Willson Consulting

Submission on Amending Annex IV and V of EU Regulation 2019/1021 on Persistent Organic Pollutants (POPs) Waste (*specifically PFOA*)

by

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Executive Summary

The particular focus of this submission is on my area of expertise in firefighting foams and their environmental impacts (ie. PFOA related). It seems to justify a higher Annex IV limit as defined in Option 2, to allow likely firewater runoff containing PFOA waste from other sources (even where Fluorine Free Foam [F3] is being used), to be transported safely, without dilution to meet lower limits before transportation to destruction facilities.

Firstly, it is recognized that some clear restriction limits are required for PFOA, its salts and related substances as a defined POP, during transportation and waste management, prior to destruction processing.

Secondly, the proposal makes clear that maximum levels defined in Annex V "*are based on existing agreed Annex V values for similar substances*" as set at 50mg/kg of PFOA and its salts and 2,000mg/kg of PFOA related substances. This is supported because it has already permitted varied PFOA waste to be effectively collected and transported within these limitations for destruction. It is however suggested that the proposed Annex IV limits should also match these Annex V levels, by accepting Option 2 levels in this proposal.

The original Option 3 level seems to be set far too low, as it barely reflects the residual trace PFOA levels permitted in EU regulation 2017/1000 for high purity C6 PFAS containing firefighting foam concentrates, which are still used within many EU member States, transported between Countries for emergency use and exported as an economic earner for world leading EU Firefighting Foam manufacturers. Hovering so close to potential Annex IV limits when variable tolerances from different analytical lab results and methodologies, is likely to cause unjustified rejections and disputes at borders, which are unnecessary. This justifies Annex IV limits being raised sufficiently to allow for such variations. Whilst the revised, Option 3 proposal allows for such variations, permitting C6 foam concentrate trade to continue, it fails to take into account other important considerations that likely require a higher limit for practical waste management.

It is important for legislators to recognize and take into account that from a firefighting perspective, in any major fire scenario - even where fluorine free foams are being used - there are likely to be PFAS present from other sources, potentially including PFOA and PFOA related substances involved in the fire. These substances are frequently mobilised as fire breakdown products into the firewater runoff, resulting from these other items consumed or severely damaged by the fire. The longer the fire burns, potentially the higher these PFOA levels could be. The revised Annex IV levels proposed (ie 1mg/kg PFOA and its salts and 40mg/kg PFOA-related substances) may

be disproportionately restrictive to transportation of such waste, by being too low. It may prevent waste contractors from collecting this firewater runoff effluent and transporting it to a processing site for destruction. A consequence maybe unintentional leakage or seepage into the environment or forced dilution, creating potentially excessive volumes requiring extra trucks for transportation, with increased risk of leaks or spillage prior to subsequent safe disposal.

It could also be relevant for any stockpiled legacy C8 foam concentrates potentially being shipped into a high quality destruction facility within the EU, or from outside the EU to ensure adequately certificated destruction of its POPs content, in order for foam users to verify destruction under high quality processes. Thereby reducing processing volumes, limiting risk of spillage or leakage, and minimizing trucks required plus attendant carbon emissions generated by conducting such transportation and operation of such energy intensive destruction processing.

These are fundamental considerations which do not seem to have been adequately considered in either the original or revised Annex IV Option 3 proposals.

Accepting the Option 2 limit for Annex IV (ie 50mg/kg of PFOA and its salts and 2,000mg/kg of PFOA related substances) should resolve these issues. Option 2 limits should allow such firewater runoff waste to be safely and economically transported in the minimum possible number of trucks, thereby reducing processing volumes, limiting risks of spillage or leaks, while also minimizing carbon emissions from such waste management operations. It is therefore strongly recommended that Option 2 limits for Annex IV be accepted by Regulators.

Public safety concerns are also raised regarding Fluorine Free Foams (F3s) use, voiced by the US Federal Aviation Administration's (FAA) Cert Alert 21/05, 4th October 2021.

"The safety concerns FAA has documented include:

- ***Notable increase in extinguishment time;***
- ***Issues with fire reigniting (failure to maintain fire suppression); and***
- ***Possible incompatibility with other firefighting agents, existing firefighting equipment, and aircraft rescue training and firefighting strategy that exists today at Part 139 air carrier airports."***

EU airports are not regulated by FAA, but by the International Civil Aviation Organisation (ICAO). However, there are concerns that ICAO's fire approval tests were weakened in 2014 by reducing the fire extinguishing requirement from 60 seconds to

120 seconds, which allowed previously unacceptable AFFFs and F3s to pass. Disturbingly FAA also found that ALL Fluorine Free Foams (F3s) that claimed ICAO's tougher Level C approval rating, failed to pass that test when run in FAA's new indoor, state of the art fire test facility.

