

General/overall comments

Willson Consulting is a specialist organisation focussed on ensuring the effectiveness of firefighting foam choices, minimising their environmental impacts to ensure life safety is not compromised. It has a broad range of clients both nationally and internationally and is widely recognised as a technical specialist in this area. It welcomes the opportunity to make this submission. All these comments relate to firefighting foam usage only.

This open and transparent process is welcomed, with a well-structured and informative document of which there are a few important points still to be made.

The workshops conducted in every State/Territory capital were also widely appreciated. This enabled clarification of the volumes and costs used as being for neat PFOS in kg, whereas most foam users relate to firefighting foams in litres of foam where the fluorine (PFOS) content is typically only around 1-5%, so this was an important distinction.

Willson Consulting endorses Option 4 of the RIS 'Ratify and phase out all non-essential uses'. Although foam users have largely moved away from continuing to buy PFOS based foams since they ceased production in most countries by 2002, although it is reported Australia continued production until late 2003. It is important however to implement legislation to prevent the use of old stockpiles which would add to the legacy contamination, already being experienced in specific high usage areas like Defence sites and airports training facilities around Australia. It also enables us to catch up with the 175 nations already ratified the Stockholm Convention's addition of PFOS as a Persistent Organic Pollutant (POP) in 2009 and set an example to those few countries remaining including Malaysia, India, Italy, Israel and USA. Interesting that the last 4 at least were significant users of 3M PFOS agents, like Australia, Germany, Norway and Belgium!

An extensive reference list to support the comments being made, is attached with this cover sheet as a separate word document. The formatting made it awkward and difficult to attach within this cover sheet, so apologies for the extra document.

Specific comments – please insert your specific comments below, listed against the part of the Consultation Regulation Impact Statement to which they apply

RIS reference:	Comments
2.5.3.2 <i>Firefighting – Use p41</i>	<p>Whilst you have a good list of typical Key Major Hazard Facilities (MHFs) and I understand you are using the word "including", so it is not intended to be exhaustive, I would still urge you to consider the addition of "offshore platforms and oil rigs; plus helidecks/heliports" as further important examples, as these are substantially different from onshore oil installations and airports which most consider as relating only to fixed wing aircraft. Helidecks are often situated at elevated levels on buildings, typically hospitals, corporate HQs, TV Broadcasting Service Providers and oil platforms, for example.</p> <p>I fully understand that all main airports across Australia are currently using F3 agents, which are widely demonstrated to be inferior by many to fluorinated foams and short-chain C6 agents. A position I and many airports around the world, plus extensive testing does not support.</p>

These concerns were also demonstrated in a Caltex Banksmeadow incident in 2013 on an unignited gasoline spill. F3 agent was preferentially applied to the spill but lasted only 15-20 minutes between top ups determined by lower explosive limit (LEL) detectors. Deemed insufficient to be effective and reliable the foam was changed to a FluoroProtein agent which achieved 4.5 times longer protection lasting 90 minutes between top ups while still retaining adequate vapour control, assessed by the same LEL detectors.

F3 was unexpectedly replaced for a showcase ICAO Level B (International Civil Aviation Organisation) fire test demonstration (Willson2016-Can F3 agents take the fires security heat?) in Singapore (2016), by a C6 AFFF agent. "Too many environmental factors were not under our control to do F3" said the foam manufacturer conducting the demo... but such factors usually happen in emergency fire incidents! A demonstration can be cancelled, real emergencies cannot!

Apparently F3 twice failed to extinguish this same fire the day before under very similar 32°C temperatures, and reportedly even caught the fuel separator alight indicating little fire control. Many delegates had not appreciated that these tests are normally conducted under 15-20°C conditions to enable comparison between test results, but there should have been an adequate safety margin to allow for such differences. The C6 agent provided fast and effective fire control and extinguishment without any edge flickers, despite the humid 32°C conditions on the day.

A recent real airliner engine fire occurred on landing at Changi airport in Singapore a few weeks before this demonstration. The fire was accessed and extinguished in 2.5 minutes by fire crews using AFFF and Film Forming Fluoroprotein foam. All passengers were rescued safely, without injury and the plane returned to service after maintenance.

