



Comments on the PFHxA-Restriction Proposal

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1 Foreword

EUROFEU recognizes and supports the consensus to reduce the use of per- and polyfluorinated chemicals.

In acknowledgment of that the industry has worked with users of firefighting foam agents to reduce the overall emission of PFAS by development of fluorine free foam agents (F3¹), developing advanced test methods for systems to avoid use of Fluorine containing foam agents, developing of strategies and trainings to effectively mitigate fire risks with F3 and issuing several best practices publications.

Still EUROFEU members have a strong responsibility to provide effective and reliable firefighting solutions.

The proposed restriction in our view has serious negative impact on the level of fire safety, particularly in industries like chemical, petrochemical and others relying on the highest possible level of fire safety. It rushes a transition away from using PFAS in fire protection without a sufficient consideration of the technical, economical and safety related impacts.

Eliminating PFAS from firefighting foams is not just changing one ingredient but reinventing the firefighting foam technology all together using other and/or new chemicals and technologies. Therefore EUROFEU is convinced that a restriction of such vital components of firefighting foams should provide sufficient transition times to enable suppliers and customers to transit without impact on safety. The proposed 5 year transition time is in our view too short. EUROFEU estimates a minimum 10-12 year transition time for a complete phase out of Fluoro technology in firefighting foams (see 2.1.3).

Reliability and trustworthiness of the law making process is of unpayable value to a society and its economies. EUROFEU appreciates REACH as a major step forward to a safe use of chemistry and strongly supports the transparent rules and procedures that have been installed with it. The basing on facts of any regulatory measurement for chemicals is a lighthouse property of REACH.

Hence, the present regulatory project should – like any – follow these rules and procedures particularly since it has an impact of that magnitude on the fire safety in high risk industries like the petrochemical and chemical industry.

In particular we are convinced that a decision with that impact should very carefully consider the consequences on various aspects associated with using firefighting foams to make a seamless transition possible and to not open voids in the overall safety of our population, environment and economy.

¹ The European standard for firefighting foam agents, EN1568:2018, part 3, Annex A introduces a new type of fluorine free foam “dedicated to meet fire performance ratings and are targeting applications similar to AFFF and/or AR-foams without using fluoroorganic compounds.”

2 Underestimation of Consequences

2.1 Restriction Draft²

2.1.1 Restriction and consequences

According to §3 the general prohibition to manufacture, import and placing on the market of any chemical mixture containing “*equal to or above 25 ppb for the sum of PFHxA and its salts or 1000 ppb for the sum of PFHxA- related substances*” becomes mandatory 18 months after the regulation enters into force (further on abbreviated as e.i.f.).

Since fluorocompounds used in firefighting foam technology presently exclusively are of the C6-type³ this ban affects all Fluorine containing firefighting agents. As of that date no manufacturing of firefighting foam concentrates or other firefighting agents in the European Union will be possible any more.

2.1.2 Proposed Exemptions

In §5 a general exemption for users of 42 months in addition to the general 18 months transition period after e.i.f. is granted to users (except operators of tanks >500 m² surface area and military - see below). In fact this is not even half way through the average shelf life of a foam concentrate hence literally expropriates users in addition to the above described sourcing issue.

The implication is that users of firefighting foams who benefit from the exemptions in §5 still would have to replace their entire stock of AFFF the moment the stock volume undercuts the minimum volume required on site⁴, as backfilling is not technically possible (no sourcing in the EU and mixing with F3 or AFFF from other manufacturers destroys the foam concentrate – see also chapter 2.1.4).

§6 grants use of “*concentrated fire-fighting foam mixtures for defence applications – as long as no successful transition to military operable fluorine free foams can be achieved*” without time limit for certain applications and under certain conditions.

§8 grants a total of 12 years transition for operators of tanks with a surface area of > 500 m². There is no mentioning of bund areas and other fuel retention facilities, which quite frequently reach much bigger surface areas and are also holding not just one tank. We think this is an arbitrary figure and needs further definition including additional risk factors such as tanks in combined bund areas, the bund areas themselves, and other installations in the direct proximity of the tank storage facilities. Also the fuel types need to be considered.

After expiration of any of the aforementioned extended transition times all fluorine containing foam agents must immediately disposed of and all hardware (trucks, trailers, tanks, systems, piping, pumps, ...) needs to be exposed to a thorough technical cleaning process or be replaced to meet the threshold afterwards (provided the analytical evidence is possible).

² Document “*rest_pfhxa_axvreport_en.pdf* (see <https://echa.europa.eu/restrictions-under-consideration/-/substance-rev/25419/term>)” published by ECHA

³ C6-technology describes Fluorosurfactants and –polymers having a fully fluorinated chain of six carbons as a common characteristic

⁴ Operation permits for a manufacturing site involve safety measures necessary to reduce risks arising from the operation to an acceptable limit. A major sector of those safety measures is fire safety. The fire safety part among other conditions (i.e. equipment, fixed systems, manpower, training status, ...) defines the minimum amount of foam concentrate to be available on site at any given point in time. Undercutting this volume either requires immediate back-fill or the operating permit becomes invalid.

