Minutes of public meeting of the PFAS Scientific Advisory Panel on Teams

10:00 on 22 October 2025

Panel Members present:	Dr Steve Hajioff – Independent Chair
	Dr Tony Fletcher – PFAS and Health member
	Professor Ian Cousins – PFAS and Environment member
In attendance:	Standing Observer (Regulation) - Kelly Whitehead - Group Director of Regulation, Infrastructure and Environment Department
	Subject Matter Expert – Michel Hubert (Ph.D.)
	Programme support team from I&E

Welcome:

The Chair welcomed everyone to the Panel meeting and reminded people the meeting was being recorded.

Introductions

The Chair and Panel members introduced themselves.

Dr Steve Hajioff, Independent Panel Chair: A retired Director of Public Health from an area of London with two major international airports and a variety of other environmental hazards and challenges, with 35 years in clinical medicine. An expert on translating science into policy, he has worked with Nice, the Greater London Authority, the EU, WHO and World Bank, several UK government departments and several international governments. Dr Hajioff has also worked extensively in the pharmaceutical industry.

Dr Tony Fletcher, PFAS and Health Panel Member: Environmental Epidemiologist at the London School of Hygiene and Tropical Medicine, working on PFAS since 2006 and member of the panel with experience of epidemiological studies on the health effects of PFAS in contaminated communities in West Virginia in the United States, in the Veneto region, in Italy, and in Ronneby, and is the health expert on the panel.

Professor Ian Cousins, PFAS and Environment Panel Member: A Professor in Environmental Chemistry at Stockholm University, an expert on PFAS, appointed as the environmental expert on this Panel and whose expertise on PFAS is on the sources, transport, fate, and exposure of PFAS.

Kelly Whitehead, Group Director for Regulation in the in the Infrastructure and Environment Department, leading on the Water Quality and Safety Programme, coordinating Government's response.

Declaration of Interests

- No new interests declared.

Minutes

- Minutes from 4 September 2025 meeting approved as a true and accurate record by the panel.

Matters Arising

- Nothing to report

Additional Findings Since the Last Meeting

The panel addressed a concern raised by a member of the public following a recent public meeting on in-home water treatment. The concern related to a perceived discrepancy between published documents and statements made by an expert during that meeting. Tony responded to this issue, referencing the Environmental Working Group's (EWG) testing of home water filters and comparing it to findings in a published paper from North Carolina. He noted that while the general consensus—echoed by David Andrews—was that tabletop and jug filters were not highly effective, further investigation into the supplementary data of the North Carolina paper revealed more nuanced results.

Tony highlighted that although the average effectiveness of tabletop filters was modest (around 75–80%), one specific product—the Berkey filter, which is a large, drum-like tabletop unit—showed 100% effectiveness in reducing PFAS compounds (PFOA, PFOS, and PFHxS) to below detectable levels in one household. This finding aligned with EWG's recommendation of the Berkey as a highly effective filter. However, Tony emphasised that this conclusion was based on very limited data—only one result in one study—and that other top-rated filters listed by EWG were not represented in the supplementary data of the North Carolina paper. He also noted that the Berkey filter may not be available in the UK, making it unsuitable for formal recommendation by the panel. Ultimately, Tony concluded that while the apparent contradiction between sources was resolved upon closer examination, the evidence base remains too limited to support specific product endorsements.

Michel Hubert Introduction

Michel Hubert introduced himself to the panel, stating that he is a senior engineer at the Norwegian Geotechnical Institute (NGI). He holds both bachelor's and master's degrees in environmental engineering. Following his academic training, he spent several years working in consultancy, where his focus was primarily on groundwater modelling and pollutant transport. Michel then moved to Norway to pursue a PhD, which he completed over the past five years. His doctoral research concentrated on the remediation of PFAS-contaminated soils. He is currently continuing his work at NGI, where he remains actively involved in projects addressing PFAS contamination, particularly at sites affected by aqueous film-forming foam (AFFF).

Presentation from Subject Matter Expert Michel Hubert

Michel began with a brief overview of the PFAS contamination problem, particularly in the soil-groundwater system, highlighting the persistence of PFAS due to their fluorinated molecular structure and their tendency to accumulate at the air-water interface in the vadose zone (unsaturated zone). He explained how PFAS contamination typically originates from hotspot areas—often above the groundwater level—especially at sites where aqueous film-forming foam (AFFF) has been applied to the surface, such as airports and firefighting training grounds.