A few weeks later (Aug. 2016) a Boeing 777 crash-landed during an attempted "go-around" at Dubai airport in 48°C heat with wind shear conditions. All 300 passengers and crew safely disembarked the plane despite a fuel fire developing. Foam was applied to suppress the fire.

Only after evacuation a brave firefighter tragically lost his life in a fuel tank explosion after 9 minutes. Extensive foam application to the fuselage continued, **but full control of the fire was not achieved until approximately 16 hours after the impact. The plane was destroyed.**

The final investigation has not been concluded, so the cause of this firefighting failure and whether the foam type in use or the very high ambient temperatures were contributory factors is not yet known, but remains a possibility. There are strong suggestions that a F3 agent was used in this incident. This was the first total loss aircraft Emirates has ever experienced.

In 2013 ICAO relaxed its fire test requirements by extending the required fire extinction time from 60 seconds to 120 seconds, allowing edge flickers

providing they did not extend beyond 25% of the tray circumference for the second minute. The fuel specification was also changed from Jet A1 with a specific flashpoint of 38°C, to a broader category of Kerosene (which includes Jet A1) but has a much broader flashpoint range of 37-65°C, so less volatile variants could now be used to enable foams to pass this test. Surprising when Aviation Rescue and Firefighting is possibly the most time critical fire application there is. Seconds can define life or death, when fire strikes.

I have drawn this detail to your attention because this series of events raises some very important questions... Are the current ICAO test requirements relevant to all locations, all year round – when much of Australia experiences >32°C for much of the year? Is a foam's potential vulnerability to volatile fuels still being adequately taken into account?

Are we perhaps eroding our margins of safety beyond what is responsible when many F3 (and perhaps lower quality AFFFs) effectively have little or no fuel shedding capabilities when flames are still present or nearby? Does the current ICAO fire test provide adequate safety margin to protect passengers at all airports around Australia, all year round? An informed answer says perhaps NO, but we have not yet had a major incident to test that. Is it a “ticking time-bomb” waiting to go off?!

Swedish Research Institute conducted some UL (Underwriters laboratories) fire tests in 2016 (Ottesen & Jonsson, 2017) with UL inspectors present to ensure all the testing was done correctly. Fluorine Free Foams (F3) and C6 AFFF agents were being tested under the same climatic conditions across the same days. Good quality foam with a median expansion ratio of around 7-7.5:1 was no problem as both foams passed the test, although the F3 agent required a 50% higher application rate with 25% more time to achieve extinguishment, as it had no film forming capabilities.

When the foam expansion was reduced to 4.4:1 to match different pieces of standard equipment aiming to be approved, the F3 agent not only took 56% longer to extinguish than it did at 7.5:1, the foam quality was too poor to protect the foam blanket against re-ignition, failing the burnback test, so it FAILED the same fire test. The lower expansion ratio produced lower quality foam, unable to prevent sustained ignition to below the 25% allowed burning area during 5 minutes of this demanding test. The C6 foam on the other hand, easily passed the test at a lower 3.6:1 expansion, only 20% slower than its earlier test at 6.9:1, still at the significantly lower application rate, but 35% faster than the F3 agent and with only 10% of the tray area ignited after 5 minutes, resisting re-ignition very well.

Different foam equipment produces different foam expansions, typically anywhere between 3:1 and 10:1 for low expansion foam devices most commonly used by brigades and industrial firefighters around the world. A device's expansion ratio can change with various factors including specific agent, water pressure and ambient temperature.

Interestingly the amount of foam used to extinguish these tests was dramatically different. The F3 foam required a substantial 24.7litres to extinguish at 7.5:1, and a much larger 38.8 litres to extinguish at 4.4:1, while

failing to keep the fire under control for 5 minutes. The C6 foam used just 13.4 litres and 17 litres respectively, around half the F3 foam used, but achieving faster control, extinction, and effectively preventing re-ignition for much longer than the burnback test required. Consider scaling this up to a real large fire scenario, ...substantially less C6 foam would have been needed, less smoke, noxious breakdown products and less run-off emitted, less risk of escalation and re-ignition reducing the extent of the incident, with less risk of overflowing containment areas, less runoff to collect, treat and dispose of; with less risk of it escaping into the environment with less adverse environmental impacts.