The proposed exemptions are of limited value to users because the prohibition to manufacture 18 months after entering into force of the regulation forces the entire manufacturing industry, transportation and warehousing businesses and all other businesses obliged to hold stocks of firefighting foam agents in Europe to transition out of AFFF-Technology significantly ahead of time.

2.1.3 Realistic Period to transition away from Fluorine Technology in Firefighting

The question what a realistic time line for a complete exit from Fluorine containing foam technology would be was discussed during the workshop on firefighting foams last year at ECHA in Helsinki. EUROFEU's professional view resulting from multi-decade experience in high-level fire protection on a realistic period for a complete transition away from Fluorine technology in firefighting foam agents is: Fluorine free foam agents show a significantly more intense interaction with liquid fuels, do not form an aqueous film suppressing vapors and fuel-pick-up, and can only extinguish as a physical foam blanket.

Given the complexity of this undertaking and that a total reinvention of foam based firefighting technology is required, as well as based on the general assumption that a decrease of fire safety is not acceptable, a minimum of ten years is considered necessary.

The following list of tasks to be addressed illustrates how we got to the above mentioned minimum transition time demand:

1. Fluorine free foams being more sensitive to changing ambient and application conditions require a more in-depth evaluation upfront hence more testing on the fuels to be protected. This in turn requires significantly more testing capacities also for testing at larger scale than are available in Europe today. These capacities need to be build up which – due to their nature – requires to go through a (typically lengthy) permitting process.
2. Since F3s can only extinguish physically as a foam blanket the required quality of the foam generated in an emergency is critical to the success. This is very different to AFFF (which in general are much more forgiving) and may require the development of new application techniques and technology particularly on risks of a large industrial scale.
3. Industrial fire brigades particularly protecting those larger risks need to intensively train the correct and efficient application of this new type of foam agents to be able and respond to fires of any magnitude foreseen in the risk management plan of the respective site appropriately.
4. Risk-management- and emergency plans need to be reviewed thoroughly, new mitigation scenarios need to be developed and implemented as well as technical risk mitigation (fixed extinguishing systems) may require revision and retrofitting to the requirements of a F3.
5. Standards need to be reviewed to make sure they cover the specific properties of F3-foam agents.
6. Trainings need to be adopted to push for a culture change away from AFFF-application towards a successful F3-application.

We like to emphasize that in order to build the facilities for large fire scenarios (testing and training) in particular an active support of governments is essential to the permitting process hence the ability to establish those resources needed.

2.1.3.1 Portable Fire Extinguishers

We are convinced that in the proposed phase-out period (approx. 2 years legislative processing time + 5 years transition period), the European fire protection industry will be able to develop fluorine-free alternatives for many, but not all foam based hand-held fire extinguishers. Given the fact that there are no universal, proven solutions available yet at this moment, it will be a huge challenge for the industry with massive investments in manpower, testing and certifications.

A transition period shorter than 5 years would not be acceptable as that period would be too short to develop sufficient and reliable solutions. The proposed 5 years transition period also matches with the usual service life of the foam filling in extinguishers; a shorter transition period would lead to a shorter than planned service life of existing equipment creating unnecessary waste of valuable products and materials and no environmental benefit.

2.1.3.2 Large Scale Fire Scenarios

At this moment, there is insufficient knowledge on the effectiveness of fluorine free foam agents on large fuel surfaces, and insufficient experience with the required application techniques for these fire scenarios. As long as this knowledge is not available, a transition cannot even start as no-one will be prepared to accept the responsibility for the unknown result of the transition.

As long as current installations remain in operation, additional measures are possible to minimize discharge of persistent materials in the environment until reliable and effective replacements are available.

2.1.4 Substitution Cost:

The DS considers a price increase of up to 20 % “on average a slight increase”⁵ which does not take into account that most likely the higher cost for the foam agent itself are accompanied by replacement- and cleaning cost.

In the further text the DS selects a price increase of 10% from the total range and a “central price” of 2 €/kg foam concentrate from the given range (<1 €/kg - >4 €/kg) without any explanation why these numbers are taken. The conclusion then converts the “price increase” of 0.2 €/kg into “substitution costs”. A price increase on the foam agent is just an add-on to the price of the foam. The substitution costs are all costs related to the transition of foam A (an AFFF) to foam B (a fluorine free foam agent) including costs for disposal, handling, cleaning and/or replacement of hardware, purchase of new foam, etc.

The DS presets in his calculation that only that portion of AFFF foam concentrate that has been used needs to be replaced by fluorine free foam agents. This is not possible:

1. It is not possible to backfill a foam stock of AFFF by fluorine free foam because
 - a. manufacturing of fluorine containing foams ends 18months after entering into force of the proposed regulation;
 - b. Fluorine containing foam agents cannot be put on the market as of 18 months after e.i.f. hence product to backfill is not available and finally
 - c. it is technically not possible to backfill stocks of Fluorine containing foam agents with fluorine free foam agents.