Michel described how PFAS compounds, including precursors, migrate through soil via percolation and eventually contaminate groundwater, forming plumes that can reach drinking water sources or natural recipients like surface waters. He emphasised the complexity of remediation due to the presence of various PFAS compounds with differing chemical properties, including shorter-chain PFAS that are more mobile and harder to contain.

He then presented a detailed overview of current and emerging soil remediation technologies, referencing a 2025 Concawe report (https://www.concawe.eu/wp-content/uploads/Rpt_24-8.pdf). These technologies were categorised by their development stage and effectiveness. Commercially used methods include excavation and landfilling, engineered containment, soil washing, and stabilisation techniques. Emerging methods still under research include phytoremediation, soil leaching, and thermal desorption.

Michel elaborated on excavation and landfilling, noting that while these methods remove contamination from the site, they do not destroy PFAS and pose challenges related to leachate treatment and landfill acceptance criteria. He discussed soil washing and flushing as separation techniques that transfer PFAS from soil to water, which then requires treatment. He cited pilot studies, including one in Australia (doi: 10.1016/j.jhazmat.2022.130441), showing high removal efficiencies for shorter-chain PFAS but lower effectiveness for longer-chain compounds like PFOS.

Stabilisation and solidification techniques were also covered. These methods aim to reduce PFAS leaching from contaminated soil rather than remove the contamination. Michel shared results from field trials and NGI's collaborative research with SLU in Sweden, demonstrating that amendments like biochar can significantly reduce PFAS leaching over long timeframes.

Thermal treatment options were discussed next, including desorption and high-temperature incineration. Michel explained that while desorption removes PFAS from soil it does not destroy them, necessitating careful gas capture and treatment. Incineration at temperatures above approximately 1000 °C can mineralize PFAS into inert compounds, such as calcium fluoride, when PFAS wastes are co-processed in cement kilns. However, thermal approaches require robust infrastructure and continuous monitoring of gas emissions

He then introduced phytoremediation as a novel, nature-based approach using plants like hemp and sunflower to absorb PFAS from soil (doi:10.1016/j.envpol.2023.122038). While promising for short-chain PFAS, this method requires long remediation periods—up to 50 years in some cases—and is not yet viable for large-scale application.

For groundwater remediation, Michel focused on two main techniques: pump-and-treat systems and permeable reactive barriers. Pump-and-treat involves extracting contaminated groundwater, treating it (often with activated carbon, ion-exchange resins or membrane filtration), and reinjecting it to contain and reduce PFAS concentrations. He noted that while effective initially, this method requires long-term operation due to slow PFAS release over time. He cited examples from the Oslo airport and U.S. Superfund sites to illustrate its application and limitations.

Permeable reactive barriers, often using sorbents like activated carbon, were presented as a passive containment strategy for groundwater plumes. Michel shared a successful case study from northern Norway, where natural geological conditions facilitated effective PFAS capture and reduction.

In conclusion, Michel emphasised that no single remediation method can address all PFAS contamination scenarios. Site-specific conditions, PFAS profiles, and regulatory considerations necessitate tailored, multi-step treatment trains combining various technologies. He highlighted ongoing research and the need for innovation in remediation approaches, particularly for persistent and mobile PFAS compounds.

Discussion

Following his presentation, Michel opened the floor for discussion and questions. He reiterated key points from his talk, emphasising the complexity of PFAS contamination in both soil and groundwater systems. He explained that PFAS compounds, particularly those found at AFFF-impacted sites, are highly persistent due to their fluorinated molecular structure and hydrophilic head groups, which cause them to accumulate at the air-water interface in the vadose zone. This unique behaviour complicates remediation efforts, especially as PFAS precursors can transform into other PFAS compounds over time, including shorter-chain variants that are more mobile and harder to contain.

Michel provided a detailed overview of available remediation technologies, categorising them by their development stage and effectiveness. He discussed commercially used methods such as excavation and landfilling, engineered containment, soil washing, and stabilisation techniques, as well as emerging approaches like phytoremediation and thermal desorption. He highlighted the limitations of landfilling, including the challenge of finding suitable disposal sites and the long-term risks of leachate contamination. Soil washing and flushing were presented as effective for certain soil types and PFAS compounds, but their efficiency diminishes in soils with high clay or organic content.