Growing comparative fire testing evidence from NFPA Research Foundation and Naval Research Laboratory confirm significant differences between fluorinated and non-fluorinated foams, particularly on more volatile fuels like gasoline, crude oil and Jet A1 aviation fuel, which could increase risks to public safety. This has been misleadingly masked because most approvals use heptane fuel for approval testing, which mirrors fire performance of gasoline for fluorinated foams like AFFFs. But heptane does NOT replicate fire behavior of Fluorine Free Foams (F3s) on gasoline, which separate testing confirmed could require 3-4 times the extinguishment density on gasoline and 6-7 times the density to extinguish E10 (gasoline with 10% ethanol added), when compared to a benchmark fluorinated C6 AR-AFFF.

Concerns have also been raised by Federation of German Industries (BDI) to the European Chemicals Agency, regarding chemicals regulation which should be based on scientific risk assessments. Otherwise "… ***virtually risk-free chemicals will be equated with substances of very high concern ("SVHC") with properties requiring regulation. …such a classification would represent an uncalculable challenge and would have far-reaching negative consequences*** *both for society and for Europe as a business location. …BDI is concerned that the* ***restriction of PFAS as currently planned will be disproportionate and unworkable****. …****A lack of viable alternatives to PFAS substances means high socio-economic costs in trying to replace them***."

Evidence also recommends treating PFAS as a series of sub-groups for risk assessment to avoid disproportionate restrictions. Permitting continued use of C6 firefighting foams is also recommended to avoid the public safety concerns and potential life safety risks raised by FAA, NFPA Research Foundation and NRL, supported by evident weaknesses exposed in ICAO Level C approval ratings and misleading claims of F3 efficacy in major incidents, which could place lives in increased (not reduced) danger.

This growing data set confirms beyond doubt that F3s are NOT viable alternatives to C6 foams, particularly in Major Hazard Facilities (MHFs), where C6 foams are critical for essential use. These MHFs include:

- Refineries and Chemical/Pharmaceutical Plants that handle flammable liquids.
- Storage and Distribution Facilities, Tank Farms & Terminals for flammable liquids including jetties/marine terminals.

- Flammable liquids in transit by rail, pipeline or road/ship tankers.
- Airports, helipads, offshore platforms and major transportation hubs.
- All military applications.
- Fixed foam systems and their re-charging to maintain designed safety protection levels.

The poor track record of F3s in major incidents so far paints a disturbing picture. Two aircraft incidents at London's Heathrow in 2013 have misleadingly been claimed as "successes" when the Air Accident Investigation Reports confirm the on-board engine suppression system and a water hose reel were responsible. F3's only played minor supporting roles in both fires.

A brave firefighter lost his life in a Dubai Boeing 777 crash where F3 was used and the plane was destroyed after burning for 16 hours. Mercifully passengers escaped 3 minutes before a fuel tank exploded, killing the firefighter. In contrast, another major Boeing 777 engine and wing fire in Singapore was extinguished in just 5 minutes using fluorinated foams, *before* passengers were disembarked safely.

30 firefighters, following multi-day attendances at a major 2018 chemical factory fire in Australia where F3 was also used, were reportedly still suffering debilitating illnesses 15months later, including sudden fainting, headaches, nausea, nose-bleeds, fatigue and dizzyness. This seems consistent with toxins or excessive smoke exposure.

I can find no evidence of any major fires where F3 was used to successfully deliver effective, fast fire control and extinguishment, which Society expects. Fast effective action is critical to saving lives, minimizing destruction and reducing environmental damage. Maintaining our duty of care, requires reliability, performance and speed in firefighting foam delivery (not evident with F3s) – to save lives and adequately protect Society from the ravages of major fires.

Contents:

Submission Justification to retain Option 2 Annex IV PFOA limits

Firstly, I would like to thank you for providing this opportunity for public stakeholders to respond to this public consultation, on proposed waste restriction level amendments under Annex IV and V of EU Regulation 2019/1021 for Persistent Organic Pollutants (POPs).

This submission covers only those proposals relating to PerFluoroOctanoic Acid (hereafter referred to as **PFOA**), its salts and related substances, which are found in firefighting foams and firewater runoff from major fires where other PFAS related materials may be consumed in the fire and potentially mobilized into the firewater runoff, even when foams without fluorine have been used. This relates directly to my specific areas of expertise.