Consequently the entire stock needs to be replaced.

2. Latest 12 years after entering into force of the proposed regulation all AFFF s are due for replacement.
 3. The DS assumes that of the total stock volume of AFFF foam concentrates in Europe (62,500 t) 50 % will be used up in service during the 5 year transition period set by the proposed restriction. Considering 20 % higher procurement cost the DS sums up the cost for the exchange of the residual 50 % of AFFF stock after 5 years to be 69 Mio €.
- According to the firefighting industry only 10% on average of the stocked volume of a foam are typically used up in service during the life span of a foam concentrate (~15 years). That leaves –

⁵ rest_pfhxa_axvreport_en.pdf (see <https://echa.europa.eu/restrictions-under-consideration/-/substance-rev/25419/term>), page 55, 4th paragraph

broken down to a five year period – a disposable volume of ~60,000 t of foam concentrate which sums up to 183 Mio €, costs for cleaning, handling, hardware replacement, etc. NOT included. The below calculation uses the figures that also the DS has been using, but a more realistic indication for the volumes of foam actually consumed:

item	cost	explanatory comment
disposal cost per tonne	830 €/t	see page 63 of the document, 1st paragraph: 0,83€ incineration cost per kg AFFF form concentrate
price per tonne F3	2,200 €/t	see page 62 of the document, last paragraph: 2.200€ for replacement of AFFF by F3 per tonne
stocked volume	62,500 t	see page 62 of the document, pre-last paragraph
consumption rate per 5a	3.3%	basis: 10% of the stock volume is used on fire over lifetime; the typical shelf life is 15 years on average
volume consumed in 5a	2,063 t	
disposable residue	60,438 t	
disposal cost	50,163,125 €	
procurement cost	132,962,500 €	
handling/cleaning/hardware replacement		numbers are not available, hence left out
Total replacement cost	183,125,625 €	
Total replacement cost per annum	36,625,125 €	

Table 1: Estimated cost for completion of transition from AFFF to F3 5 years after the regulation entering into force.

We like to point out that the assumed price level for F3-foam agents of 2,200€/ton might be correct for F3-foam agents for standard applications such as municipal firefighting. The industrial grade foam agents that would be required for the chemical/petrochemical industry and similar risks are ≥5,000€/ton. System cleaning cost (excluding disposal cost for foam concentrates but including disposal of flushing water) are about 1€/ltr of system content (e.g. a 10,000ltr tank requires 10,000€ to clean to the proposed threshold level).

We also like to make the readers aware that the cost for handling, cleaning and retrofitting can ramp up to 15-20 Mio € for a single one of Europe’s biggest chemical sites. On average a site operating 20-40 storage tanks require 2-5 Mio. € for retrofitting. *Tankterminal.com* lists 1,166 tank terminal facilities in Europe operating in total 30,982 tanks. This is per site on average 27 tanks having a total storage capacity of 215,000 m³.

It also needs to be considered that any change to the system of a site also triggers additional testing and calibration costs to ensure full functionality.

2.1.5 Interchangeability of AFFF and F3

The dossier implies that fluorine containing foams can be replaced by fluorine free foams in a comparatively simple process because efficiency of F3 is similar to AFFF.

A recent Study published January 2020⁶ concludes after extensive comparative testing of Fluorine containing and Fluorine free foam concentrates “The AR-AFFF performed well against all test fuels included in this assessment (IPA, Heptane, and Gasoline (MILSPEC and E10). The F3s did well against heptane but struggled against some of the scenarios conducted with IPA and gasoline (both MILSPEC and E10), especially when the foam was discharged with a lower foam quality/aspiration. The F3s required between 2-4 times both the rates and the densities of the AR-AFFF to produce similar results against the IPA fires conducted in with the Type II test configuration. During the Type III tests, the F3s required between 3-4 times the extinguishment density⁷ of the AR-AFFF for the tests conducted with

⁶Study by Fire Protection Research Foundation “Evaluation of the fire protection effectiveness of fluorine free firefighting foams”, January 2020; 1 Batterymarch Park, Quincy, MA 02169-7417, USA Email: [REDACTED]@nfpf.org | Web: nfpf.org/foundation

⁷ The authors describe the “extinguishment density” as the total amount of foam needed to extinguish a fire of a given size.

MILSPEC gasoline and between 6-7 times the density of the AR-AFFF for the tests conducted with E10 gasoline. From an application rate perspective, the F3s typically required between 1.5 to 3 times the application rates to produce comparable performance as the baseline AFFF for the range of parameters included in this assessment.”

