

ANNEX XV RESTRICTION REPORT

PROPOSAL FOR A RESTRICTION (DRAFT)

SUBSTANCE NAME(S): Polyfluoroalkyl and perfluoroalkyl substances (PFAS) in firefighting foams

CONTACT DETAILS OF THE DOSSIER SUBMITTER:

VERSION NUMBER:

DATE:

Overview - Problem Analysis Investigation Report

Grounds for the restriction proposal and possible issues identified

This Problem Analysis Investigation Report (PAIR) gives the status of the investigation to propose an Annex XV restriction on the placing on the market and use of PFAS in firefighting foams. The option of restricting in addition the manufacture of PFAS foam concentrates is also discussed. The report is intended to be a basis for discussion with the Commission on how to take forward this restriction proposal.

In July 2020, the Commission requested ECHA to prepare a restriction proposal in accordance with Article 69(1) of REACH of PFAS in firefighting foam and to cooperate with the authorities working on the broad restriction of PFAS¹ (hereafter referred to as "universal PFAS restriction"). ECHA updated the Registry of Intentions and announced a planned submission date of 1st October 2021².

The present Annex XV report is largely based on study jointly contracted by the Commission and ECHA in 2019 on possible regulatory management options to address the ~~risks of~~ the risks of PFAS in firefighting foams in the EU³, hereafter referred to as Wood (2020). This study included extensive literature searches, stakeholder surveys and a workshop. However, comments received from stakeholders during the opinion-making process of the PFHxA restriction proposal⁴ and a call for evidence held to support the development of a universal PFAS restriction proposal by NL, DE, SE, DK and NO⁵ (which at the time included the use of these substances in firefighting foams) indicated that certain key elements of Wood (2020) might need to be revised, in particular the annual usage rate of foams and the total stock in the EU. On this basis, additional consultancy work was contracted by ECHA early 2021 to clarify a series of elements with stakeholders and based on literature review. The outcome of this work is expected in June 2021 and will be incorporated in the present report. Since these key input parameters affect several calculations and sections of the Annex XV report, significant review and update time is envisaged to take place after the new data is received.

Despite several stakeholder consultations, it is likely that some of the information sought for the analysis will not be available or will be of low quality (e.g. lack of supporting evidence, poor justification for representativeness, lack of specificity, large uncertainties, conflicting information). In the absence of further information from stakeholders, best estimates and robust assumptions will be generated using the information available, highlighting the limitations and uncertainties. Assumptions will be revised during opinion making if additional credible information becomes available. The necessary information to revise an assumption (i.e. that would be needed to be submitted during the consultation on the Annex XV report) could be clearly stated in the Annex XV report.

¹ https://echa.europa.eu/documents/10162/13641/request_echa_pfas_ff_en.pdf/aa089887-bc27-e642-747e-b935809075cc

² <https://echa.europa.eu/registry-of-restriction-intentions/-/dislist/details/0b0236e1856e8ce6>

³ https://echa.europa.eu/documents/10162/28801697/pfas_flourine-free_alternatives_fire_fighting_en.pdf/d5b24e2a-d027-0168-cdd8-f723c675fa98

⁴ Restriction on undecafluorohexanoic acid (PFHxA), its salts and related substances available at: <https://echa.europa.eu/restrictions-under-consideration/-/substance-rev/25419/term>

⁵ <https://www.reach-clp-biozid-helpdesk.de/SharedDocs/Meldungen/DE/REACH/2020-05-08-RMOA-PFAS.html>

Commented [BV(1)]: I would suggest that this is done. It will be very helpful to guide stakeholders in collecting information to be submitted in the public consultation.

Commented [MD2R1]: Thank you [REDACTED] we will do that.

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Hazard and concern

PFAS are persistent substances and most PFAS are also easily transported in the environment covering long distances away from the source of their release. These substances have been frequently observed to contaminate groundwater, surface water and soil. Remediating polluted sites is technically difficult and costly. If releases continue, they will continue to accumulate in the environment, drinking water and food.

Wood's study did not address in detail the hazard and risk of PFAS as this was initially planned to be developed by ECHA. In addition, considering the Commission's request to cooperate with the authorities working on the universal PFAS restriction, ECHA identified that the work performed by these authorities on the scope of substances identity, the hazard and risk could be used in ECHA's restriction proposal on PFAS in firefighting foams. This integration would benefit all parties by saving resources and experimenting the approach (sometimes termed 'ice-breaker') with a restriction dossier that would undergo the RAC-SEAC opinion-making ahead of the universal PFAS restriction. The five authorities would then be able to use the learnings from the opinion-making of ECHA's restriction proposal to adapt their own proposal prior to, or in the initial period after, its submission.

The main challenge with the proposed approach is the timing of ECHA's restriction proposal preparation for which final input from the authorities on the SID scope, hazard and risk would be needed by summer 2021. The authorities have shown commitment to the suggested approach and further discussions in June 2021 will take place to confirm it and the associated timeline. ECHA is providing precise information on timelines and deliverables (and formats) within a 'concept paper', that is currently being drafted. Should it not be possible to use the hazard approach of the universal restriction, this is likely to require additional work from ECHA (possibly using a consultant) to address this part of the Annex XV report. A key decision point over the next few weeks will be on whether to continue cooperation with the universal restriction or whether to invoke the contingency plan.