1. Clear restriction required for PFOA

it is recognized that some clear restriction limits are required for PFOA, its salts and related substances as they are POP listed, during transportation and waste management, prior to destruction processing.

2. Annex V maximum levels have been effective

it is understood Annex V defines maximum waste levels permitted which are proposed for acceptance at **50mg/kg of PFOA and its salts and 2,000mg/kg of PFOA related substances,** which the proposal document makes clear "*are based on existing agreed Annex V values for similar substances*". Presumably these limits have not caused problems for waste management in the past.

3. Option 3 Annex IV levels seem too low

The original Option 3 level seems to be set far too low, as it barely reflects the residual trace PFOA levels permitted in EU regulation 2017/1000 for high purity C6 PFAS containing firefighting foam concentrates, which are still used within many EU member States, transported between Countries for emergency use and exported as an economic earner for world leading EU Firefighting Foam manufacturers. Hovering so close to potential Annex IV limits with variable tolerances on analysis results and methodologies, is likely to cause unjustified rejections and disputes at borders over ppb levels, which are disruptive and unnecessary, providing Annex IV limits are raised sufficiently to allow for such variations. Whilst the revised, Option 3 proposal (ie.**1 mg/kg for PFOA and its salts and 40**

mg/kg for PFOA-related substances) allows for such variations and trade to continue, it fails to take into account other important considerations that likely require a higher limit to avoid similar upsets during practical waste management.

What is not clear is why Annex IV values cannot or should not also reflect Annex V values, as suggested in Option 2 of the Annex IV options being proposed. This would provide a wider tolerance to variations in analysis results and testing methodologies, while providing consistency for waste handling and waste transportation with a single limit level. This would ensure that realistic PFOA waste can be transported between countries within the EU, through EU countries for export to countries outside the EU, or be potentially imported into EU for high quality destruction processing at adequate temperatures with trusted certification provisions. It also avoids confusion with a single realistic acceptance level legislated, without the need for unnecessary dilution where spillage and leakage is more likely.

4. Firefighting perspective supports Annex IV and V at same level

It is important for legislators to recognize that from a firefighting perspective, in any major fire scenario - even where Fluorine Free Foams (F3s) are being used - there are likely to be PFAS present from other sources (notably fabrics, office furniture, computer screens, electronic and processing equipment, valve and flange seals, cabling, mobile phones, Li-ion batteries, food packaging etc.) potentially involving PFOA and PFOA related substances in the fire and probably mobilised into the firewater runoff, resulting from such other items consumed or severely damaged by the fire. The Annex IV levels currently being proposed may be disproportionately restrictive, by simply being too low to accommodate such residues. This may prevent waste contractors from collecting such runoff effluent and transporting it to a processing site for safe destruction. A consequence maybe unintentional leakage, seeping into the environment or forced dilution, creating potentially excessive quantities for transportation with increased risk of leaks and increased costs, prior to subsequent longer more energy intensive safe disposal.
This is a fundamental consideration which may not have been adequately considered in either the original or revised Annex IV Option 3 proposals.

5. Preferred Option 3 in this proposal - may be disproportionately restrictive

Whilst the revised option 3 proposal for Annex IV limits defined as **1mg/kg of PFOA, its salts and 40mg/kg for PFOA-related substances,** should be suitable to permit transport of high purity C6 firefighting foam concentrates, delivering reliable and rapid extinguishment of major fires, between EU countries, where such fires may eventuate. It should also permit the sale and export of such high purity C6 firefighting foam concentrates to foam users in other countries, outside the EU, with sufficient variation allowance to cater for variations in analysis results.

However, this revised Option 3 level may not be sufficient to allow for waste collection of PFOA containing materials consumed in major fires (anything from offices, cinemas, restaurants, commercial light industrial to major hazard facilities), where PFAS residues may gravitate into the firewater runoff containment areas, prior to collection for transportation to a safe destruction facility, but could exceed proposed and preferred Annex IV restriction level limits. Consequently, if this Annex IV level is set too low, the waste cannot be handled effectively and may need to be further diluted, with additional risk of escape or leakage simply to reduce levels below those acceptable for transportation to an appropriate safe destruction facility, whether within or potentially from outside the EU. This could also increase the risk of unintentional spillage and

increased volumes of liquid required for thermal destruction. This seems perverse, as it will likely not assist reductions in carbon emissions. More fuel will likely be required for more trucks and for disposal of the resultant greater volumes of more diluted waste, therefore demanding more energy intensity, also increasing likely carbon emissions.

