likely to contain contaminants other than foam with significant environmental impacts. Accordingly, there is no basis for the Draft Policy to have a different standard for the containment, treatment, and disposal of foam discharges or runoff depending on the type of foam used to extinguish the fire.

The requirement for fluorine-free foams that users "adequately" contain and treat foam runoff is the requirement that should be applicable to all types of allowable foams. The requirement that fluorinated foams must be "fully and completely" contained would be almost impossible to achieve given the dispersive nature of foam use. Such a requirement could end up resulting in a virtual ban on the use of fluorinated foams.

As noted above, the environmental impact and chemical composition of fluorotelomer-based foams has been extensively studied, and in general they have been shown to be low in toxicity and not bioaccumulative or biopersistent. At the same time, there are very few data available on the environmental impact or chemical composition of fluorine-free foams. The data that are available show that fluorine-free foams are an order of magnitude higher in acute aquatic toxicity than Aqueous Film Firefighting Foam (AFFF) agents[iii]. This difference was apparently a factor in a recent decision by the Australian Department of Defence to not allow the use of fluorine-free foams at its facilities.

Most users of AFFF mix foam concentrates in tanks as they are designed to be compatible. This is the most efficient way to replenish stocks that are used and avoids extensive and expensive tank cleaning and line cleaning. It is also important to recognise that the purity specification for the new C_6 short chain products is just one of many hurdles that the Draft Policy creates that hinder or prevent the use of fluorinated materials in firefighting. Toxicity and biodegradation testing as required by the Draft Policy is significant, time consuming and costly. The containment and disposal requirements for fluorinated as opposed to non-fluorinated foams are not in concert with their environmental profile and will make the fluorinated products very unattractive to end users.

Under Section 319 of the *Environment Protection Act* measures undertaken to protect the environment must, among other things, take into account the "current state of technical knowledge of the activity", "the likelihood of successful application of the different measures that might be taken" and "the financial implications of the different measures as they would relate to the type of activity". The Draft Policy does not appear to have adequately taken these criteria into account in formulating the recommended approach.

Lack of Focus on Foam Effectiveness

The Draft Policy ignores the most critical issue in choosing foam - the firefighting performance of the foam for the intended application. The restrictive measures in the Draft Policy that effectively ban all fluorinated foams would leave foam users in Queensland with foam options that are less effective, or possibly ineffective, to fight fires in major applications such as military, petrochemical, and aircraft rescue and firefighting.

There are significant differences in performance and performance-related issues between different types of foams that are not recognised in the Draft Policy. Data presented at the 2013 Reebok conference and the 2011 SUPDET conference show that fluorotelomer-based AFFF agents are more effective at extinguishing flammable liquid fires than fluorine-free foams[iv,v]. Fluorine-free foams can require up to three times more foam for a given size fire than AFFF agents[vi], which produces increased amounts of runoff and potentially a greater environmental impact. Any comparison of environmental impact could be grossly understated if based on equal quantity comparison only. The Draft Policy does not recognise this potential large negative when using fluorine-free foams. In addition, there are issues for fluorine-free foams related to compatibility and viscosity. Whereas most AFFF agents are compatible and different brands can be mixed in the same equipment, fluorine-free foams are generally not compatible and cannot be mixed. This can cause issues for fixed fire protection systems and military applications. Fluorine-free foams are also more viscous than AFFF agents, and this can cause inaccurate mixing and system fatal problems for proportioning equipment.

The critical importance of life safety is not weighted appropriately. Statements such as "adequate levels of firefighting performance" are not defined and grossly understate the importance of firefighting performance. For life safety such as at airports, the best foam should be selected. In the event that an airport manager or fire chief is not allowed to select a foam that is the best performer, it is not clear who will be ultimately liable for the potentially disastrous outcomes of such decisions. In such an event, the future insurability of the facility could be negatively affected.

The Role of Foams in Firefighting

The Draft Policy does not adequately address the viability of the fluorine-free foam technology against fluorinated foam technology in terms of firefighting foam's function to save lives and properties. The implicit endorsement of fluorine-free foams as a viable alternative technology is based principally on the *potential* adverse environmental impacts due to the persistence of the fluorinated compounds, and does not balance these issues against the effectiveness of the foams in firefighting. The lack of serious fire performance comparison in the Draft Policy between the fluorinated and fluorine-free foams, and the lopsided emphasis on the potential adverse environmental impacts give the impression that the Draft Policy considers the firefighting performance of the foam not as the primary but as a secondary function. The only mention about the performance issues of the fluorine-free foam is relegated to the Explanatory Notes 8.