Emissions modelling

In terms of emission and exposure assessment Wood (2020) chose two identified PFAS substances⁶ to calculate and represent the overall emissions of PFAS to the environment (water, air, soil) based on the quantities of firefighting foams used per sector or type of use and emission parameters across the foam life cycle based on standard parameters or expert judgement. Due to the absence of specific annual usage rates for all sectors and types of use (especially training), the emission parameters are based on assumptions ~~from~~ based on the information received from the stakeholders consulted and might not represent the reality or could be challenged during the opinion-making process. The shares and amounts of PFAS foams (a) still used in training and (b) never used and sent to incineration when reaching

Commented [LS(3)]: Name the two substances

Commented [MD4R3]: OK, I added a footnote with the SID.

Commented [BV(5)]: Something is missing here.

Commented [MD6R5]: I completed the sentence.

⁶ 1-Propanaminium, N-(carboxymethyl)-N,N-dimethyl-3-[[[3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)sulfonyl]amino]-, inner salt (CAS 34455-29-3), and 1-Propanaminium, 3-amino-N-(carboxymethyl)-N,N-dimethyl-N-[[[gamma-omega-perfluoro-C6-C16-alkyl]thio]acetyl] derivatives, inner salts (CAS 80475-32-7)

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expiry date are still unclear. These elements have an important impact on the emissions and the disposal costs under the restriction option where PFAS foams have to be disposed of at the end of the transitional period. The latest attempt to contact stakeholders (survey targeted on the users) has been initiated on 6 May 2021 to clarify these elements (deadline for response: 4 June 2021). In absence of more specific information, assumptions will be made based on the more generic information already available.

Also, the approach taken for the emission characterisation is simple and does not model complex fate aspects (e.g. flow across environmental compartments, degradation products, direct human exposure). This simple assessment has been chosen based on RAC and SEAC approach to consider emissions as a proxy for risks and impacts ('PBT/vPvB approach') and due to the complexity of modelling the fate of a very large number of PFAS substances. This approach could also be challenged during the opinion-making process unless RAC agrees that PFAS should be considered as non-threshold and that releases should be minimised as per PBT/vPvB substances (see links to hazard/risk above). Independently of this issue, the emission estimation will model the variation of emissions per sector of use according to different transitional periods.

Cost calculations

The cost calculations consider both costs and savings to industry. These comprise price differences between PFAS and fluorine-free foams, higher quantities of fluorine-free foams needed to achieve the same level of fire-protection, savings in clean-up and incineration costs.

The absence of clear information on some of the main input data affecting cost calculations, especially the amount of foam stocks in the EU and the cost of equipment cleaning (to achieve different concentration limits) and change in equipment to use alternatives, leads to large ranges of costs associated with the restriction options. However, we are currently trying to collect more specific information which would allow narrowing down these cost ranges.

The possibility to assess technical RMMs to contain releases for sectors where containment may be possible cannot be currently assessed from the cost perspective (due to lack of data), however, we are currently collecting information on that as well.

Commented [BV(7)]: I would indicate that RAC already agreed on this approach for PFHxA. This case should not be so different, as we are talking about a similar sub-group of PFAS.

Commented [SP8R7]: This is much larger sub-group with more diverse properties so I would not be 100% confident that we could rely in RAC.

Commented [D19]: The cost calculation should also include the societal and/or industry cost of low probability events with high impacts > major fire incidents. This is a critical element of the cost of moving to alternatives as it concerns safety of humans, animals and capital stock.

Commented [SP10R9]: Agree that society costs/benefits are important to at beyond just the industry actors. However, are we assuming though that alternatives would only be used if they would be as effective as PFAS foams. In which case this is not relevant. Only relevant if there is a loss in performance.

Commented [D111]: In cases where the same level of fire protection cannot be achieved, an estimation of those costs (e.g. lower fire protection) should also be carried out.

Commented [MD12R11]: The idea is to allow the use of PFAS foams until suitable alternative are available and implemented at the sites, this is why we would suggest different transitional periods. In this sense, there would be no loss of fire protection capacity due to the restriction.

Commented [SP13R11]: OK. Perhaps we just need to make clear(er) what our analytical / assessment starting point is. i.e. that no loss of performance is considered tolerable for a safety-critical use such as this and alternatives would not result in lower performance that would require an assessment of this type.

Commented [BV(14)]: Will you consider also the costs for society of drinking water or soil contamination?

Commented [MD15R14]: There are already some elements about this in the report but will try to gather more information and assess this issue in more details.

Commented [D116]: What is the reason for the lack of data? That there are limited places where RMMs are in place? Or lack of information submitted by those with RMMs in place.

Commented [MD17R16]: Lack of information from stakeholders in terms of possible improvements of RMMs and associated costs. The additional survey which just finished only lead to a few responses on this topic. We will build the assessment on the data we have collected and these assumptions can be further checked during the public consultation on the Annex XV report.

Summary of the restriction proposal

This Annex XV report describes a restriction proposal on the manufacture, use and placing on the market of PFAS in fire-fighting foams.

Per- and polyfluoroalkyl substances (PFAS) are a large family of thousands of synthetic chemicals that are widely used throughout society and found in the environment. They all contain carbon-fluorine bonds, which are one of the strongest chemical bonds in organic chemistry. This means that they resist degradation when used and also in the environment. Most PFAS are also easily transported in the environment covering long distances away from the source of their release.