This could also be relevant for any stockpiled legacy C8 foam concentrates potentially being shipped to high quality destruction facilities within the EU, or from outside the EU, to ensure adequately certificated destruction of its POPs content, in order for foam users to verify destruction under high quality processes. Option 2 Annex IV Levels should enable foam users to adequately discharge their duty of care to Regulators, employees, local communities and Society at large, that they have acted responsibly and in Society's best interests. It could also mean the environment gains a direct benefit from reduced leakage risks and lower energy requirements in transportation and at incineration facilities, with resulting lower carbon emission benefits, more likely to meet EU Green Deal objectives.

6. Adopt Proposed Option 2 Annex IV levels

it is therefore strongly suggested that the current Option 2 proposal for Annex IV limit values (**ie. 50mg/kg PFOA, its slats and 2,000mg/kg PFOA-related substances**) remain acceptable and regulated to coincide with Annex V levels. Thus avoiding potential analytical variations and firewater runoff problems arising from stipulating too low a waste level for transportation to destruction facilities. This will also provide benefits by reducing the overall volumes of waste being transported within and between countries for disposal processing, thereby reducing the risks of traffic incidents and unintentional spillages, as volumes handled should be suitably reduced (by the avoidance of unnecessary dilution). It should also deliver associated benefits in carbon emission reductions.

7. Public Safety Concerns with Fluorine Free Firefighting Foams (F3s)

It is also my duty to bring to your attention a recent 4th October 2021 Cert Alert issued by the US Federal Aviation Administration (FAA)[1], regarding Fluorine Free Foam's (F3s) inferior fire performance.

This document confirms FAA's priority is preventing public safety from being potentially compromised from the use of F3s: *"While FAA and DoD testing continues, interim research has already identified safety concerns with candidate fluorine-free products that must be fully evaluated, mitigated, and/or improved before FAA can adopt an alternative foam that adequately protects the flying public.*

The safety concerns FAA has documented include:

- ***Notable increase in extinguishment time;***
- ***Issues with fire reigniting (failure to maintain fire suppression); and***
- ***Possible incompatibility with other firefighting agents*** [eg. dry chemical]***, existing firefighting equipment, and aircraft rescue training and firefighting strategy that exists today at Part 139 air carrier airports.***

[1] US Federal Aviation Administration Oct. 2021 – Cert Alert 21-05, Part 139 Extinguishing Agent Requirements, 4 Oct.2021, https://www.faa.gov/airports/airport_safety/certalerts/media/part-139-cert-alert-21-05-Extinguishing-Agent-Requirements.pdf

While FAA and DoD continue the national testing effort, the FAA reminds all Part 139 airport operators that while fluorinated foams are no longer required, the existing performance standard for firefighting foam remains unchanged (whether that foam is fluorinated or not). Airports that are currently certificated under Part 139 will remain in compliance through use of an approved firefighting foam that satisfies the performance requirements of MIL-PRF-24385F(SH). If a certificate holder identifies an alternative foam, not currently approved, that it believes satisfies the performance requirements, it may propose that agent to FAA for approval."

Few others seem to be so seriously considering the potential consequences and liabilities for our travelling public, flight crews and emergency responders, when leading Fluorine Free Foams (F3s) and developmental prototypes do not meet the performance mandated by US Military Specification PRF 24385F (SH) Amendment 4, April 2020 (Mil-Spec), which now accepts F3s that pass, as set out in the 2018 FAA Reauthorization Act.

The International Civil Aviation Organisation (ICAO) Level B and C fire tests[2], under which most European airports are mandated, were weakened in 2014, by extending fire test extinguishment time from previously 60 secs to 120secs. This has allowed previously unacceptable lower quality AFFFs and F3s to pass, which does not seem to have improved Safety Standards, and may have compromised passenger safety within the EU, particularly where F3s are in use at some of Europe's busiest airports like London Heathrow, Schipol (Amsterdam), Stuttgart, Copenhagen and Paris CdG. Are they delivering 'second class' fire protection for Europe's travelling public? F3 fire incidents tell a disturbing story.

8. FAA Concerns underlined by NFPA Research Foundation and Naval Research testing

Comparative NFPA-RF 2020 fire testing[3] with 5 leading F3s confirmed FAA's concerns. F3 testing required 3-4 times extinguishment densities of the C6 AR-AFFF control on Mil-Spec gasoline, and 6-7 times C6 AR-AFFF density on E10 (gasoline with 10% Ethanol added), while F3s also exhibited inferior burnback capabilities.