Should some unavoidably escape, substantially less volume of a much less toxic, non-bioaccumulative chemical, with much less associated contaminated run-off, would be entering the environment, which is likely to help minimise the adverse impacts of the incident, than had an F3 agent been used instead. A case study (Willson 2017 – AFFF Hangar Spill: Better outcomes, minimal Env. impacts) of the Brisbane Airport AFFF spill confirms no significant adverse impacts to human health, wildlife, water quality, seafood, soils or sediments occurred from that incident.

Its still not ideal, ...but when disaster strikes its usually best to deal with it quickly, effectively and reliably using least agent and creating less potentially noxious firewater run-off. This should provide our best chance of minimising life safety exposures, community disruption and environmental harm, particularly in Major Hazard incidents involving volatile fuels.

Is there an increased incident escalation risk when high performance C6 agents are not being used? Hence my eagerness to see C6 agents allowed equally for future firefighting uses alongside F3 agents to ensure lives are being adequately protected. It gives foam users choice to meet their duty of care, allows a detailed risk assessment to be satisfied with the most appropriate agent to adequately address the specific hazard(s), so their adverse impacts can be minimised to society and the environment.

2016 Research in Spain (Castro, 2016) showed major differences between C6 and F3 agents on the same fire when 3 different application rates were used 1.25L/min/m², 2.5L/min/m² and 3.75L/min/m².

At the median 2.5L/min/m² test application rate, average fire control times for F3 were 60% slower on gasoline than C6 AFFF, but 3 of the 5 Fluorine free products tested failed to extinguish the gasoline fire, and one struggled. On Jet A1 we saw control times were 50% slower than C6 AFFF, but all 5 of the F3 foams tested again failed to extinguish these fires.

At half this application rate of 1.25L/min/m² the F3s were 100% slower on Gasoline and 100% slower on Jet A1 than the C6 AFFFs, ...pretty significant when seconds count to save a life.

Even at the highest application rate of 3.75L/min/m², F3 was still 50% slower to control Heptane fires, 25% slower on gasoline and 10% slower on Jet A1. BUT significantly ALL the F3 foams FAILED to extinguish the Jet A1 fuel at any application rate. No F3 extinguished gasoline at the lower rate, but some also failed to extinguish gasoline at the highest rate. Is this acceptable when C6 AFFF extinguished all fuels at all application rates?

	<p>F3s only reliably extinguished Heptane fires at all application rates. How strange? ... when Heptane is the most commonly used fire test fuel, yet Gasoline and Kerosene (of which Jet A1 is a specific type), are far more widely found fuels in use and storage at industrial sites around the world, than Heptane!</p> <p>Are we at risk of “breeding foams” simply to pass fire tests and gain approvals? ...rather than providing a robust and reliable capability on a wide-range of fuels and fire scenarios to protect our communities against fire disasters in the real world?</p> <p>I hope you can begin to understand these concerns, when some agents appear to be targeted at passing small scale tests, rather than perhaps aiming to provide effective, reliable and robust fire protection across a wide range of more difficult and challenging conditions usually faced in real fire incidents.</p> <p>Besides, what is the justification for a complete PFAS ban, other than convenience?... particularly when PFHxA is neither B nor T; is not shown to be carcinogenic, mutagenic, genotoxic or a reproductive toxicant.</p> <p>There is a presumption in some quarters that PFHxA is mobile in the environment but this is neither proven nor proven to be harmful even if it were mobile. Just being a persistent fluorochemical with claimed “uncertainties around its toxicological profile” does not mean it justifies a ban, particularly when there is clear scientific research refuting any toxicity status. Some are claiming it may build up in plant tissue, but there is no evidence to suggest this is harmful, nor how it may relate to TDIs.</p> <p>Dismissing C6 agents on the incorrect assumption that there are equivalent F3 alternatives is misleading, wrong and potentially dangerous, as F3s are not “drop-in” replacement for C8 or C6 agents. The evidence contained within this submission and its reference list confirms this.</p> <p>Suggestions that PFHxA is “very difficult” to remove from water is also strongly contested as incorrect, since there are several acceptable and practical methods existing that can remove PFHxA and short-chain fluorochemicals from soils and water, whether surface, ground or firewater runoff. These include proven Ion Exchange resins, reverse osmosis, modified clay adsorption, sonochemical destruction, heated persulfate oxidation and nano-filtration as well as cement kiln and plasma arc incineration.</p>
<p>2.5.3.3 <i>Firefighting – Alternatives</i> p42</p>	<p>Encouraging transition to fluorine free foam wherever possible, does not seem to recognise the critical importance of fuel shedding ability of foams in large volatile fuel incidents (eg. Gasoline). I would urge you to consider the addition of short-chain C6 alternatives in this section, as they are vitally important tools for Major Hazard Facilities to minimise incident escalation, avoid overflow of bunded areas, minimise complex and costly re-engineering of existing systems and retain the ability to meet their duty of care to act quickly, effectively and reliably to control and extinguish any incident to protect life safety on site and beyond.</p>