All PFAS are highly persistent in the environment. In fact, they are known to persist in the environment longer than any other man-made substance. As a consequence of this persistence, as long as PFAS continue to be released to the environment, humans and other species will be exposed to ever greater concentrations of PFAS. Even if all releases of PFAS would cease tomorrow, they would continue to be present in the environment, and humans, for generations to come. Their release and mobility in water and air the environment causes contamination to groundwater and drinking water, which is difficult and costly to avoid. Certain PFAS are known to accumulate in the bodies of living things-organisms and cause toxic effects. Certain PFAS are toxic for reproduction and can harm the development of fetuses. Several PFAS have been demonstrated to cause cancer. Some PFAS are also suspected of interfering with the human endocrine (hormonal) system and testing in this area is ongoing. PFAS are released into the environment from direct and indirect sources, for example, from professional and industrial facilities using PFAS, during use of consumer products (e.g. cosmetics, ski waxes or clothing) and from food contact materials. Humans can be exposed to them every day at home, in their workplace and through the environment, for example, from the food they eat and drinking water⁷.

PFAS have been frequently observed to contaminate groundwater, surface water and soil. Cleaning up polluted sites is technically difficult and costly. If releases continue, they will continue to accumulate in the environment, drinking water and food.

Whilst some PFAS are subject to risk management (e.g. PFOS, PFOA) or will be subject to risk management in the future (e.g. C9-C14 PFCA, PFHxS, PFHxA), there is a lack of regulation for the PFAS as a whole, and of implementation or proven effectiveness of risk management measures to address the release of PFAS from the use of PFAS-based fire-fighting foams. Fluorinated fire-fighting foams are the cause of many cases of contamination in Europe, both of soil and drinking water (Wood, 2020). The most relevant technologies for the remediation of PFAS contamination from use of fire-fighting foams have also been identified (Wood, 2020). National regulation does not appear to be forthcoming and discrepancies across Member States could affect the functioning of the internal market. Since firefighting foams are being traded over the EU borders and that it is not meaningful or possible to restrict them nationally due to internal market considerations, it is therefore concluded that a restriction on the placing on the market and the use of PFAS-containing fire-fighting foams at EU-level appears to be an appropriate option.

Commented [MD18]: To be confirmed.

Commented [BV(19R18)]: I would support to cover also manufacture. Due to the long-range transport of PFAS, if we allow manufacture for export we will have exposure due to use outside the EU (in add t on to the emiss ons during manufacture and formulation).

Commented [LS(20R18)]: I have a lot of concerns to support it. 1) There is the need to produce FFFs for exempt ons mainly for defence sector, for naval ships and for the big tanks as well as for mobile FFFs extinguishers as a plan B for extinguishing big fires in refineries and or defence sectors where the sites are close to ammunitions. In addition, there is hardly any pract cal experience of acc dents using F3 foams in such cases. The MSs for defence can take exemptions and they need the European market. It is a safety issue and pol t cal sensitive for the COM. The market will be adjusted on its own.

Commented [MD21R18]: Thank you both. I realise that this element was not clearly described in this report. What was meant is the restriction of the manufacture for export only. Not exporting substances which are banned in the EU is a measure which is stated in the Chem cal Strategy.

The manufacture for placing on the market in the EU would still be allowed for the per od for wh ch the uses are allowed. This is to ensure supply of the foams as long as uses are allowed, w thout the need to rely on imports. So, in the restrict on entry the word "manufacture" should probably be replaced by "manufacture for export" or simply "export". The export could be banned soon after entry into force (for any type of use) or only from the end of the longest trans t onal per od for use in the EU (e.g. 10 years) in order not to penalise non-EU countries not having initiated the trans t on yet.

Commented [BV(22)]: I would add mobility in soil (wh ch is the cause of groundwater contaminat on).

Commented [MD23R22]: This wording comes from ECHA's website, I understand that the PFAS move in the soil via the water but I can check with [REDACTED] and [REDACTED]

Commented [SP24R22]: Just mobil ty in the environment would be OK

Commented [BV(25)]: I would add the immunotoxicity and effects on vaccinat on (wh ch was the endpoint used by EFSA in its recent opin on).

Commented [MD26R25]: This part of the assessment will normally come from the universal PFAS restriction but we will see if there is a need to completment their assessment.

⁷ Source. ECHA website: <https://echa.europa.eu/hot-topics/perfluoroalkyl-chemicals-pfas>

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The **substance identities** of the PFAS currently used in firefighting foams are largely unknown due to manufacturer secrecy, claiming though that they mostly belong to the C6 chain length category. However, shorter chain structures have also been found from other information sources. Consequently, a restriction covering all PFAS would allow addressing all chain lengths and avoid regrettable substitution by shorter chain PFAS.

In terms of **market**, in the EU around 30 000 tonnes of firefighting foams are manufactured per year by around 25 manufacturers, 67% of this tonnage being PFAS-based foams (20 000 t/year). It is estimated that 60-70 Mio. EUR of revenues are generated from the sales of firefighting foams, with 25 % resulting from exports to non- EEA countries. Precise data on imports is missing but are estimated to be in the same order of magnitude as for exports.

These foams are used for fires involving flammable liquids ("class B fires") by a variety of sectors (oil/ (petro)chemical, municipal fire brigades, marine, airport, defence, ready for use products). By far, the largest sector of use being the oil and (petro)chemical (59% of tonnage). PFAS foams are also used in certain 'ready for use' products (mainly portable fire extinguishers) but account for only 1% of the total use.

The main function of PFAS contained in fire-fighting foam is to act as a surfactant, that is to form a film over the surface of a burning liquid in order to prevent flammable gases from being released from it as well as reigniting. This is a particularly relevant feature that enables applications in industrial fires - for example tank fires, where large quantities of flammable liquid are stored. They are used for training purposes and in a variety of fire incidents, from small fires to large tank fires, and can be applied both with mobile and stationary equipment.