This is strongly supported by 2019 US Naval Research Laboratory (NRL)[4] comparative fire testing. NRL confirmed to extinguish MilSpec gasoline pool fires in 60 secs required 2.5 times more Fluorine Free Foam (F3) than the benchmark C6 AFFF, even when the best F3 was tested. Second best F3

[2] ICAO (international Civil Aviation Organization), 2014 – Airport Service Manual Doc 9137- AN/898 Part 1, Rescue and Fire Fighting 4th Edition, Chapter 8 Extinguishing Agent Characteristics https://www.docdroid.net/0C33COp/icao-doc-9137-airportservicesmanualpart1withnoticeforusers-pdf

[3] National Fire Protection Association (NFPA) of America, Research Foundation, 2020 - "Evaluation of the fire protection effectiveness of fluorine free firefighting foams", https://www.nfpa.org//-/media/Files/News-and-Research/Fire-statistics-and-reports/Suppression/RFFFFEffectiveness.pdf

[4] Naval Research Laboratory (NRL) -Snow, Hinnant et al, 2019 - Fuel for Firefighting Foam applications: Gasoline v Heptane - NRL/MR/6123--19-9895 https://apps.dtic.mil/dtic/tr/fulltext/u2/1076690.pdf

required 3.75 times more foam, third F3 required 5 times more and the least effective F3 required 6.25 times more foam agent than C6 AFFF to extinguish this gasoline pool fire in 60 seconds. These differences increased further with faster extinguishment requirements.

Both sets of testing identified higher application rates and gentler delivery from higher expansion ratios were required when using F3s. Reduced throw, forcing firefighters closer to flames and increased risk, plus greater wind effects may result, with slower fire control and extinguishments as likely outcomes.

Recent FAA test reports[5] showed 90secs Jet A1 preburn created similar results to gasoline (not the 60secs preburn currently required by ICAO). NONE of 19 F3s tested on Mil-Spec and ICAO Level C by FAA were able to pass either test (9 commercially available, the rest were developmental). Several did not extinguish at all, some exceeded 2mins extinguishment on Mil-Spec (30secs requirement). Others took over 3mins against ICAO Level C's 2mins requirement. Only the best achieved 38secs on MilSpec; 2mins 12secs on ICAO Level C. 6 of 9 F3s failed burnback testing (66%). Worryingly ALL Fluorine Free Foams (F3s) tested that claimed ICAO Level C approval ratings, failed to pass that test when run in FAA's new indoor, state of the art fire test facility. Why? Are such increased risks acceptable? …Could we be increasing (not reducing) dangers to public safety? When most expect the duty of fire protection is increased safety.

9. Fire accidents using Fluorine Free Foams (F3) tell a disturbing story

We have also witnessed misleading claims of 'F3 successes' at two aircraft fire incidents at London's Heathrow airport where Air Accident Investigation reports confirmed other systems (on-board engine suppression and water hose reel) were responsible for primary fire suppression in both incidents not F3s as falsely claimed.


A319 small engine fire, London Heathrow, 24th May2013

An Airbus A319 engine fire at LHR (May2013)[6] was controlled, almost extinguished by on-board fire suppression systems, before landing. Calculated fuel leakage rates reportedly emptied the wing tank, before landing.

A further Boeing 787 fire at LHR (July 2013)[7] occurred when unpowered, unoccupied, and parked.

[5] US Federal Aviation Administration, Sep. 2021 – FAA Research Program, PFAS-Free Foam Research presentation to Research, Engineering and Development Advisory Committee (REDAC).

[6] UK Air Accident Investigations Branch, Jul.2015 – Report 1/2015 on the accident to Airbus A319-131, G-EUOE, London Heathrow Airport 24th May 2013. https://www.gov.uk/aaib-reports/aircraft-accident-report-1-2015-airbus-a319-131-g-euoe-24-may-2013

[7] UK Air Accident Investigations Branch, Aug.2015 – Report 2/2015 on the serious incident to Boeing B787-8, ET-AOP, London Heathrow Airport 12th July 2013 https://www.gov.uk/aaib-reports/aircraft-accident-report-2-2015-boeing-b787-8-et-aop-12-july-2013

Firefighters extinguished a small slow-burning composite material cabin roof fire (likely from Li-ion battery fault), using a water hose-reel internally.