Equivalent fluorotelomer based alternative foams competed with PFOS based products for many years before this cessation of PFOS foam production, so there have been equivalent products that many foam users transitioned to as their PFOS based foam stocks were used up or needed replacement, so there is no issue with a complete ban on PFOS firefighting foams in Australia.

Some of these longer chain replacement agents may degrade to PFOA (but only 3M branded products derived from the electrochemical fluorination process can break down to PFOS and PFHxS). As you are aware PFOA along with PFHxS are currently under review for POP listing because of their Persistent, Bioaccumulative and Toxic (PBT) status and long range transport potential.

Under the US EPA PFOA stewardship program since 2006 there has been a voluntary transition away from all long-chain $\geq C8$ fluorinated chemicals by that industry and removing PFOA related chemicals from firefighting foams to more environmentally benign (P not B not T) short-chain $\leq C6$ foam agents, most of which are able to provide equivalent fire performance to previous PFOS and PFOA related agents, without using increased quantities of foam agent for a given size volatile fuel hazard. These high purity $\leq C6$ agents have been widely available since late 2015 globally, but particularly since late 2016 in Australia.

Some foam users have selected Fluorine Free Foam (F3) alternatives, although increasing research and testing has shown these do not seem to offer equivalent fire performance on volatile flammable fuels like gasoline and Jet A1 where forceful application is inevitable, but fuel shedding additives are NOT included to resist mixing with the fuel.

Unpredictable and sudden flashbacks and re-ignition can occur with F3 as a result, along with unexpected incident escalation and increased life safety risks to casualties, emergency responders and other site workers.

Increasing research has also shown that typically 2-3 times more F3 agent is required to be applied for a given sized volatile fuel fire, which is usually significantly slower to control and extinguish these fires. This can result in significantly increased volumes of F3 and water resources being required which increases the firewater runoff and potentially escaping flammable liquids, potentially exposing other areas to danger and may prematurely overflow containment areas, which can also provide significantly reduced life safety protection for casualties, firefighters, and other emergency responders, while also potentially causing increased damage and community disruption, as a result of such incidents.

Accordingly, F3 agents are suggested as potentially suitable for smaller fires where high application rates are more easily achieved eg. by routine Fire and Emergency Services response to small routine incidents; firefighter training where easily accessible emergency shut-off facilities are provided for instructors/supervisors to protect life safety; and as a possible surrogate for some foam system testing (although viscosity considerations may make this ineffective). F3 is not widely considered by most foam users as acceptable for Major Hazard Facilities where large volumes of volatile fuels are stored or used in industrial processes.