Fluorine-free Foam Performance is not Established

It is stated in Explanatory Notes 8 that many fluorine-free foams are acknowledged as meeting the toughest amongst the firefighting standard. This claim is not supported by facts. No fluorine-free foams have so far been demonstrated to pass the US military standard (Mil-Spec) on fire performance requirements, the toughest specification amongst the Aviation Rescue and Firefighting (ARFF) standards.

It is also interesting to note that there is only one fluorine-free foam that has passed the latest International Civil Aviation Organization (ICAO) Level C standard. This foam is alcohol-resistant foam and the ICAO Level C approval was gained only at a double use rate (6%), not at the normal designated use level of 3% for hydrocarbon fires. ICAO Level C has been developed to match the performance efficiency of the US military specification (Mil-Spec). It has been also promoted to the National Fire Protection Association (NFPA) as a standard for "high-performance" foam in the same class as the current US Mil-Spec. So far no other commercial fluorine-free foams have claimed to have passed the ICAO Level C test. If ICAO Level C is considered to be as "tough" and "high performance" standard as the US Mil-Spec test, none of the fluorine-free foams currently on the market seem to have managed to pass the two toughest fire test standards.

Fluorine-free foams are inherently oleophilic (oil friendly) and do not have resistance to fuel contamination[vii]. They have not proven to be effective for large scale, fuel-in-depth fires such as tank fires while fluorinated foams have proven to be effective for all size of fires. Large fuel-in-depth fires pose logistical and firefighter safety issues. Fluorine-free foams require longer discharge times and higher application rates, because oleophilicity of foam negatively impacts extinguishment as well as burnback resistance. Fluorine-free foams depend on the method of gentle application to minimise fuel contamination whereas fluorinated foams can be used with both forceful and gentle applications.

One of the most critical "secondary properties" required of firefighting foams is the inter- and intra-agent compatibility. Fluorine-free foams lack both the intra-agent (between fluorine-free foams) and inter-agent (with other type of agents such as AFFF) compatibility. Other needed secondary requirements for foam also are not identified or addressed. All US airports are required to use only US Mil-Spec AFFFs. The use of alcohol-resistant foams is not allowed mainly due to the inter-agent compatibility[viii].

Performance Efficiency of Short-chain Foams

In Explanatory Note (8), it is stated that "the proposed alternative pure C_6 short-chain fluorinated compounds reportedly may require greater concentrations of the fluorinated organics in their formulations to achieve the same firefighting performances so it could be inferred that this may result in large amounts of persistent organic contaminants being released by the legacy foams." This idea may be drawn from the references to the Helsingor and Madrid statements, which in turn quote references that are not relevant to firefighting foam. In fact, a sample AFFF agent containing only C_6-based fluorosurfactants has passed the toughest fire test standard, US Mil-Spec, at a fluorine concentration well within the historical range for Mil-Spec QPD AFFF agents. This testing shows that C_6-based formulations can achieve equal effectiveness without a significant increase in fluorosurfactant concentration.

Lack of Economic Impact Assessment

The Draft Policy lacks a regulatory and environmental impact assessment and cost benefit analysis to justify the high cost to industry of implementation. As written it would immediately ban the sale of most Class B foam products and require virtually all existing Class B foam concentrate in Queensland to be removed from service and disposed of as regulated hazardous waste. This would place a huge burden on foam users from both a cost and logistical perspective, and is likely to significantly decrease fire safety.

Unrealistic Timeframe for Implementation

FFFC fully supports a requirement that PFOS-based foams be immediately removed from service and disposed of by high temperature incineration. This would be consistent with actions taken by the European Commission and Environment Canada.

FFFC could also support a phased withdrawal of fluorotelomer-based foams with significant long-chain content, although we note that these products do not contain any chemicals that are currently listed as persistent organic pollutants under the Stockholm Convention. However, the proposed two-year timeframe is unreasonable, onerous, and unacceptable to industry. It would require users to dispose of foam products that they are buying today as regulated wastes within two years.

The restrictions in the Draft Policy do not reflect the work currently being done by fluorochemical manufacturers worldwide to eliminate C_8 and higher homologues from their products by year-end 2015 under the EPA PFOA Stewardship Program. Nor does the Draft Policy recognise the work being done by foam manufacturers to reformulate their Class B foam products to incorporate short-chain fluorochemicals. The restrictions pre-empt this process by almost two years and are likely to cause severe market disruptions.

FFFC would support the recommendation by Fire Protection Association Australia (FPAA) for a 10-year transition period. This would be in line with the transition periods provided in Europe and Canada for the phaseout of PFOS-based foams.

Additional comments on the Draft Policy by Section

Definition – C_6 purity-compliant foam

The definition is not clear on the derivation of the 50mg/kg (50 ppm) of "total" impurities in the foam concentrate. It is not clear which impurities are covered and whether verified analytical methods are available to test for all these impurities in Australia. Furthermore it would be necessary to establish the responsibility for measurement and certification of impurities.