This is not just a slightly higher consumption of extinguishing agent but has significant implications for users:

- Increased storage volume of foam concentrate
- Bund areas in tank farms may need to be retrofitted to cover a significantly higher volume of liquids associated with an emergency response action
- Significantly increased firewater retention capacity is required, which can cause reasonable difficulties in retrofitting operating sites to the new demand.
- Cut-back on tank storage capacity to leave sufficient space for additional firefighting agent application: Tank owners may have to reduce the maximum stored volume in tanks to leave enough space for containment of an increased amount of firefighting foam
- Studies of the US Naval Research labs⁸ clearly indicate that F3 require significantly higher application rates (see above).

The DS states on page 56 of the Dossier⁹:

“Administrative issues, training with alternative foam

Additional costs are connected to the slightly different properties of fluorine-free foams. It might be possible that some users have to consult external experts to prepare the conversion to fluorine-free foams. It might be possible that additional training is necessary to acquaint firefighters with the new foam. Costs cannot be estimated.”

This statement carries two incorrect pieces of information:

1. The properties of F3's are not just “*slightly different*”¹⁰ but significantly different:
 - a. The fuel-repelling property by fluorocompounds is completely missing,
 - b. Alcohol resistant foam agents with low Newtonian¹¹ viscosity are not possible any more,
 - c. F3-foams tend to have high viscosity which may be an issue for existing proportioning systems
 - d. Proportioning rates of 1% v/v or less for alcohol resistant foam agents are not possible any more,
 - e. Foam quality requirements are very different and
 - f. Consequently requirements on application techniques are different (for instance, good foam quality and large range of application, i.e. on fires of large tanks, are contradicting properties), and in some areas of application (i.e. large storage tanks) no solution to this dilemma is known yet.
2. AFFF foams are very forgiving with respect to changing environmental conditions and inaccuracies of proportioning and application and in particular fuel types. F3s in turn seem to demonstrate a significantly higher level of sensitivity in that respect. Consequently, F3s need to be applied with much more care and oversight, which again does require an according training of the firefighters using it.

⁸ Naval Technology Center for Safety & Survivability-Chemistry Division: K. Hinnant, J. Farley, R. Ananth, A.W. Snow and S. Giles “Fuel for Firefighting Foam Evaluations: Gasoline vs Heptane”; June 2019

⁹ [rest_pfhxa_axvreport_en.pdf](https://echa.europa.eu/restrictions-under-consideration/-/substance-rev/25419/term) (see <https://echa.europa.eu/restrictions-under-consideration/-/substance-rev/25419/term>)

¹⁰ [rest_pfhxa_axvreport_en.pdf](https://echa.europa.eu/restrictions-under-consideration/-/substance-rev/25419/term) (see <https://echa.europa.eu/restrictions-under-consideration/-/substance-rev/25419/term>), page 57; 1st paragraph

¹¹ “Newtonian” describes a viscosity, which only depends on the liquid and its temperature (water, Milk, Honey) as opposed to non-Newtonian also depending on the movement of a liquid (ketchup).

3 Weaknesses of the Dossier:

EUROFEU is highly concerned about how legislation is about to be developed in this particular case.

As we understand it, the generally applicable legal framework for hazardous substances and chemicals is the democratically developed and agreed REACH¹² regulation. This regulation among other things lays down conditions for authorization, restriction, placing on the market and use of chemical substances.

The present restriction proposal in our view does not meet those requirements set out by REACH:

- It uses the criterion “mobility” for justification of a restriction with serious impact on EU-wide fire safety measures. Mobility is not legally defined nor specified.
- It attempts to restrict a chemical for which no particular hazard was identified.
- The proposed restriction shall be based on a single property of the substances affected: persistence. Persistence is no hazard as such.
- The proposed restriction uses the principle of “equivalent level of concern” for justification, although this argument already has been rejected in the context of listing the same substances as SVHC

3.1 Supporting Information given by DS

3.1.1 Analytical issues

The DS suggests with 25 ppb of PFHxA and 1,000 ppb of related substances the same limits in chemical products as were established for PFOA in Regulation (EU) 2017/1000. Even disregarding the fact that the dossier gives no explanation nor scientific basis for these limits, enforceability of the limits is questionable.

All existing approved analytical methods are optimized for analytics in water. In case of firefighting foams, we have a complex organic matrix with a mixture of solvents, surfactants and other organic components, which make up about 30-70% of the product.

There is no approved method available for quantification of PFHxA in complex matrices like chemical mixtures.

Even more complicated is the case with PFHxA related compounds. There are, in most cases, no approved analytical methods for quantification at all available, even if it is possible to identify them.

How the DS will make sure that the proposed limits are kept for products placed on the EU market is unclear.

Development and approval of analytical methods takes typically several years. Still, the limits take effect immediately when the regulation gets into force, without a sufficient transition period that allows for analytical method development.