The discussion also covered stabilisation and solidification techniques, which aim to reduce PFAS leaching rather than remove the contamination. Michel shared results from field trials and collaborative research with SLU in Sweden, demonstrating that amendments like biochar can significantly reduce PFAS leaching over extended periods. He noted, however, that long-term performance data is still limited, and regulatory acceptance of these methods may vary.

Thermal treatment options were explored, including desorption and high-temperature incineration. Michel explained that while desorption removes PFAS from soil, it does not destroy them, necessitating careful gas capture and treatment. Incineration at temperatures above approximately 1000 °C can mineralize PFAS into inert compounds, such as calcium fluoride, when PFAS wastes are co-processed in cement kilns. However, thermal approaches require robust infrastructure and continuous monitoring of gas emissions. Michel mentioned that closing the fluorine mass balance for methods aimed at destroying PFAS — to confirm complete mineralization — has not been performed in many scientific studies due to its difficulty.

Phytoremediation was discussed as a novel, nature-based solution using plants like hemp and sunflower to absorb PFAS from soil. While promising for short-chain PFAS, this method requires long remediation periods—up to 50 years in some cases—and is not yet viable for large-scale application.

Groundwater remediation techniques were also addressed, with a focus on pump-and-treat systems and permeable reactive barriers. Michel explained that pump-and-treat systems help contain and reduce PFAS concentrations but require long-term operation due to slow contaminant release. He cited examples from Oslo airport and U.S. Superfund sites to illustrate the method's application and limitations. Permeable reactive barriers, often using activated carbon, were presented as passive containment strategies for groundwater plumes, with successful case studies from Norway demonstrating significant PFAS reduction. Michel mentioned that pump-and-treat systems and permeable reactive barriers need to be tailored to each site, taking into account not only the PFAS contamination but also the geological and hydrogeological conditions present on site.

In conclusion, Michel emphasised that no single remediation method can address all PFAS contamination scenarios. Site-specific conditions, PFAS profiles, and regulatory considerations necessitate tailored, multi-step treatment trains combining various technologies. He highlighted ongoing research and the need for innovation in remediation approaches, particularly for persistent and mobile PFAS compounds. The discussion closed with appreciation from Steve Hajioff, who described Michel's presentation and insights as brilliant and fascinating.

Treatment technologies for PFAS in environmental waters and soils

The panel proceeded to item on the agenda, focusing on treatment technologies for PFAS in environmental waters and soils. Ian presented findings from a literature review, expanding the scope beyond drinking water to include groundwater and soil treatment technologies. He emphasised that while the review was not exhaustive, it captured the key developments and aligned with insights from subject matter experts.

Ian began by stressing the importance of understanding the specific site conditions before selecting treatment technologies. This includes identifying the types of PFAS present, their sources (such as AFFF use in Jersey), and the site's hydrogeology. He introduced the concept of Technology Readiness Levels (TRLs), which range from 1 (basic principles) to 9 (fully tested and commercially available). Most technologies reviewed were not yet at TRL 9, and some commercially available methods lacked rigorous testing, making them potentially misleading.

For environmental waters, Ian reviewed absorption technologies such as activated carbon, ion exchange resins, and foam fractionation. These are effective but face challenges in complex water matrices due to fouling and reduced efficiency. Destruction technologies, including advanced oxidation and UV treatments, were also discussed. Despite claims of high PFAS destruction rates, Ian cautioned that many lack comprehensive validation, such as fluorine mass balance studies or testing in real-world conditions. He noted that most destruction technologies remain in development and are not yet deployable.

Regarding soil treatment, Ian echoed Michel Hubert's earlier presentation, listing methods such as excavation and disposal, soil washing, stabilisation, solidification, phytoremediation, and thermal treatment. He clarified distinctions between electrokinetic remediation (for soil) and electrochemical oxidation (for water), noting that neither is currently ready for practical use. His summary highlighted that absorption and membrane filtration technologies are the most mature for water treatment, while excavation and thermal treatment are effective but costly for soil.

Steve praised the clarity of Ian's paper and referenced Michel's graph showing TRLs versus effectiveness, suggesting it could be useful to include a similar figure. Ian agreed, noting his tables conveyed the same message, albeit less visually. Both emphasised the need to focus on technologies in the top-right quadrant of that graph—those with high TRLs and proven effectiveness—even though they are few and expensive.