Further concerns were raised during a ***Boeing 777 engine detachment fire in Dubai*** (August 2016)[8], during a landing 'go-around' manoeuvre in 48°C(118°F) heat with wind shear conditions. Despite repeated Fluorine Free Foam (F3) attacks, full extinguishment took 16 hours after impact: plane destroyed. A brave firefighter died when a fuel tank exploded, 9 minutes into the fire. All 300 passengers were evacuated 3 minutes earlier; critically before that explosion. Imagine the carnage, had evacuation been delayed. Seconds count saving lives. Investigation reports did not explain why this fire continued to burn, nor whether the firefighter's life may have been saved, had the foam been effective. Foam samples were re-tested and passed ICAO Level B certification in N. Europe, but why not tested under Dubai's summer heat; better representing accident conditions? Society's expectations were not met; perhaps a future warning; perhaps endorsing FAA's decision.


Boeing 777 engine fire, Dubai - 3Aug16

Contrast this with Singapore's Boeing 777 engine and wing fire (June2016)[9], while loaded with several thousand gallons of jet fuel. A problem two hours out forced a return, for landing with fully involved engine and wing fire at Changi airport, in tropical 32°C(90°F) heat. The Investigation Report confirmed thrust reversers spread fire into the core of the engine. All fire was extinguished in 5minutes using fluorinated AFFF and FFFP agents. 241 passengers and crew


Boeing 777 on landing at Changi - 27Jun2016.

[8] Gulf Civil Aviation Authority UAE, 2020 - Final Report - AAIS Case No: AIFN/0008/2016 Runway Impact During Attempted Go-Around, Air Accident Investigation Sector https://www.gcaa.gov.ae/en/ePublication/admin/iradmin/Lists/Incidents%20Investigation%20Reports/Attachments/125/2016-Published%20Final%20Report%20AIFN-0008-2016-UAE521%20on%206-Feb-2020.pdf

[9] Singapore Transport Safety Investigation Bureau, 2017 – Final Report into Boeing 777 engine Fire at Changi Airport on 27th June 2016, https://www.mot.gov.sg/docs/default-source/about-mot/investigation-report/b773er-(9v-swb)-engine-fire-27-jun-16-final-report.pdf

remained on-board, safely disembarking 15minutes *after* the fire's extinguishment. No injuries resulted; minimal disruption; the plane repairable. Suppose extinguishment was delayed? Suppose unexpected flashbacks occurred, or fire control failed, … it might have ended very differently?

Forcing F3 adoption prematurely could be reducing public safety, something most would agree neither legislators nor operators should be compromising. Everyone's duty of care should be protecting lives and public safety. It is therefore suggested retention of C6 AFFFs and other C6 foams for Major Hazard Facility (MHF) fire emergencies would ensure lives are not unacceptably exposed to unnecessarily increased danger. Saving lives is still the primary duty and responsibility of firefighting professionals – Isn't it? How can they be expected to do that without the best tools available –including relatively non-hazardous C6 foams?
These MHFs include:

- Refineries and Chemical/Pharmaceutical Plants that handle flammable liquids.
- Storage and Distribution Facilities, Tank Farms & Terminals for flammable liquids including jetties/marine terminals.
- Flammable liquids in transit by rail, pipeline or road/ship tankers.
- Airports, helipads, offshore platforms and major transportation hubs.
- All military applications.
- Fixed foam systems and their re-charging to maintain designed safety protection levels.

10. Regulatory risk assessments for PFAS sub-groups according to REACH

Another important recent document you should be aware of, is the Sept.2021 position paper from the Federation of German industries (BDI) to the European Chemicals Agency (ECHA)[10]. BDI confirms: *"Within the framework of sustainable chemicals regulation, substances that pose uncontrollable risks due to their properties and use profile should be restricted or regulated on the basis of scientific assessments."* Otherwise *"… virtually risk-free chemicals will be equated with substances of very high concern ("SVHC") with properties requiring regulation. …such a classification would represent an uncalculable challenge and would have far-reaching negative consequences both for society and for Europe as a business location. …BDI is concerned that the restriction of PFAS as currently planned will be disproportionate and unworkable. …A lack of viable alternatives to PFAS substances means high socio-economic costs in trying to replace them*." Such concerns are not limited to Europe, affecting all technologically advanced economies globally, including USA.