	<p>A reference list to support these, and other comments, is attached at the end of this cover sheet.</p>
<p>2.5.3.4 firefighting – waste disposal p43</p>	<p>As mentioned above, increasing amounts of research is showing that typically 2-3 times more F3 agent is required to be applied for a given sized volatile fuel fire, which is usually significantly slower and less reliable in controlling and sometimes extinguishing these fires. This can result in significantly increased volumes of F3 and water resources being required which increases the firewater runoff and potentially escaping flammable liquids. This potentially exposes other areas to danger and may prematurely overflow containment areas. Similarly it can also provide significantly reduced life safety protection for casualties, firefighters, and other emergency responders, while also potentially causing increased damage and community disruption, as a result of such major volatile fuel incidents.</p> <p>Smaller incidents could also soon become major ones where F3 agents are inappropriately chosen for significant storage of volatile flammable fuels like gasoline.</p> <p>Your suggestion that <i>"This shift in waste management requirements creates a strong incentive for businesses to review their need to use PFOS, and fluorinated foams more broadly."</i> suggests that C6 fluorinated foams and their importance for MHFs is not being adequately recognized?</p> <p>By placing <i>"The onus is on fire fighting foam users to select products that meet their business needs while satisfying regulatory requirements for waste disposal."</i> You are potentially placing MHFs in an impossible position if C6 is included in a PFAS ban. Will the Government be liable for preventing the best agent being used, if it all goes badly wrong and people lose their lives because an inferior F3 agent had to be used to meet environmental regulatory requirements?!</p> <p>Are we in danger of placing environmental protection ahead of life safety, at a time when the 95% of other PFAS uses (including PFOA and Teflon) are disposed of via landfill and Waste Water Treatment Plants (WWTPs) where the PFAS laden effluent is entering our environment, mostly unchecked, every day of every week of every year of every decade. How can that be acceptable?</p> <p>Yet later in this section it clearly states <i>"Despite the recent increase in regulation of PFOS [and presumably implicit is other PFAS] emissions from firefighting, the priority in an emergency is always the protection of life and safety. For fire and emergency services, this takes precedence over avoiding PFOS waste generation and emissions"</i></p> <p>There seems to be a disconnect here that requires fixing as far as other alternative C6 PFAS are concerned.</p> <p>Why is there no "exoneration clause" for choosing to protect life safety over risk of environmental escape in major incidents, to avoid the inherently implicit penalisation from <i>"waste disposal and remediation liabilities"</i> irrespective of the reason?</p>

	<p>By suggesting firefighting foam users should preferentially use F3s to adhere to regulatory requirements and avoid “a high risk of significant waste disposal and remediation liabilities in the event of an emergency”, irrespective of how deleterious that may be to their duty of care to protect their workforce, site contractors, emergency responders, the local community as best they can, and the local environment from potential unpredictable flare-ups, incident escalation, increased damage, increased firewater runoff - which could contain fluorochemicals from inside buildings, valve seals, flanges and other process equipment, even when F3 foam is used.</p> <p>Such F3 usage is also more likely to overflow containment areas and cause environmental pollution from increased use of a 10-25 times more aquatically toxic F3 agent, causing increased death to fish and shellfish with associated disruption to local fisheries in the surrounding area for some considerable time. Does that represent an improvement to environmental impacts?</p> <p>More effective environmentally acceptable short-chain C6 foam agent’s usage would provide quicker more effective, more efficient, more reliable fire control and extinguishment in these situations, reducing life safety hazards, reducing the risk of escalation and danger to surrounding communities, and reducing the risk of firewater escaping into and polluting the surrounding environment. It also reduces the total volume of contaminating material that has to be dealt with!</p> <p>These serious potential outcomes and anomalies should be adequately addressed in the final legislation, before it is released.</p>
<p><i>Section 3.2 Problems with existing arrangements Table 5, p48</i></p>	<p>PFOS consumption in firefighting by industry is estimated at 2034kg in 2014-15, by this RIS, as shown in Table 5.</p> <p>Independent best estimates of PFOS foam stocks currently still available with foam users across Australia by Fire Protection Association Australia (FPA Australia) members, has identified 56,000 Litres of 3M foam containing and breaking down to PFOS. This is believed to be mostly in storage, but potentially some also in equipment/systems ready for emergency use. This is not expected to be used unless there were a major incident on one of these anticipated sites. Since many sites store 100% back up supply in reserve, we suspect old PFOS foam may be providing that duty on some sites, or may still be quarantined on some sites, waiting a cost-effective disposal outcome It is believed that cement kiln incineration of PFAS is still not authorised by the environmental regulator in QLD or TAS, although pilot trials are underway and seem acceptable.</p> <p>We therefore strongly suspect there is considerably more in the field which is unquantified. Best estimates suggest 80-100,000L+ PFOS foam concentrate may still be held on sites around Australia.</p> <p>Assuming 3M had approximately a 5% fluorochemical content in most of their firefighting foam concentrates, this could equate to around 4-5,000kg of neat PFOS still in Australia, that has not yet been changed out.</p> <p>Firefighting foam manufacturers (outside China) no longer manufacture firefighting foams that contain PFOS or that have components that could breakdown to PFOS (or PFHxS). Most are now producing short-chain high purity ≤C6 agents which do not break down to PFOA, although may have acceptably minute unavoidable impurities from the manufacturing process</p>