The investigations made for the preparation of this restriction proposal show that safer-less hazardous fluorine-free fire-fighting foams are generally available and technically feasible and have been successfully used in most of the sectors⁸ identified. However, additional testing of alternatives foams and application methods for specific uses (in particular large storage tanks of flammable liquids and installations with different types of flammable liquids) appears to be required to ensure that fire safety is not compromised.

In order to maximise effectiveness while minimising potential adverse socio-economic impacts of such a restriction, it appears appropriate to **propose specific transition periods by application and user sector**, because of their differences in terms of the likelihood of emissions and implications of switching to alternative foams. It is concluded that training and testing and use by municipal fire services should be the highest priority for a rapid transition to fluorine-free foams. Users have suggested a longer transition period of up to 10 years may be needed for specific applications (notably large atmospheric storage tank fires) where further testing is required to determine the technical feasibility of alternatives, and where potential fire-safety risks from using alternatives may be higher. The chemicals/petrochemicals sector is the largest user sector, so in order to ensure effectiveness of a restriction in reducing PFAS-emissions, it seems appropriate that any longer transition period should be limited to the most sensitive applications within this sector, which could be defined as the installations subject to the Seveso Directive on major accident hazards. For all

Commented [BV(27): This is a very good reason to ban also manufacture.

Commented [D128]: Data on imports will be needed in order to analyse the restriction on manufacturing if the EU will be fully dependent on imports. We will have a loss of revenue in the EU without a risk reduction, i.e. impact on the competitiveness and loss of critical supply. These elements should be reflected in the assessment.

Commented [MD29R28]: Unfortunately we didn't get much information on export and import values but we will search more again. As clarified above, the manufacture for the EU would still be allowed as long as the uses are allowed. Only after a certain period (e.g. the end of the longest transitional period for use in the EU) there would also be a ban on the export and we will calculate the corresponding loss of revenues.

Commented [BV(30): I would add that they are found also in portable fire extinguisher (indicating a much more widespread use).

Commented [MD31R30]: Indeed, I added it, noting though that this is a very minor use.

Commented [LS(32): Here we have oil, petrochemicals and chemicals. Do you consider it as one sector?

Commented [MD33R32]: Yes. This is the category used by Eurofeu.

Commented [LS(34): Less hazardous is better than safer. Concerning safety it is not proven

Commented [MD35R34]: OK, amended.

Commented [SP36R34]: Safety is implied by technically feasible, but no issue with the proposed revision.

Commented [MD37]: Possibly adding defence as well.

⁸ Oil/(petro)chemical industry, defence, marine, airports, municipal fire brigades, ready-to-use products

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other sectors, shorter transition periods are expected to be sufficient to ensure a transition to PFAS-free alternatives while having limited economic consequences.

Alternatives to PFAS foams have mostly been tested in small scale tests according to standards, with a limited number of flammable liquids. However, the results of recent tests show that fluorine-free foams behave differently to PFAS foams and show more variability of performance. This necessitates additional testing with other flammable liquids and fire scenarios such as large fires to ensure their effectiveness under the range of scenarios where they could be applied. Since large fire incidents are rare and large fire testing is costly, little experience has been gained until now on such challenging fire scenarios. For this reason, even though a fluorine-free foam may have passed tests according to recognised standards and already be in use in some installations, it is not currently possible to assume that it would perform equally well in all potential fire scenarios, such as in a large fire incident or involving specific flammable liquids.

An additional reason for the need for further testing is that it is not only the foam itself which is important to consider but the foam in combination with the application method (application system and application parameters) that are key in managing a fire adequately.

Consequently, determining whether a given fluorine-free foam is a suitable alternative to a PFAS containing foam in a specific real-life fire incident is not straightforward. This is the reason for proposing different transitional periods per sector or type of use, which would allow additional time for further testing and the adaptation of equipment and application methods.

Regarding the setting of an appropriate **concentration limit** for any remaining PFAS in foams and equipment that previously used PFAS-based fire-fighting foams, the costs of cleaning associated with the different concentration limits will be presented. Stakeholder input suggests that 0.1 mg/L (or 100 ppb) can be achieved with a relatively simple cleaning process (cost likely low but not quantified); such a limit would remove the vast majority of emissions. Lower thresholds are achievable with more complex and costly processes. For instance, achieving 1 ppb could cost around €12 300 per appliance according to one estimate, which could imply EU total costs in the order of €1 billion. However, setting a lower concentration threshold would lead to a relatively small additional reduction in PFAS emissions, compared to the overall reduction achieved by the restriction.

Finally, the restriction proposal suggests an obligation to apply **fire management plans and best practice risk management measures** during and after the use of PFAS-based firefighting foam. This covers among others foam purchase, containment, treatment, proper disposal of foams and fire water run-off, use of personal protective equipment. These measures could provide relatively effective reduction of PFAS emissions and exposure of workers and professionals at relatively low cost during the transition periods when PFAS-based foams continue to be used.

The inclusion of PFOA, its salts and PFOA related compounds in Annex I of the POPs Regulation, following the listing under the Stockholm Convention, will lead, in the next few years, to a partial substitution of fire-fighting foams containing these substances. However, available information suggests that other PFASs would still be available to be used in the foams.

Commented [D138]: However, they do happen and the cost of those if not handled correctly can be very high. Adequate fire fighting foams in those instances are important as one tool.

Commented [MD39R38]: Indeed. This is why appropriate transitional periods (including longer ones for the most sensitive sectors) are proposed, to allow that suitable alternatives foams are developed, tested and implemented, without compromising fire safety.