This is supported by recent 2021 research[11] confirming only 256 PFAS (including precursors and breakdown products) are commercially relevant globally. Less than 6% of 'theoretical' 4,730 PFAS substances presented in OECD/UNEP's 2018 Report. This questions the wisdom of suggesting all PFAS: solids, through liquids into gases, with widely differing levels of safety concerns, require 'single

[10] Federation of German Industries (BDI) Sep.2021 – EU Chemicals Legislation: Restriction of PFAS, Evaluation of envisaged restriction procedure. Position paper https://english.bdi.eu/publication/news/eu-chemicals-strategy-restriction-of-pfas/#:~:text=In%20June%202021%20a%20broad,in%20the%20EU%20by%202025

[11] Buck R, Korzeniowski S et al, 2021 – identification and Classification of Commercially Relevant Per- and Polyfluorinated Alkyl substances (PFAS) https://pubmed.ncbi.nlm.nih.gov/33991049/

group' regulation, without recognizing huge diversity in properties and impacts. Some like legacy C8s justify tight controls. Others which are not shown to be harmful to human health, nor bioaccumulative, nor toxic – like short-chain ≤ C6 PFAS, justify continued use with manageable controls. Particularly when they contribute to saving lives, like firefighting foams during major fire scenarios, particularly when involving Major Hazard Facilities like airports, offshore platforms, refineries, chemical plants, defence and bulk distribution[12]. BDI[7] and Buck's[8] research recommends conducting proper regulatory risk assessments according to REACH protocols, on appropriately similar sub-groups, segregating safe from unsafe substances, which would address these issues. Why aren't legislators already doing this?

11. Performance is crucial to duty of care

Maintaining our duty of care, requires reliability, performance and speed in firefighting foam delivery (not evident with F3s) – to save lives.

Many C8 foam users (including US AirForce[13]) transitioned to reliable, effective 'drop-in' high purity, high performance C6 AFFFs, meeting Mil-Spec, US EPA PFOA Stewardship[14] and European Regulation 2017/1000[15] (limiting residual PFOA to low parts per billion [ppb] trace levels) to provide such reliability and performance. C6 PFAS are proven not bioaccumulative, nor toxic, and meet only two of four key criteria required for POP listing[16]. 2013 studies confirmed human half-life averaging just 32days for the main C6 PFAS marker PFHxA, excreted in urine[17], without concentrating in our bodies. Few organisations seem to be taking account of PFAS from other sources than the firefighting foam being involved in most major fires from fabrics, office equipment including computers, processing equipment, cabling, valve seals, operating manuals, even mobile phones and food packaging.

A recent US firefighter study[18] identified only legacy C8 PFAS found in 135 firefighter blood serum samples. PFHxA, was not detected (consistent with Rotander et al's 2015 Australian study[19]). Latest

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[12] Willson M, Jul.2021 — Factors to consider before any C8 transition, Asia Pacific Fire iss.78, Jul.2021 https://apfmag.mdmpublishing.com/factors-to-consider-before-any-c8-firefighting-foam-transition/

[13] US Airforce, 2016 – Airforce awards replacement firefighting foam contract http://www.af.mil/News/Article-Display/Article/915057/af-awards-replacement-firefighting-foam-contract/

[14] US EPA, 2016 – PFOA Stewardship Program final report of 2015 goals met, https://www.epa.gov/sites/production/files/2017-02/documents/2016_pfoa_stewardship_summary_table_0.pdf

[15] European Commission (EU), 2017 - COMMISSION REGULATION (EU) 2017/1000 of 13 June 2017 amending Annex XVII to Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) as regards perfluorooctanoic acid (PFOA), its salts and PFOA-related substances. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017R1000&from=EN

[16] UN Environment Program, Stockholm Convention 2019 – What are POPs? http://chm.pops.int/TheConvention/ThePOPs/tabid/673/Default.aspx

[17] Russell, Nilsson, Buck, 2013 – Elimination Kinetics of PerFlouroHexanoic Acid in Humans and comparison with mouse, rat and monkey, Chemosphere 2013 Nov;93(10):2419-25, PMID: 24050716 http://www.biomedsearch.com/nih/Elimination-kinetics-perfluorohexanoic-acid-in/24050716.html

[18] Graber et al, Apr.2021 – Prevalence and predictors of Per- and PolyFluorinated Alkyl Substances (PFAS) Serum Levels among members of a suburban US Volunteer Fire Department https://pubmed.ncbi.nlm.nih.gov/33918459/

[19] Rotander A et al, 2015 - Novel Fluorinated Surfactants Tentatively Identified in Firefighters Using LC-QTOF-MS/MS and a Case-control Approach, 2015, Environ. Sci. Technol. 49(4) 2 pp2434-2442 DOI 10.1021/es503653n http://pubs.acs.org/doi/abs/10.1021/es503653n

US Centre for Disease Control NHANES 2017-18 data[20] from 1,929 individuals, also showed no PFHxA detection in blood serum samples, across all age and demographic groups of the general US population. Presumably from its quick excretion in urine after exposure, dramatically reducing any risks of harm.