which are generally well below the European Chemicals Agency/REACH acceptance criteria of 25ppb PFOA, its salts and 1,000ppb of one or a number of PFOA precursors.

Since PFOS based product has not been available for the last 15 years and such concentrates are expected to have an average lifespan in storage of 10 years for AR-AFFFs (mostly used in petrochemical plants and Emergency Services) up to a claimed 25 years for standard AFFF agents for use on hydrocarbon fuels only, we would not anticipate the high level of annual consumption shown in Figure 6 (p48) to relate to PFOS based concentrates alone.

This may more likely relate to all firefighting foam usage, much of which would be long-chain $\geq C8$ fluorotelomer based foam concentrates which could degrade to PFOA, but NOT PFOS (principally 3M branded foams degrade to PFOS and PFHxS due to the different electrochemical fluorination manufacturing process used).

This seems to be considerably less than your anticipated annual consumption volumes (Figure 6), but may enable the costs of a total PFOS ban to be revised downwards, as this is not expected to be an annual consumption level but a total PFOS quantity likely to remain in circulation until regulation requires disposal and destruction. The sooner this is collected and disposed of as concentrate (Table 6 p 55) rather than firewater, contaminated groundwater or soil, everyone would seem to benefit from accepting Option 4.

Other more significant uses of PFOS from stain repellents, may be a more likely source of continued PFOS emissions eg. from carpet, curtains and upholstery cleaning and replacements. Many carpets and upholstery may have a 15-40 year life span, so could still be in circulation in people's homes, offices, other commercial and communal centres, despite PFOS ceasing widespread use 15 years ago in 2003. These PFOS residues are likely to enter the environment through landfill leachate when replaced and waste water treatment plants when being cleaned

<p>section 3.4.3 Waste infrastructure p55</p>	<p>It is re-assuring to find acceptance that “Management of landfill leachate is therefore a key area for intervention.” As is waste water treatment plant (WWTP) effluent and biosolids. Research studies have shown that PFAS breakdown levels are generally higher in effluent than influent to these plants, due to breakdown of pre-cursors and intermediaries by bacteria and activated sludge in the process.</p> <p>The suggestion “it may be more efficient to focus on reducing PFOS entering waste infrastructure, for example by placing conditions on PFOS use that prevents its discharge to sewers” is expected to be very hard to identify and regulate all those sources.</p> <p>Perhaps a far more effective answer is the collection and remediation of all PFAS at the WWTP outfall (since most landfill leachate also seems to be directed into WWTPs). This could concentrate all PFAS in Granular Activated Carbon, modified clays, Ion exchange resins, reverse osmosis or nano-filtration prior to disposal of the concentrated medium by incineration in cement kilns, or other cost-effective disposal avenues like sonochemical destruction, ozonification or heated persulfate oxidation perhaps.</p> <p>This would also collect most firefighting foam usage from training and banded area collection (whether fluorinated or fluorine free foam was used) to also gather the fluorochemicals likely in the firewater runoff and the majority of other PFAS uses we take for granted. This should provide a major benefit to reducing PFAS contamination of the environment, both aquatic and terrestrial environments IF biosolids were also prevented from use as an agricultural supplement.</p> <p>Has this been adequately considered in meeting our commitments under the Stockholm Convention?</p>
<p>6.2 Requirements for Management of PFOS waste p97</p>	<p>Most foam users when replacing PFOS foam have used what they consider an “appropriate decontamination process”, which I suspect is usually cold water flushing (as there is no guideline standard to follow as best practice, which I am trying to encourage regulators, users and service providers to work together on developing).</p> <p>It is therefore likely that a low level of PFOS contamination of the replacement foam stock will inevitably occur, particularly when this is decanted into bulk foam storage tanks for fixed systems.</p> <p>Acceptance of the Stockholm Convention’s threshold contamination level of above 50ppm (mg/kg) as requiring destruction and your suggested acceptance of this 50ppm contamination level threshold to determine PFOS waste, should adequately address these concerns and exclude replacement foam stocks in re-used storage tanks from being considered “PFOS waste”.</p> <p>But a standardised, cost-effective and approved procedure that requires to be undertaken, would also be helpful to foam users in achieving this objective, and avoiding them having to assess every clean-out option to try and determine which is the best and most cost-effective answer. Only when they have chosen a service provider and are part way through, would they be able to realise whether they have been sold a less efficient or not very practical option, or not!</p> <p>Clear guidance is needed.</p>