Commented [BV(40): Wouldn't this be true also for C6-based foams? This is the message I remember from the workshop for the study.

Commented [MD41R40]: There are now decades of experience with PFAS foams (first C8 and then C6), including on large accidents. C6 are a bit different from C8 but they overall perform in the same way (same chemistry). However, F-free foams are a totally different chemistry and behave differently on the fuels and also depending on the application methods. Industry trust C6 foams (even though there are different qualities as well) but F-free foams still need to prove their effectiveness on the most challenging fire scenarios.

Commented [LS(42): (ie. On naval ships or defense sector where ammunition is in close proximity)

Commented [MD43R42]: Indeed, this will be further elaborated based on the recent feedback from MoDs.

Commented [SP44R42]: Defence, including naval, can invoke derogation in any case

Commented [MD45R42]: Agree, even though they say they would like to have harmonised measures to facilitate interoperability and that the defence derogation is invoked in last resort and more difficult to obtain in some MS than others. This is why my suggestion would be to have them in (i.e. not derogated) but with a longer transitional period similar to the oil/petrochemical industry. If the latter achieve the transition in 10 years as they seem to think

Commented [MD46]: Under further review.

Commented [BV(47R46): Could we think about a limit of 100 ppb for a certain period, before moving to 1 ppb? Sooner or later the equipment will need to be

Commented [MD48R46]: We will try to characterise the costs related with different thresholds because it can

Commented [BV(49): Do you plan to provide specific technical requirements in the restriction text?

Commented [D150R49]: That would be helpful.

Commented [MD51R49]: I made a proposal in the restriction on entry but - especially for the RMMS - it would be very difficult to prescribe them in more

Commented [SP52R49]: This is more relevant to RMO5 where we would have to be specific. However, an absence of clear minimum standards for this option

Commented [BV(53): I'm not sure this sentence is correct. We know that PFOA was never intentionally used in AFFFs. It was present as an impurity in the

Commented [MD54R53]: This sentence refers to the non-C8 PFAS (i.e. there are foams using PFAS which are not C8, therefore need to address the issues pos

Commented [SP55R53]: Perhaps just need to add containing these substances 'as an impurity'

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Considering the concern raised by substituting firefighting foams containing PFOA with other fluorine-based ones, the increasing availability of fluorine-free alternatives and the conclusions of the ECHA and Commission's study (Wood, 2020), the present restriction proposal, if adopted, would lead to a reduction of PFAS released in the environment while maintaining the necessary fire protection among the sectors of use.

The below table summarises the main risk management options assessed, their emission reduction potential, cost and cost effectiveness.

Table 1: Summary of the risk management options assessed

RMO #	RMO description ⁹	Emission reduction profile and possible issues identified	Emission reduction (T/year)	Total cost (€/year)	Cost effectiveness (€/kg avoided releases)
1	Restriction on the placing on the market but use continued until expiry date of the stocks	Progressive reduction of emissions. Could lead to stock piling and issues with emergency stock re-fill.			
2	Restriction on the placing on the market and use	Faster reduction of emissions than RMO#1. Defined substitution deadlines leading to strong incentive for investments in substitution. However, no flexibility for sectors/sites for which alternatives would appear unsuitable at the end of the transitional period			
3	Restriction on the manufacture, placing on the market and use	Similar reduction of emissions and issues as RMO#2, exports are banned as well			
4	Restriction on the manufacture, placing on the market and use with derogation mechanism via a permit system to	Slower reduction of emissions than the other RMOs since the largest user sector would have the possibility			

⁹ All the risk management options include transitional periods adapted to the different sectors of use or type of use, supplemented with the requirement to implement risk management measures minimising the emissions of PFAS in the environment.

Commented [MD56]: See section 2.3 on RMO for further details on these RMOs (still under development).

Commented [MD57]: Figures to be completed later

Commented [BV58]: There is still some flexibility, as the transitional periods can be reviewed by COM, if justified.

Commented [MD59R58]: Thank you for clarifying this, I was unsure.

Commented [BV60]: The reduction of emissions should be higher. For substances with LRTP, also emissions outside the EU are relevant.

Commented [MD61R60]: Indeed, here emissions refer to the ones from the manufacture/use in the EU but I will modify, reflecting the emissions taking place outside the EU as well.

Commented [LS62]: No European market for the derogated uses especially for sectors like defence which can also use national derogations. Ministry of Defences?

Commented [MD63R62]: Manufacture for use in the EU allowed as long as the uses are allowed in the EU, so no supply issue for any sector of use. This will be clarified in the text.

Commented [BV64]: Would we really need a separate permit system? Isn't it specified in the environmental permit if a site is Seveso?

Commented [MD65R64]: Yes, this is the environmental permit issued by the local authorities which is suggested to include the description of the conditions of use of PFAS foams and a justification for continuing this use. The local authorities would judge based on these elements to allow the use or not and under which conditions.

Commented [SP66R64]: The appropriate legislative framework for this needs to be thought out. Could we check what a SEVESO permit looks like?

Commented [MD67R64]: This is not a Seveso permit (Seveso permits only address how a major incident is planned to be handled but do not address the pollution aspects of the use of the foam as far as I understand), it is proposed to include this in the environmental permit that companies have to obtain from local authorities for operating. This description and justification of use of PFAS foams would only be required for Seveso sites (and possibly defence) willing to use this temporary authorisation of use.