The problem with remote yet potentially catastrophic fire risks – they do sometimes materialise, and may require C6 foams to provide the rapid control and extinguishment necessary to reduce smoke, firewater runoff, protect lives and reduce damage to communities. Then, otherwise very reasonable decisions can **start to look very Unreasonable, … even criminal**.

12. Recommendations

The evidence presented recommends acceptance of the proposed Option 2 levels for implementation as the Annex IV limits **(ie. 50mg/kg PFOA, its salts and 2,000mg/kg for PFOA-related substances**). This coincides with the existing maximum Annex V limits currently in place, which do not seem to have caused any such concerns over the issues raised, to date. Lowering these levels may create undesirable and unforeseen problems, as outlined above.

Evidence also recommends treating PFAS as a series of sub-groups for risk assessment to avoid disproportionate restrictions. Permitting continued use of C6 firefighting foams is also recommended to avoid the public safety concerns and potential life safety risks raised by FAA, NFPA Research Foundation and NRL, supported by evident weaknesses exposed in ICAO Level C approval ratings and misleading claims of F3 efficacy in major incidents, which could place lives in increased (not reduced) danger.
This growing data set confirms beyond reasonable doubt that F3s are **NOT viable alternatives** to C6 foams, particularly in Major Hazard Facilities (as defined above), where C6 foams are critical for essential use to continue safely protecting lives from unnecessary danger.

[redacted],
Director & Technical Firefighting Foam and Foam Systems specialist,
Willson Consulting, Tasmania, Australia. 12th November 2021

[20] US Center for Disease Control and Prevention (CDC), Feb.2021 – Early release: Per- and PolyFluorAlkyl Substances (PFAS) Tables, 2011-2018 (Specifically 2017-2018 PFHxA Data set)
https://www.cdc.gov/exposurereport/pfas_early_release.html

Appendix A – Who is Willson Consulting?

[redacted]

Thank you for inviting this consultation process to engage with interested stakeholders as part of this PFHxA restriction proposal, which is not supported. I am confident your consultative approach will produce better, more broadly accepted, robust, meaningful, useful and implementable outcomes, which also have an increased chance of being understood, respected and valued by the wider firefighting and foam user community after your deliberations and recommendations are concluded, because of this process and the broader understanding achieved - which I hope will contribute to its final outcome.

Willson Consulting is nationally and internationally recognised for providing Environmental and Fire Protection Consultancy Services, specialising in the area of firefighting foams, foam systems, their suitability, applications, system designs, environmental impacts and remediation.

It is run by Director [redacted], B.Sc Hons, MCIM. [redacted] has over 30 year's fire industry experience as an international specialist in Class B firefighting foams, fluorinated and fluorine free, their application and impacts, and design of foam systems, with expertise across product development, systems design, performance testing and evaluation, end-user sector requirements, environmental impacts, remediation and major incident emergency response. He has wide ranging clients including foam users, manufacturers, fire service Cos, Industry Associations and provides guidance through the minefield of complexity surrounding firefighting foams, to help achieve the best outcomes in decision making.

He was nominated as UK foam expert to the UK Government's 2004 PFOS (PerFluoroOctanyl Sulphonate) Strategy Review. He contributed major improvements to bunded areas, storage tank protection and LNG application additions as a member of the European CEN Standard Committee's development of Fixed Foam Firefighting Systems standard EN13565-2:2009.

[redacted] is a Technical Advisory Committee member of Fire Protection Association Australia for Special Hazards (incl.Firefighting Foams and Foam Systems), and has contributed major improvements to standards and Regulatory positions on PFAS chemicals and foams, while helping to ensure fire protection and life safety objectives are not compromised. He is also a Task Group member on UL162, considering revisions to this leading current fire testing and approval standard.

He is therefore particularly well qualified to assist with informative aspects that may not have been previously considered by EU and ECHA. This submission helps explain the relevance and full complexity of these firefighting foam performance and environmental issues.

Realising the importance of fast, effective and reliable action to protect critical life safety, minimise incident escalation, protect critical assets while also minimising the overall environmental and societal impacts of the whole incident's assessment, is a challenge beyond the capability of F3s alone.

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