This definition also raises a question as to why PFHxS is not covered here as PFOS is referenced as covered.

On the face of it this proposed standard is flawed given the uncertainties noted above. What is included in the list of impurities is really critical. As an estimate this means any and all products must be at least 99.7% pure i.e. free of any long-chain impurities (which presumes the sum of all long chains of any kind). In practice the standards might need to consider select species as markers to measure and have known methods available before issuing a policy of this type.

The new generation of C_6 short chain foams and concentrates should meet these criteria but this will take time for the transition to occur. Two years is not likely to be achievable in a cost effective way.

FFFC fully supports the transition to the short chains consistent with the US EPA PFOA Stewardship program. Customers should make all effort to purchase or use short chain chemistry as soon as practically possible.

Definition – Environmental persistence

FFFC does not agree with the statement "Environmental persistence increases the risk of toxicity…"

This is too general a statement and requires qualification.

Definition – PFOA

PFOA is not just linear, it can also be branched if derived from electrochemical fluorination. If this is restricted to the current generation telomers, then straight chain is correct. However the definition requires qualification.

Table 6.2.2 A – Fluorinated organic compounds limits in concentrates

The table is confusing in its description of various PFOA precursors and defining their concentration limits. The Explanatory Notes (7.4) say the 50 mg/kg limit is on the concentration of PFOA, PFOA precursors and their higher homologs. Under the definition (2. Definitions) of *C_6 purity-compliant foam*, the 50 mg/kg is the level of impurities (compounds where the per-fluorinated part of the carbon chain is longer than 6 carbon atoms). However, Table 6.2.2 A defines the total level of these impurities in 2 ways: the 50 mg/kg impurity concentration expressed as the total organic fluorine content (3rd row of the table) and the other one expressed as free PFOA equivalent (last row). The two levels are consistent if one takes into consideration that PFOA molecule consists of 69% organic fluorine content. The problem with the total organic fluorine content is that there is no direct analytical method to determine the total organic fluorine content of the various impurities. It is relatively easy to determine the concentration of PFOA and each of the C_8 and higher fluorinated chain length precursor impurities and therefore the total concentration.

To make the Table more consistent and to read more clearly the following is proposed:

— Change 3rd row: "PFOA and higher homologs, and PFOA precursors and higher homolog PFCAs as total organic fluorine" to "PFOA and higher homologs, and PFOA precursors containing C8 and higher fluorinated chains, expressed as the concentration of PFOA equivalent" and set the value at 50 mg/kg (2nd column).
— Remove the last row and "□."

This way the limits for both PFOS (10 mg/kg) and PFOA (50 mg/kg) represent the concentration of the impurity molecules in the foam concentrate.

6.2.3 Disposal of foam containing PFOS, PFOA, precursors and higher homologues

The inclusion of 6:2 FtS as an unacceptable component appears to be a mistake, as foams based on this compound are deemed acceptable subject to use restrictions in other parts of the Draft Policy.

6.2.4 Foams containing short-chain fluorotelomers

These conditions for the new C_6-based short chain foams are unacceptable and harsh as well as impractical to fight an emergency and/or critical Class B fire. This shows bias versus historic PFOS-based foams that were allowed on the market at least 13 years after manufacture was ended by the primary producer.

6.3 Environmental Acceptability

A large and expensive body of testing in some cases will make the products uneconomic under current arrangements and may increase costs for firefighting services. The Draft Policy appears to state that all foams will be required to do this testing. This needs to be clarified before definitive comments can be provided.

The requirement in this section for persistence and bioaccumulation testing goes well beyond the type of testing usually required for foam agents by chemical registration programs such as AICS, REACH, and TSCA. Tests to determine bioaccumulation such as BCF (bioconcentration factor), BAF (bioaccumulation factor), and BMF (biomagnification factor) are expensive and time-consuming. Requiring this data to be available on the SDS for each fluorinated foam product would place a significant unfair burden on foam manufacturers, and the data would almost certainly not be available when the Draft Policy becomes effective.

FFFC would ask the Department of Environment and Heritage Protection to remove the requirement for persistence and bioaccumulation testing from the Draft Policy. If a requirement for persistence and bioaccumulation testing is to be included in the Draft Policy, then FFFC would strongly recommend that a specific and limited set of tests be required for all foam agents.

The requirements for investigating and presenting the environmental profile and safety of a foam selected is overwhelming, not well defined and possibly not achievable. Assigning this responsibility to foam end users is not appropriate as it is outside their area of expertise.

Test Samples

The Draft Policy should make it clear that the main potential environmental harm is due to the foam solutions (premix solutions) used in the event of fire, not the foam concentrates. It is the foam solution, 1, 3 or 6% dilution of the concentrate, that is used to make foam and it is the foam that fights the fire. Obviously, spillage of foam concentrates should be considered as part of the overall firefighting foam management, but the degree of environmental exposure due to the incident of foam concentrate spills is very low.