3.1.2 Release into Environment

It seems to be the understanding of certain stakeholders (DS, ECHA, and diverse NGO's) that PFASs in firefighting foams “*evidently end up in the environment*”¹³. The DS also states, “*The application of*

¹² REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2006

¹³ <https://echa.europa.eu/de/podcasts: Bjoern Hansen about PFAS>

*firefighting foams will in most cases lead to considerable amounts released to the environment*¹⁴. This is not the case:

This above-mentioned type of dispersive use of firefighting agents mostly takes place with municipal firefighting. The manufacturers of firefighting foams have been pointing out for years that AFFF and the likes have no advantage for municipal firefighting hence shall be discontinued in this area of application.

AFFF foam agents are nowadays predominantly used in industries holding large stockpiles of flammable liquids (i.e. chemical or petrochemical industry). Those industries are required to establish measures to retain any effluents of those facilities - including fire water run-off - as a vital part of their operating permits.

Hence it is evident that from the part of AFFF that is actually used on fires during the foam agent's lifetime¹⁵ only that fraction will be released directly into the environment which is either not retained and/or not incinerated. Any foam concentrate with its shelf life expired would be subject to proper disposal of industrial chemical products (incineration), hence would also not be released into the environment.

3.1.3 Hazardousness:

The DS itself states clearly that no hazards are identified for the substance proposed for restriction: *"2.5.2 Human health impacts*

The human exposure to PFHxA, its salts and related substances has the potential to cause adverse health effects. The toxicological profile of PFHxA is described in Annex B.5. Studies suggest that PFHxA might cause risks with regard to developmental and reproductive toxicity.

To date no indications of serious human health risks are documented. Human exposure to PFHxA is limited and the studies available suggest a considerable gap between effect levels and measured exposure levels and the current state of research suggests that human exposure to PFHxA is unlikely to increase to levels that cause risks to the human health. But since PFHxA is extremely persistent and the releases are not reversible the magnitude of future exposure cannot be predicted conclusively. The extreme persistence means that the exposure via environment is intergenerational, and inevitably increasing, in case the releases are not minimised. It may thus be possible that serious health concerns related to PFHxA-exposure may be documented in the future. It is important that releases are reduced to a minimum and possible future uses of the substances are prevented. Considering the absence of clear evidence regarding human health impacts from exposure to PFHxA, the Dossier Submitter concludes that there are currently no impacts to be expected. However, with a rising environmental concentration of PFHxA this may change in the future.

All health related statements in the dossier point to the future and use conjunctives only, e.g. p. 10: *"PFHxA may affect the health of the general population in the future"* and, stronger, p. 85 *"The possible impacts of continued emissions on the environment and human health are largely unknown but might be extremely severe."*

The criteria for adding a substance to Annex XVII REACH are stated in REACH, article 68 ff.:

- unacceptable risk to human health or the environment

¹⁴ *rest_pfhxa_axvreport_en.pdf* (see <https://echa.europa.eu/restrictions-under-consideration/-/substance-rev/25419/term>), p. 53, 4th paragraph

¹⁵ Field experts estimate the amount of foam to actually be used in emergency over the course of the product's lifespan is roughly 10% of the stocked volume

- meets the criteria for classification in the hazard classes carcinogenicity, germ cell mutagenicity or reproductive toxicity, category 1A or 1B (dossier says this is not fulfilled, p. 31)
- Taking into account the socioeconomic impact of the restriction, including the availability of alternatives

PFHxA does not meet any of the above criteria. This is supported by numerous literature referenced by the DS himself in the restriction dossier.

3.1.4 Proposed thresholds

The limiting value for PFHxA and its related substances is a copy-and-paste-exercise from the regulation 2017/1000/EC on PFOA. While PFOA is proven to be hazardous and the type and extend of hazard are used to justify the threshold, in case of PFHxA the proposed numbers are not substantiated at all.

REACH states in Annex XV, part II, paragraph 3: *“The proposal shall include the identity of the substance and the restrictions proposed for the manufacture, placing on the market or use and a summary of the justification.”* This does not just ask for a justification of the proposal to restrict a substance but also to justify the proposed limiting value. No such justification is given by the DS in the case of PFHxA.

3.1.5 Persistency:

The substance is undisputedly persistent which nevertheless per se is not a hazard.

3.1.6 Mobility:

- “mobile” is not a defined regulatory criterion, the definition applied is given in *“Protecting the Sources of our Drinking Water”*, by German Environmental Agency¹⁶;
- The definition used by the DS for “very mobile” as given in the document by UBA is not consistent with ECHA’s understanding: ECHA understands substances with a $\log(K_{oc}) > 3$ as “strongly adsorbing”¹⁷ whereas UBA classifies substances with $\log(K_{oc}) < 3$ as “very mobile”. Literally a substance having $\log(K_{oc}) = 3,001$ could be “strongly adsorbing” meaning strongly binding to surfaces hence be the opposite of mobile, whereas another substance having a $\log(K_{oc}) = 2,999$ would be “very mobile”? Also: according to the UBA proposal a $\log(K_{oc}) < 4$ would still be “mobile” which clearly contradicts the ECHA understanding of “strongly adsorbing”.