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	which only Seveso sites would be eligible	to request derogation for use. Even if risk management measures are implemented (containment and treatment), these are never 100% effective, especially in case of large fire incidents. Main advantage: allows taking into account site-specific constraints for implementing the substitution.			
5	Restriction for all uses unless adequate risk management measures are in place to minimise the emissions to the environment	RMO proposed based on the discussions on the PFHxA restriction. Main advantage: allows substitution if technically and economically feasible and continued use of PFAS foams where this is not feasible, to the condition that adequate containment and reduction of emissions is ensured. Incentive for industry to provide additional information on conditions of use. However, in practice, this is likely to be only applicable in certain sites being able to implement such strict RMMs. Even if risk management measures are implemented (containment and treatment), these are never 100% effective,			

Commented [D168]: Need to be assessed whether this is including all relevant sectors in need of very high performance FFF.

Commented [MD69R68]: The oil, petrochemical and chemical sectors are, according to our findings, the only industrial sectors needing these high performance foams and they are covered by Seveso (unless it is a small firm with low risk but then they don't need such foam).
Based on additional information received last week from the defence sector it seems that this sector would probably also need such possibility for longer use or derogation. Defence could be added in this permit system mechanism.

Commented [SP70R68]: Defense can derogate themselves if they did not achieve the permit, so perhaps this will not be very useful

Commented [MD71R68]: Cfr. my previous comment on derogation.

Commented [LS(72): Maybe also defence sectors (army, navy, airforce?) with specific constraints and RMMs? Did you base this proposal on Eurofeu proposal but did you take on board also the comments from the MoDs?

Commented [MD73R72]: Yes. We received recently further information from the Defence sector which seem to indicate that longer time would be needed, so under this RMO4 Defence could be added in the permit system. However, as mentioned in my comment above, it seems impossible to require additional RMMs to the defence sector (just confirmed by Eurofeu, no possibility to have bunding or appropriate collection of firewaters in case of an incident on a training battlefield).

Commented [SP74R72]:

Commented [BV(75): Would you specify the RMMs in the restriction? This would lead to the need to amend it every time there is a technological development. If we do not specify them, we risk to have a lack of uniformity in the implementation of the restriction.

Commented [D176R75]: In my view we would need some sort of specification, BAT to date to have an understanding of the RMMs in question.

Commented [MD77R75]: Cfr. my comment above, if clear RMMs are needed for enforcement purposes we will most probably need to limit them to Seveso sites where such enhanced RMMs are possible to list. For the other sectors, it would then just be (not enforceable) recommendations based on sector's best practices.

Commented [SP78R75]: We would have to for RMO5, but not being able to could be one of the reasons not to progress. See my comments above.

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		especially in case of large fire incidents.			
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Specific transition periods are proposed per type of foam use and the sensitivity analysis depicts the emission reductions and costs associated with other transition periods.

The Dossier Submitter's proposed risk management option is **option 3** and is specified in detail in the below paragraph "Proposed restriction".

Additional regulatory management options have also been considered but not assessed in detail for the reasons described below:

- Restriction of use in training, testing, municipal brigades and portable extinguishers only, other uses allowed until suitable alternatives are found + mandatory collection and treatment of concentrates and fire waters with techniques maximising mineralisation + reporting to ECHA and periodic review of the restriction for update of derogations

Issues: marine and offshore uses where collection and destruction is not possible, administrative burden for ECHA, much weaker incentive for substitution leading to continued emissions in the environment during an unknown but probably long period

- Restriction of use in training, testing, municipal brigades and portable extinguishers only + mandatory collection and treatment of concentrates and fire waters with techniques maximising **mineralisation** + inclusion of all PFAS in REACH Annex XIV leading to AfAs for remaining uses

Issues: marine and offshore uses where collection and destruction is not possible; unlikely to have all PFAS included in the Candidate List and Authorisation List, AfA would encompass all types of PFAS uses, not only firefighting foams and AfA process unlikely to be able to judge on the need for PFAS foam with regard to fire safety such as major accidents dealt by the Seveso Directive requirements

- A tax per ton of PFAS placed on the market

Issues: if set high enough, the tax would encourage substitution for uses where feasible alternatives are available. However, levying this tax would require unanimity in the EU to be implemented. A relatively high tax would be needed to have an effect on the use of PFAS-based firefighting foams since the PFAS concentration in these foams is low (typically around 3%) and that fire-safety considerations are likely to have more weight than foam price considerations in the users' decisions to transition to fluorine-free alternatives. It would not be possible to establish the risk reduction capacity in terms of release reduction upfront when deciding on the level of tax. Furthermore, substantial effort would have to be taken to develop such taxing scheme. Because of these challenges and limitations, tax scheme is not considered appropriate risk management measure for the use of PFAS-based firefighting foams.

- Gradual limitation of the average concentration of PFAS used in the manufacture of firefighting foams placed on the market

Issues: in a given firefighting foam product it is highly unlikely that the concentration of PFAS could be reduced below its current levels while ensuring maintaining its functionality. Therefore, a reduction of the PFAS concentration should be looked as an average concentration over all firefighting foams (PFAS and fluorine-free) placed on the market. In other words, this RMO would be a gradual (i.e. over time) reduction of

Commented [MD79]: Still to be confirmed, based on the additional data which we expect to receive from stakeholders.

Commented [LS(80R79): You should consider option 2. European market will be dead for the derogations for defence, if MSs decide to opt out, especially for army, airforce and navy. I have also added some other additional exemptions to the RMOs (eg.4)?