The discussion turned to commercial claims, with Steve warning against overreliance on manufacturer assertions, drawing parallels to the pharmaceutical industry where many promising treatments fail. Ian agreed, stressing the need for rigorous testing and transparency in claims, including real-world validation and monitoring of degradation products.

Tony raised questions about the intended audience for the report, suggesting it should consider different stakeholder levels—from large entities like Ports of Jersey to individual landowners. Ian responded that tailoring solutions requires detailed site-specific data, which was beyond the scope of his review. Steve added that future recommendations would need to be based on local assessments, and Kelly Whitehead noted that site-specific redevelopment projects would likely be the most relevant use case for the report.

Ian concluded by referencing international experiences, such as the Netherlands, where stringent soil guidelines for PFAS halted redevelopment until thresholds were adjusted. Steve suggested that comparative data from European countries could be useful when evaluating Jersey's situation. Ian indicated that future work would include soil and biosolids, potentially in a separate report.

Borehole level treatment approaches

The panel moved on to the next agenda item, a review paper on borehole treatment technologies presented by Steve. He began by noting that many of the technologies discussed in the context of mains water, surface water, and soil treatment were also applicable to borehole treatment. These included granular activated carbon (GAC), ion exchange resins, and membrane filtration methods such as reverse osmosis and nanofiltration. Steve briefly outlined how each technology works and their respective limitations, particularly in borehole settings where water quality and scale can vary significantly.

He emphasised that while GAC and ion exchange are effective, their performance can be compromised by the presence of certain ions and organic compounds. Reverse osmosis and nanofiltration, though highly effective, produce significant volumes of reject water, which may be problematic in resource-limited settings. Foam fractionation was mentioned as a potentially useful add-on technology, but destruction technologies were deemed not yet proven for field use at this scale.

Steve then discussed the physical design options for borehole treatment systems, which typically involve installation either at the borehole itself (well house) or at the point of entry into a household. He explained that the choice of technology—whether GAC, ion exchange, or reverse osmosis—should be guided by the specific PFAS profile and co-contaminants present. For single-household boreholes, he suggested that household-level treatment (e.g., under-sink or countertop filters) might be more cost-effective than installing a full-scale borehole treatment system.

Monitoring was highlighted as essential, both for PFAS and co-contaminants, and for managing residuals such as concentrate from reverse osmosis or spent media from GAC and ion exchange. Steve reiterated that most technologies are separation-based and that treatment trains—combinations of technologies—often yield better results and reduce risk. He stressed the importance of piloting technologies on-site or in similar conditions due to the variability of borehole water characteristics.

Ian raised a question about the availability of commercial borehole treatment solutions that address PFAS, sharing his own experience with a wastewater treatment system installed on his property. He noted that the system focused on nitrate removal and did not consider PFAS. Steve responded that while he had reviewed commercial domestic treatment options, he had not explored borehole-specific offerings due to the need for site-specific solutions. He offered to investigate further if the panel deemed it helpful.

Tony contributed by emphasising the importance of tailoring treatment approaches based on the intended use of borehole water. For example, if the water is only used for irrigation or non-potable purposes, treatment may be unnecessary. He suggested that for single-household boreholes, focusing treatment on kitchen taps used for drinking and cooking might be sufficient. For boreholes serving multiple dwellings, more robust treatment systems would be required.

Kelly informed the panel that her team was preparing a paper on borehole registrations and private water supply legislation, which would provide contextual data for future discussions. Tony noted that even without precise numbers, the panel could outline principles for different borehole use cases—single household, garden use, and multi-dwelling supply.

The discussion concluded with agreement that the paper should be expanded to include practical considerations for different borehole contexts and that future recommendations would benefit from this tailored approach.

Domestic appliances for reducing PFAS in drinking water

The panel turned to the topic of domestic appliances for treating PFAS in drinking water. Steve introduced the discussion by noting that there are currently no formal regulations in Europe, the UK, or Australia governing devices that claim to reduce PFAS levels in water. The only existing standards are in North America, particularly the U.S. and Canada, but even the most stringent of these fall short of the drinking water thresholds recommended for Jersey. Nonetheless, devices that meet these standards often outperform them in practice, as noted in previous expert presentations.