3.1.7 Inconsistencies within the Dossier:

The Annex XV restriction report is formally peppered with inconsistencies and presentations of alleged facts as already ECHA’s Risk Assessment Committee mentions in their report on the conformity check of the dossier: *“The concerns described are overlapping and non-consistent, could be more clearly and coherently presented. Some concerns somewhat speculative and could be backed up with more argumentation/references.”*¹⁸

- On page 21 the DS says *“PFHxA has a low to moderate tendency to volatise from water to air (Henry’s Law constant of PFHxA is 5.279 Pa m³/mol).”* On page 23 of the same document: *“The combination of the extreme persistency and the high mobility of PFHxA also leads to long distance transport*

¹⁶ Umweltbundesamt, ISSN 1862-4804

¹⁷ ECHA’s guidance on information requirements and chemical safety assessment, chapter R.7b (v4.0; June 2017; p.146; first paragraph), substances with “log K_{oc} > 3” are considered “strongly adsorbing”

¹⁸ Report presented at RAC-52, March 2020; File: “08_2a1_PFHxA_conformitycheckandkeyissues_RAPPS.pdf”

- processes in the environment. Transport is taking place via the atmosphere or with ocean currents and not only PFHxA itself but also its precursors are subject to transport (see chapter B.4.3)."
- c. DS speaks of *"This high mobility leads to a ubiquitous distribution of PFHxA in the environment."* (see p. 79). Ubiquitous distribution commonly means it can be found everywhere in the environment. However then the next line says: *"PFHxA has been found in several compartments such as in surface waters and in marine waters. Also, some drinking water resources and drinking water itself are already contaminated with PFHxA."* In EUROFEU's view "ubiquitous" does not correlate to "several" and "some" hence may rather be used to dramatize the situation.
 - d. The justification for the restriction proposal is a presumed future risk arising from growing concentrations of PFHxA in the environment particularly in drinking water. However, the DS also states: *"Considering the absence of clear evidence regarding human health impacts from exposure to PFHxA, the Dossier Submitter concludes that there are currently no impacts to be expected."* (p. 73, chapter 2.5.2.) or on page 2 of the document: *"For human health impacts standardized risk assessments (DNEL vs. exposure) can be carried out. These suggest that current exposures and emissions to the environment from manufacture and use do not pose a risk for human health at the moment."* Or on page – even stronger: *"Human exposure to PFHxA is limited and the studies available suggest a considerable gap between effect levels and measured exposure levels and the current state of research suggests that human exposure to PFHxA is unlikely to increase to levels that cause risks to the human health."*¹⁹
 - e. The DS has no clear view on costs for transition from AFFF to F3: he admits that the evaluation of costs for a transition from AFFF to F3 are *"widely unknown"* as is whether or not affordability of these costs could be an issue²⁰. Contrasting this statement by another in the same paragraph: *"Obviously larger airports, some manufacturers and the defence sector in general can afford the costs associated with substitution to FFF"*. Then again just a few lines further down: *"It is not possible to determine whether a restriction would be proportionate. Costs are high, especially for the replacement of existing foams."*
 - f. The DS states on page 56 of the dossier: *"The Dossier Submitter expects that as a result from the listing of PFOA under the Stockholm convention a phase-out process for foams already installed in systems will be implemented. Stored foams would have to be disposed of by 2025."* Presently the only regulation in place for PFOA in Europe is the 2017/1000/EC which does NOT require a disposal of stored foam agents (not meeting the thresholds) by 2025! The vast majority of the industry is not aware the exemption in the 2017/1000/EC is about being pulled barely two years after its publishing date. How would under these circumstances anyone start to transition out?

3.1.8 Incorrect/Misleading/Incomplete Information

3.1.8.1 Definitions:

When speaking about firefighting foams the term *"testing"* is used in the restriction proposal as well as in the explanatory notes of the DS. However, *"testing"* is not defined at all yet covers a range of very different activities of different nature:

Testing of foam agents during their development phase, testing of foam agents by users to evaluate products and/or their suitability on specific combustibles; testing of systems for their function (cannot be done using surrogates as also the properties of the foam generated by the system are pass/fail

¹⁹ *rest_pfhexa_axvreport_en.pdf* (see <https://echa.europa.eu/restrictions-under-consideration/-/substance-rev/25419/term>); p. 73, chapter 2.5.2.

²⁰ *rest_pfhexa_axvreport_en.pdf* (see <https://echa.europa.eu/restrictions-under-consideration/-/substance-rev/25419/term>), p. 57: "Calculation of avoided emissions"

criterion); testing of correct proportioning of firefighting foam concentrates (can be done using surrogates simulating hydrodynamic properties).

On Page 11 of the Dossier the DS uses the term “*extinguisher products*”²¹. Since this term used in the fire protection community for extinguishing devices (i.e. portable extinguishers) rather than extinguishing agents the volume of PFAS given in the statement is very confusing. As is the information that Fluorine containing foams are also used “*in special cases for class A fires (combustible materials)*” (which is simply wrong).