Commented [MD81R79]: Cfr above, manufacture for EU uses still allowed as long as all uses are allowed. If, like for the oil/petrochemical sector, a transitional period of 10 years is granted to the Defence (based on the information freshly received) they will have all switched to F-free foams by then. Note that the US defence is also banning PFAS, expect for the navy but I'm confident that within 10 years' time the navy will also be able to switch to F-free. If the oil/petrochemical sector can do it, I see no reason why the defence couldn't do also. The issue for defence is the containment of releases during the transitional period. Probably nothing we can do about it.

Commented [LS(82): You have to define the term here

Commented [MD83R82]: Yes, see my comment on this in the following page.

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the tonnages of PFAS foams to be allowed to be placed on the market. In practice, this would mean that the available PFAS foams would progressively be used by the sectors needing them the most, the other users switching to fluorine-free alternatives. However, it would be difficult for authorities to determine which amounts of PFAS firefighting foams should be allowed to be placed on the market without compromising fire-safety. Furthermore, substantial effort would have to be taken to develop such a regulatory scheme. Because of these challenges and limitations, this is not considered appropriate risk management measure for the use of PFAS-based firefighting foams.

Proposed restriction

Brief title: Restriction on the manufacture, placing on the market and use of PFAS in firefighting foams

Column 1	Column 2
Per- and polyfluoroalkyl substances (PFAS) CAS No. various EC No. various Defined as any substance having at least two perfluorinated carbons with the formula $C_nF_{(2n+1)}$ with ($n \geq 2$) directly attached to any chemical group, as one of the structural elements.	<i>Exemptions for PFASs restricted under REACH or the POPs regulation:</i> This regulation does not apply to PFASs as defined in column 1 that are covered by REACH Annex XVII entries and the POPs regulation Annex I which apply to: - PFHxA, its salts and related substances (REACH) - C9-C14 PFCAs, their salts and related substances (REACH) - (3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl)silanetriol and any of its mono-, di- or tri-O-(alkyl) derivatives (REACH?) - PFOS and its derivatives (POPs) - PFOA, its salts and related compounds (POPs) - Other? 1. Shall not be placed on the market as substances on their own, as a constituent in other substances or in mixtures for use in firefighting foam concentrates after the transitional periods for the types and sectors of use specified in paragraphs 3 and 4 unless the concentration of total PFAS is less than 10mg/l¹⁰. 2. Shall not be manufactured six months after entry into force for export as substances on their own, as a constituent in other substances or in mixtures for use

¹⁰ Or 10 000 ppb, or 0.001%

Commented [MD84]: To be aligned with the universal PFAS restriction on wording.

Commented [LS(85R84)]: I am not so sure that it has to be aligned with the universal PFAS restriction. This formula comes from the specific literature review on FFFs (specific to this application). The broader scope may not be needed for this application.

Commented [SP86R84]: It needs to be to prevent regrettable substitution

Commented [MD87]: Comment from [REDACTED] in the draft annex XV report, brought back here:

I am not quite sure if you need to use the broad definition which covers also polymers. This proposed definition is based on the AFFs-related substances identified being used. You have to explain what is the added value of using the broad definition instead of this analysis in the study as the more general the chemical formula is the more difficult the enforcement becomes.

This is the reason why a broad definition is not necessary. In addition, enforcement is even more difficult with chemical formulas that are general

Commented [MD88R87]: We intend to use the SID developed by the universal PFAS restriction two reasons:

1. We don't know exactly what are the PFAS SID currently used in firefighting foams (manufacturer's secrecy), so we do not know exactly what to restrict (even though industry claim they are all C6-based).
2. To avoid regrettable substitution on to PFAS not yet used in firefighting foams. This is in line with the grouping approach adopted by ECHA for RMOs.

The enforcement authorities will anyway have to come up with agreed testing methods for the upcoming broad SID PFAS restrictions. Several methods exist (TOP assay, total fluorine, etc.). It is essentially a question of deciding which method is the one of reference.

Commented [MD89]: To be aligned with the universal PFAS restriction on wording.

Commented [LS(90R89)]: The exemptions should be written in column 1. Column 2 has got the conditions not the exemptions of the general formula

Commented [MD91R89]: OK.

Commented [MD92]: This paragraph could actually be removed if one is covering the export and the other one the use, then there is no need to refer to placing on the market since after the end of the longest transitional period both the exports and EU use would cease, so no reason to manufacture anymore.

Commented [MD93]: Or from the end of the longest transitional period for use in the EU (e.g. 10 years) in order not to penalise non-EU countries not having initiated the transition yet.

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Column 1	Column 2
	in firefighting foam concentrates unless the concentration of total PFAS is less than 10mg/L 3. Shall not be used in firefighting foam concentrates with concentrations above the ones mentioned in paragraph 1 for training and testing purposes (except testing during the development phase of new PFAS foams and testing of the firefighting systems for their function), irrespective of the sector of use: 18 months after entry into force; 4. Without prejudice of paragraph 3 on training and testing, shall not be used for other types of uses in firefighting foam concentrates with concentrations above the ones mentioned in paragraph 1 with the following transitional periods per sector or type of use: a. Establishments covered by the Seveso Directive (tier 1 and tier 2) and defence: 10 years after entry into force b. Marine applications: 3 years after entry into force c. Municipal fire services, ready-to-use applications (e.g. portable fire extinguishers): 18 months after entry into force d. All other uses not covered by paragraphs (a), (c) and (d): 5 years after entry into force 5. Six months after entry into force, industrial and professional users of firefighting foam concentrates containing PFAS above the threshold indicated in paragraph 1 shall: a. only use these foams for fires involving flammable liquids (class B fires); b. establish a fire management plan for every site and type of foam use which would include a description of the procedure and reasons for the procurement of the specific fire-fighting foam concentrates, their storage, use, containment and treatment and the efforts made to search for PFAS-free alternatives. The fire management

Commented [D194]: Does this mean that you only ban manufacturing for export but not for EU uses? In fact, if there are long transitional periods for some uses you need to reflect how those users will be supplied. However, what comes to mind is how you will ensure enforcement? Usually customs check incoming goods rather than exported goods.