<p>7 Consultation p 98 “For fire-fighting, information on the current import, use, storage and stocks of PFOS – contaminated firefighting foams, including use in shipping”</p>	<p>FPA Australia has conducted a member survey of estimated PFOS foams currently stored on sites which has identified 56,000L of PFOS based foam, but since many sites store 100% back up supply in reserve, we suspect old PFOS foam may be providing that duty on some sites, or may still be quarantined on site waiting disposal. We therefore strongly suspect there is considerably more in the field which is unquantified. Best estimates suggest 80-100,000L+ PFOS foam concentrate may still be held on sites around Australia.</p> <p>Assuming 3M had approximately a 5% fluorochemical content in most of their firefighting foam concentrates, this could equate to around 4-5,000kg of neat PFOS still in Australia, that has not yet been changed out. (See also section 3,2 comments above).</p> <p>The situation regarding shipping is unknown, although since 175 of the 187 signatories to Stockholm Convention have already ratified the 2009 amendment calling for a PFOS ban, it is anticipated that only American, Indian, Italian, Malaysian & Israeli ships docking in Australian ports may still have some PFOS based foams on board, as these countries have not yet ratified the PFOS amendment.</p>
<p>7 Consultation p98 “How Industry capacity can be best mobilised to achieve the proposed phase outs, process improvements and waste disposal and destruction requirements”</p>	<p>Clean out issues:</p> <p>There is substantial confusion currently amongst foam users, which is probably helping to hold back disposal and clean-out of PFOS systems.</p> <p>As you confirm the Stockholm Convention identifies a 50ppm PFOS contamination limit above which any PFOS containing material has to be destroyed. Queensland has defined 10ppm for PFOS/PFHxS as an acceptable contamination level (50ppm for PFOA & precursors), but provides no guidance on how this should be achieved. Several major organisations like Airservices, Dept of Defence, Fire and Emergency Services have conducted this onerous work, but seem unwilling to share their experiences, in terms of procedures, strengths and difficulties, what worked well, what didn't what was easy and hard, what residual levels were achieved, whether the costs of doing it were justifiable or whether a simpler clean-out would have been adequate.</p> <p>Everyone suggests their clean-out procedure is best, but they can't all be best... foam users need a standardised open and transparent procedure with defined acceptability limits so they know what is acceptable by regulators. A key element of EPA South Australia's PFAS ban requires systems to be thoroughly cleaned “as far as reasonably practicable” ...well what does that mean? Good luck arguing that in court to avoid penalties against a regulator? In fairness they are working to produce some guidelines based on experiences from users currently conducting clean-outs, which will be very welcome.</p> <p>Is cold or hot water best? Does steam cleaning or solvent rinsing dramatically improve this? Is there any study that confirms or quantifies this? We need to know and I would welcome being involved with you in trying to pull a standard procedure and acceptable contamination levels together that would be acceptable to regulators, foam users and those providing the service.</p>

What is expected to be cleaned out?

Should just storage tanks be addressed, or all components of the system in contact with neat concentrate, or does everything in contact with foam solution (already diluted almost 100 times from concentrate) have to be cleaned including fire hoses, nozzles and PPE. Is everything expected to be below the 50ppm acceptable contamination level.