3.1.8.2 Alleged Data Gap:

The DS states on page 55 that “*Some sources claim that fluorine-free foams have to be used in higher quantities to achieve stable performance. Further details are not available.*”. This is incorrect as corresponding information indeed is available: several organisations (amongst others EUROFEU, BVFA,...) as well as manufacturers of firefighting foam agents have provided such information including detailed technical justification and offered more support upon request.

Besides IPEN²² (an organization well known to be in strong opposition to any use of persistent chemicals, but not an expert in the field of fire protection), it would have been helpful to also consider the knowledge of accepted experts in the area of firefighting, firefighting foam technology and fire protection in general.

3.1.8.3 Interchangeability of AFFF and F3

As explained in chapter 2.1.5 AFFF and F3 are not as interchangeable as suggested by the DS. A transition to F3 requires a very careful and in depth review of the entire situation of a site and may result in significant restructuring/retrofitting of the fire safety measures.

3.2 Intransparent Maths

The calculations are not transparent and the results vague to the point where they are getting meaningless. Also this aspect has been identified as a weakness by RAC: “*Uses and associated volumes (somewhat unclear)*”:

3.2.1 Remediation cost:

“*For example, one study analyzed reported remediation cost and estimated costs for environmental remediation of all PFAS in the EU totaling 821 million € to 170 billion €.*” (Dossier, p. 73). This is a variation of more than 20,000 %. Other calculations show a similar spread.

3.2.2 Volumes of Fluorine containing Foam concentrates:

- “*The Dossier Submitter is not aware of any reliable estimates for the EU-wide stock of AFFF foams. However, to be able to give an idea on the possible procurement costs it is assumed that stock is five times the annual use of AFFF, i.e. 62,500 t.*” In this calculation the “annual use” would be a fifth of the total stock volume equaling to 12,500 t. The term “use” is not defined, yet critical for the correct understanding of the information. If “use” means sales, the assumed consumption is incorrect: the total volume of firefighting foam concentrates being placed on the market per annum covers replacement of aged foam concentrates, new installations and any use including the use on fires. According to the experience of our members the fraction actually used on fire is

²¹ *rest_pfhxa_axvreport_en.pdf* (see <https://echa.europa.eu/restrictions-under-consideration/-/substance-rev/25419/term>); p. 11: “*About 3 000 t/a precursors are used in fire extinguisher products.*”

²² *rest_pfhxa_axvreport_en.pdf* (see <https://echa.europa.eu/restrictions-under-consideration/-/substance-rev/25419/term>), page 55, 3rd paragraph

the least fraction of the total volume. Our members estimate that fraction to be about 10% of the total annual demand of fluorine containing firefighting foam concentrates. This equals to 1,250 t/a.

- In Table 8 of the document the “*total annual used tonnages of PFHxA and related substances*” are given to be 1,000-3,000 t. Considering the aforementioned annual consumption of 12,500 t firefighting foam concentrates assumed by the DS, the average concentration of PFHxA and related substances in firefighting foam concentrates would be between 8 % and 24 %. Reality is that Fluorochemicals make up only 1-2 % w/w as an average across all Fluorine containing firefighting foam concentrates.
- Example calculation on release of PFHxA and related substances from firefighting foams:
AFFF is nowadays predominantly used in the petrochemical and chemical industry. Municipal fire brigades have already started to transition away from AFFF a while ago and are quite mature in the process. Airports as well have started to transition to F3.
Most of the releases in the industry will be contained, as the applicable regulations require.
Therefore only a fraction of the foams used in fire events will be actually released into the environment. The firefighting industry estimates that about less than 10 % of AFFF is actually used before end of its lifetime. The rest will be orderly disposed of.
Total annual amount: 12,500 t (presumed 20% Of total stock volume in Europe)
10 % use on fires 1,250 t/year
Average content of PFHxA/related substances 2 %
Total release of PFHxA/related substances 25 t/a
annual release into the environment from firefighting foams is about 16.7 t (opposed to 1,000-3,000 t suggested in table 8 of the dossier) which sums up to 334 t in 20 years – as opposed to 1,449 t.

3.3 Wrong and misleading information:

In the dossier itself and the supporting document there are many case where information given by the DS does not match the information from the referenced studies.

3.3.1 Concentrations of PFAS in firefighting Foams/Foam solutions

In the explanatory document²³ to the restriction dossier the DS states on page 103: “A synthetic foam concentrate intended for dilution at 3 % into water contains PFCAs and / or their related substances from 0.9 – 1.5 % (mean 1.2 %) of the total weight (Pabon and Corpart, 2002). So, the ready to use foam includes usually up to 0.45 % Fluorosurfactants (Sontake and Wagh, 2014).”