Commented [MD95R94]: Yes, banning exports only but allowing manufacture for use in the EU until these are allowed. Probably no need to specify that the manufacture is only allowed for the allowed uses since if the use is forbidden there is no reason to manufacture for this use. So, the restrict on could be on export and use only. Regarding enforcement of exports I don't know but I guess that inspectors can come at manufacturing sites can check the paperwork and see who are the clients.

Commented [MD96]: Need to determine which testing types to ban:

Definitions of "testing" by Eurofeu (comment 2983 in PFHxA restriction, page 12)

- Testing of foam agents during their development phase,
- testing of foam agents by users to evaluate products and/or their suitability on specific combustibles;

Commented [BV(97): Do we want to allow development of new PFAS foams? With the longest transitional period of 10 years, is this really needed? Would industry invest in new foams?

Commented [MD98R97]: I hope they will indeed rather invest in developing F-free foams than in new PFAS foams but in case they wish to develop new formulations with less problematic PFAS during the transitional phase probably this possibility should be

Commented [SP99R97]: SR&D is in any case outside of restriction so they could develop in any case.

Commented [MD100]: As indicated below I suggest to add defence here (instead of being included in "all other uses"), based on latest information received from MoDs.

Commented [MD101]: Includes e.g.: Civil aviation, aerospace, defence, offshore oil, gas and chemical manufacturing or processing facilities (unless covered by paragraph a.), sectors with minor uses: hospitals, power plants, glass manufacturers, waste treatment

Commented [LS(102R101): You should specify all other uses

Naval ships where are in all other uses? In defence

Commented [MD103R101]: It will not be possible to define with an exhaustive list all the other sectors, for sure we will miss some minor ones that we don't know. The main ones we know and we can list examples but not as an exhaustive and exclusive list.

Commented [LS(104): Including ready to use applications eg. portable fire extinguishers ?

Commented [MD105R104]: Whether they are stored in portable fire extinguishers or in something else the PFAS foams should be restricted to class B fires. PFAS foams are only needed for flammable liquid fires and the remaining portable fire extinguishers using PFAS

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Column 1	Column 2
	plan shall: (i) aim at reducing the use of PFAS foams to the minimum necessary while transitioning to PFAS-free foams, (ii) be reviewed annually and kept available for enforcement authorities; c. ensure the minimisation of emissions of PFAS in the environment and direct and indirect exposure to humans from all activities related to firefighting such as but not limited to: the use of foam concentrates, water-added foams, fire waters, mixtures used to clean the equipment containing PFAS firefighting foams, by applying sector best practices. The measures shall ensure: (i) an adequate protection of workers using PFAS firefighting foams (ii) the maximisation of the collection of the waste (iii) that the waste disposal uses methods shall be treated with techniques (maximising the mineralisation of the PFAS substances) to the extent feasible. For each event of foam use or leakage handling, proof of appropriate management and disposal of the foam concentrates, water-added foams and fire water should be documented and kept available for enforcement authorities. 6. From six month after entry into force onwards, firefighting foam concentrates containing PFAS above the indicated threshold which are held in stock and need to be disposed of shall be treated with techniques (maximising the mineralisation of the PFAS substances). Proof of appropriate disposal should be documented and kept available for enforcement authorities.

Commented [LS(106): Can you use the simpler term should be treated with BAT/BEP to maximize to the extent possible PFAS destruction ? Otherwise you have to explain the terminology of mineralisation of PFAS in footnote and literature reference for the term

Commented [MD107R106]: Indeed, this term of BAT/BEP could be used instead if refers to best practices from industry but not if it refers to EU-level approved BATs because they do not exist for the disposal of firewaters as far as I know. The other possibility is to explicitly recommend incineration in hazardous waste incinerators or in cement kilns (the two best techniques identified so far), however, there is very little data on what are the emissions resulting from these processes. These techniques are described in the report and seem to be the best ones but we cannot affirm that they are without problems either due to lack of data. Also, new techniques might emerge in the future, so the restriction on entry should be amended. Any views on this?

Commented [BV(108): Need for a grammar check.

Commented [MD109R108]: Indeed, some words were leftover from a previous wording.

Commented [MD110]: I suggest this wording instead of "minimisation of the emissions to PFAS in the environment" because incineration at $t^{\circ} < 1100^{\circ}\text{C}$ can lead to the emission of fluorinated gases with powerful greenhouse effect. To see if the PFAS substance ID scope covers these substances or not. If yes, then the standard wording of minimisation can be used instead.

Commented [BV(111R110): Would it be possible to give more indication of the type of installations that could fulfil this requirement? Or better explain what is meant by "mineralisation"? This wording is a bit cryptic.

Commented [MD112R110]: See also my comment above on the description of the technique. What is meant here by maximising the mineralisation is maximising the transformation of PFAS in CO_2 , H_2O and inorganic fluorine (and other inorganic substances if other atoms than C, H, O and F are present in the PFAS). This could be the definition added to the entry.

Commented [MD113]: Cfr. comment above.

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Question to the Commission:

Are the proposed RMOs which will be assessed in more details clear and appropriate?

[I think that the list of RMOs is appropriate. The comments I have added could be useful for the detailed assessment.](#)