Considering the above fact, the recommended tests for persistence and bioaccumulation (6.3.1), acute toxicity (6.3.2), chronic toxicity (6.3.3), and biodegradability (6.3.4) should be required to be carried out on the firefighting foam solutions, not on the concentrate itself. In the Explanatory Notes (2.4) it is correctly pointed out that the acute toxicity test should be carried out for the final product formulation "at the usage concentration." The same principle should be applied to the rest of the above tests.

6.3.1 Persistence and bioaccumulation:

Referring to the last paragraph: "Highly persistent degradation products must also be identified together with relevant persistence, bioaccumulation and toxicity (PBT) data."

This test requirement means that every chemical substance generated as the result of biodegradation of fluorotelomers used in the foam concentrate must first be chemically identified, and secondly synthesised to investigate their PBT status and generate PBT data. This is an open-ended test requirement that could take substantial time and resources, because determining the chemical identity of all the potential biodegradation products can easily become a huge research project even for a chemical research lab. It is not something that internationally certified laboratories (generally commercial labs) can do.

6.4 Disposal of fluorinated organic compound wastes:

The Draft Policy states: **"**All solid and liquid wastes…including those from C_6 purity-compliant foam are regarded as regulated wastes."

Branding all fluorinated foams as regulated wastes, i.e. hazardous wastes, is inconsistent with the current regulations of any regulatory authorities in the world. The National Waste Policy that sets Australia's waste management and resource recovery direction relies on the Basel Convention definition of hazardous waste. Neither the Basel Convention nor the EU directives lists C_6-fluorotelomer surfactants as controlled hazardous substances. Nor are these short chain fluorotelomer surfactants on the Stockholm POPs list. Australian National Occupational Health and Safety Commission's "Approved Criteria for Classifying Hazardous Substances [NOHSC: 1008(2004)] (3rd Edition) does not even contain PFOA, let alone any C_6 fluorotelomer surfactants.

Concluding comments

The Draft Policy as written is extremely onerous and would be almost impossible to comply with for the average foam user in Australia. It bans the sale and use of most fluorotelomer-based foams without providing any scientific or risk-based justification for these unprecedented actions. It also pre-empts the internationally accepted US Environment Protection Authority PFOA Stewardship Program and the work of manufacturers to comply with the goals of the program.

FFFC would urge the Department of Environment and Heritage Protection to work with foam users to develop a policy that is both simple to implement and effective at reducing the environmental impact of foam use.

The main components of such a policy should include the following:

1. A ban on the use of existing stocks of PFOS-based foams along with a requirement for proper disposal. This can be accomplished by having users remove from service a few specific foam brands and without requiring any complicated analyses or assessments. FFFC would recommend that the Department of Environment and Heritage Protection work with NICNAS to expand this requirement to all of Australia. It would be confusing for users if PFOS-based foams are banned in one state and allowed in another.
2. A single standard for the containment, treatment, and disposal of all foam discharges independent of whether or not the foam contains fluorochemicals. Considering the large body of data on fluorotelomer-based foams showing them to have low environmental impact and the scarcity of data on the environmental impact of fluorine-free foams, the only basis for having a less stringent standard for fluorine-free foams would be an assumption they are safe based on a lack of information.
3. A single standard for the containment, treatment and disposal of all foam discharges that protects the environment and allows for proper fire protection. The proposed requirement for fluorine-free foams that users “adequately contain, treat or properly dispose of the foam, firewater, wastewater, runoff from activities or incidents” could be an appropriate standard for all foams.
4. A recommendation to use alternative fluids and methods that do not contain fluorochemicals for training, testing, and maintenance whenever possible.

A firefighting foam management policy based on these components would significantly reduce the potential environmental impact of foam use in Queensland while at the same time continuing to allow for the best available fire protection.

Appendix A Environmental impact study

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 C_6-based AFFF fluorosurfactants and their likely breakdown products are low in toxicity and not considered to be bioaccumulative or biopersistent.

Groundwater monitoring studies have shown the predominant breakdown product of the short-chain C_6 fluorosurfactants contained in telomer-based AFFF to be 6:2 fluorotelomer sulfonate (6:2 FTS)[ix]. 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[x,xi,xii,xiii]. 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[xiv].

Aerobic biodegradation studies of 6:2 FTS in activated sludge have been conducted to better understand its environmental fate[xv]. 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 is a possible breakdown product and contaminant that may be found in trace quantities in telomer-based AFFF. Extensive data on PFHxA presented in 2006 and 2007 gave a very favourable initial toxicology (hazard) profile[xvi,xvii,xviii]. 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[xix].

Appendix B References

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