How realistic is this? ...particularly when some concrete fire training areas are saturated to 12cm with PFOS which leaches out during every F3 training exercise and even when it rains! This is expected to continue for decades! So what is the point of an incredibly intense, time consuming and costly clean out procedure. Also there will be other PFOS emissions from landfill leachate and WWTPs entering the environment every day of every year from other legacy uses of PFOS as stain repellents for carpets, curtains, upholstery etc, etc.

There is a clear urgent need for a nationally consistent approach agreed by regulators, foam users and service providers as an acceptable, fair, reasonable and cost-effective procedure set at a contamination level which is achievable but not too onerous in terms of time or cost.

This would encourage foam users to undergo the clean-out, transition to C6 or F3 alternative agents and achieve the removal and disposal of PFOS based foams more quickly and effectively. You can understand foam users do not want the expense of clean out, only to be penalised later because their residual levels are "too high". Some/many would probably want to wait until there is some approved process in place with defined limits of what is the acceptable PFOS contamination level, to avoid incurring more problems and costs down the track.

Has the government considered a subsidy or incentive towards the costs for foam users to change-out their PFOS stock within a short time period? So they only get the rebate or subsidy if they can show they have destroyed the product by a certain timeline perhaps? This might be a way of trying to speed up the transition process and remove PFOS more quickly from the system, ensuring all commitments to UNEP are met in advance of agreed deadlines?

Capture issues:

Whilst every effort is being made by foam users to collect and contain PFOS agents if used or transferred from storage, or in diluted washings form, there probably needs to be some minor allowance for slight leakage from pipework, valving, bunding, transfer hoses or vehicles transporting the PFOS waste. It would be helpful if such an allowance could be made clear so users are not in fear of penalties if a few drops are inadvertently spilt during this often complex and quite difficult process. Again a contamination acceptance level would assist this.

Disposal issues:

It seems that cement kiln destruction is significantly cheaper than plasma arc incineration, but it is unclear where these approved kilns are located, and whether they have regulatory approval to process PFOS based firefighting foam concentrates and other PFOS contaminated materials including clean-out

	<p>washings and firewater run-off. I am only aware of plants in QLD and TAS which may be able to handle such regulated waste, but have no confirmation they have regulatory approvals in place to conduct this work at scale yet, although pilot trials have apparently worked well.</p> <p>Are there other sites which could be used, particularly in other States/Territories including WA, NSW, VIC, SA & NT? Is there anywhere else in QLD as it is a vast area and transport costs could be very significant for foam users if there is nowhere local with the inherent risks of rollovers on the highway depositing concentrate into the environment from vehicle accidents.</p> <p>Are there other PFOS disposal methods which are acceptable to regulators yet? If so these should be clearly publicised.</p> <p>Research is being conducted into other potentially lower cost destruction options including Sonochemical destruction, which seems to work better at higher concentrations of PFAS, so could be ideal for foam concentrate disposal. Heated persulphate oxidation also seems to be effective. Ozonification, microwave thermal treatment are also being investigated.</p> <p>Concentrating PFOS from washings or firewater runoff would seem to be achievable using Granular activated Carbon(GAC), GAC and clay mixtures like Rembind, and modified clays like matCARE, as well as Ion Exchange resins, reverse osmosis and nano-filtration. Could the legislation provide confidence to foam users as to which methods are approved by regulators as acceptable for use, as this could also give foam users confidence that proposed mechanism by their service provider is going to be adequate to achieve the specified level required to get below the threshold level to be defined as regulated waste for disposal, so that most of the water treated can be declared clean and does not require incineration, just the material used to concentrate the PFOS from the washings or firewater runoff.</p> <p>I suggest this would substantially assist mobilisation of foam users to actually rid themselves of quarantined PFOS stockpiles, if they can see a cost-effective and acceptable way to undertake destruction, with approved procedures and certifications in place to demonstrate they have taken all reasonable steps to clean up and can verify this to avoid future penalties, or regulatory changes that might mean they have to repeat it all over again, which is unacceptable to them.</p>
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Extensive Reference List provided on separate word document, attached.