However the source tells different²⁴: “The foam solution that is formed generally contains the following: • Water, 98%-99% • Surfactants (Fluorosurfactants and hydrocarbon surfactants), 0.03 %-0.45 % ...”.

So the referenced 0,4 5% are not the content of Fluorosurfactants, but are the total surfactant content of the foam solution consisting of Fluorosurfactants and carbon hydrate surfactants. It is important to note that there are no firefighting foams which do consist of only Fluorosurfactants. The ratio of carbon hydrate surfactants to Fluorosurfactants in an average AFFF designed for a 3 % proportioning in the foam solution (the example given by the DS) is roughly between 2:1 or even 3:1. Hence the maximum share of Fluorosurfactants of those 0.45 % is 0.15 %.

²³ rest_pfhxa_axvreport_annex_13842_en.pdf (see <https://echa.europa.eu/restrictions-under-consideration/-/substance-rev/25419/term>)

²⁴ Chemical Engineering and Science, 2014, Vol. 2, No. 1, 11-14 Available online at <http://pubs.sciepub.com/ces/2/1/3>

Using the mean value for total content of Fluorosurfactants as given by the DS 1.2 % (w/w) in the concentrate and putting 3 % (v/v) of that concentrate into water to yield the foam solution the resulting content of Fluorosurfactants would be 0.036 % (w/w) which perfectly fits to the information by Sontake and Wang but is far less than the number given by the DS.

3.3.2 Information on annual consumption

The DS references a study by K. Keutel and M. Koch about *Investigation on fluorine free firefighting agents and firefighting procedures to fight fires of polar liquid fuels*²⁵ (title of the study translated from German by the author) to explain the annual consumption and release of PFHxA into the environment (see page 103ff of footnote 8).

While the DS states only seven *volunteer* fire brigades have responded to a survey about their foam use, the cited study says 20 *professional* FBs have responded. While the DS speaks of a “*use of perfluorinated substances in the AFFF foams by volunteer fire brigades*” the study states that of 20 fire brigades which have responded to the survey 15 are using fluorine free foam agents. The DS concludes that an average of 1,150 kg foam solution was used per case of fire response; the study says 300-1,000 ltr of the concentrate are consumed per annum.

There is no reference whatsoever in the literature how many cases of emergency are covered with the annually consumed amount of foam concentrate. However the DS draws the conclusion that per individual case 1,150 kg of foam solution are used which (using the above number for PFHxA content in foam solution) sums up to a total annual amount of 4.6 t of PFHxA being released into the environment.

The DS also fully ignores the fact that Keutel and Koch clearly say that 15 of 20 fire brigades are using fluorine free foam agents. Members of EUROFEU can confirm that the vast majority of municipal fire brigades (professional and volunteer) use fluorine free foam agents exclusively.

4 Final Note on the Dossier

The dossier on restriction of PFHxA and related substances is not able to prove that a restriction is necessary from a hazard point of view, or enforceable, affordable or proportionate.

A neutral, fact based and science based approach should be the basis for law making. This dossier fails on all those levels, and is not suitable to provide justification for a restriction. It would be a bad sign for legal security and the reliability of law-making processes in the EU if based on this dossier a restriction for a chemical would be created.

The DS fails to provide evidence that PFHxA meets the requirements for an Annex XVII restriction.

The DS repeatedly states in his own restriction dossier that the incriminated substances do not pose a risk for human health or the environment, and that it is not to be expected that in the future a level may be reached where this may happen. Thus the DS himself removes any basis for a restriction of PFHxA and related substances.

The “hazards” the DS connects to PFHxA and related substances either are no hazards as such or pose no risk to human health or environment. To hide the fact that there are no hazardous properties to base the restriction on, repeatedly many overlapping and interconnected hazard claims are made in the dossier. Some of those claims even do not correspond with the cited literature sources.

²⁵ Karola Keutel, Mario Koch, Forschungsbericht Nr. 187; FA-Nr.: 86 (3/2014) IdF; ISSN 170-0060

The DS puts PFHxA in such a context with other recognized dangerous PBT substances that the reader must assume that PFHxA has the same hazard characteristics. However, the DS contradicts himself by stating elsewhere that the substances are not comparable.

The DSs calculations of releases, human exposure or replacement costs related to a phase-out of the substances are inconclusive, incoherent and incomprehensible, even if applying the figures used by the DS himself. Calculation results have such a huge spread that they become meaningless (20,000%!).

Transition costs from AFFF to F3 are intentionally calculated far too low.

Existing information on use and comparison of AFFF to F3 in terms of performance were disregarded. Still the DS claims that no information is available.

The Dossier does in no way prove a hazard coming from the substances, neither at present or in the future, or the necessity of a restriction. On the contrary: It is in itself a plea for not restricting PFHxA and related substances. The quality of the dossier raises serious concerns about it becoming the basis of a legal act with an impact of the magnitude this restriction may develop. Additionally it would set a precedent for arbitrary restrictions on chemicals.

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