Steve outlined the three main technologies used in domestic filtration: activated carbon, ion exchange, and reverse osmosis. He referenced studies from the Environmental Working Group (EWG), North Carolina, and the Pacific Northwest that evaluated the effectiveness of these technologies in household settings. The findings showed variable performance, with activated carbon being the most commonly used but not always the most effective.

He described four levels of deployment for domestic filtration systems:

1. **Point-of-entry systems**, which treat all water entering a household and are typically carbon-based. These are suitable for boreholes supplying a single home but may be less effective with high water demand due to reduced contact time.
2. **Under-sink systems**, which treat water at a specific tap (usually the kitchen). These often use composite cartridges combining ion exchange and carbon, or reverse osmosis with carbon polishing.
3. **Worktop filters**, which are larger countertop units that perform similarly to under-sink systems.
4. **Gravity-fed filter jugs**, which are the least effective due to their single-stage carbon filtration and shorter contact time.

Steve emphasised that the effectiveness of these devices depends on the PFAS chain length of concern. For long-chain PFAS, carbon filtration may suffice, but for short-chain PFAS, ion exchange or reverse osmosis is necessary. He also noted that performance can degrade quickly if cartridges are not replaced regularly, and raised concerns about the disposal of spent cartridges, which often end up in municipal waste.

Kelly clarified that in Jersey, domestic waste—including used cartridges—is incinerated rather than landfilled. However, since the energy-from-waste facility does not operate at temperatures above 1000–1200°C, there is a risk that PFAS may escape into the environment during incineration.

The panel discussed the limitations of laboratory certification versus real-world performance, especially in the presence of co-contaminants. Steve reiterated that no device is currently certified to reduce PFAS levels to the thresholds recommended in Jersey's interim report. Ian added that the state of Massachusetts does not recommend reverse osmosis for household use due to concerns about PFAS-laden reject water entering septic systems and groundwater. He also noted the lack of borehole-specific PFAS treatment options, with most commercial solutions focused on point-of-entry systems.

Tony questioned the logic behind Massachusetts' stance, arguing that separating and concentrating PFAS does not increase the total amount released into the environment. He expressed greater concern about solid waste from filter cartridges, which concentrate PFAS and may pose a disposal risk. The panel agreed that incineration could reintroduce PFAS into the environment if not properly managed.

Steve concluded by noting that while some devices tested in studies did achieve PFAS reductions below the recommended levels, these results were based on limited data and not representative of broader performance. He emphasised the challenge of relying on percentage reduction claims, which vary depending on initial PFAS concentrations. Without a standard that aligns with Jersey's thresholds, the panel cannot confidently recommend specific products, though they may signpost promising studies.

The discussion ended with consensus on the need for cautious interpretation of commercial claims and certification standards, and the importance of considering site-specific factors when evaluating domestic filtration options.

Any other business

Tony raised a noteworthy point that he had intended to mention earlier in the meeting. He shared details of a recent initiative by the European Environmental Bureau, which involved voluntary PFAS blood testing among 24 individuals—including commissioners, politicians, and bureaucrats—from 16 different EU countries. The purpose of the study was to assess PFAS exposure levels across a geographically diverse group of non-industrial participants.

Tony noted that while the press release accompanying the study presented a range of exposure levels, it lacked an average value suitable for comparative analysis. Upon contacting the organisation, he received confirmation that the median PFAS concentration (sum of four PFAS compounds) among the participants was 7.1 nanograms per millilitre. He found this figure particularly interesting, as it aligned closely with the target level discussed in the panel's third report. He speculated that the average age of participants was likely around 55 and emphasised that these individuals were not exposed to PFAS through industrial or hotspot sources, making the data a useful reference point for general European background exposure.

Steve responded by acknowledging the value of this data, noting that although the sample was small and not fully representative, it provided a useful triangulation point. He suggested that the findings imply Jersey may not have a significantly greater PFAS exposure problem than the broader European population, at least outside of known contamination plumes. Both agreed that expanding such studies would be beneficial for future comparative assessments.

Date of next meeting

Thursday 6 November 2025. It will be held 10am - 1pm online.

The Chair thanked everyone for their contributions, those watching the meeting and those offering support throughout the whole process.

A reminder to the public that this meeting has been recorded, and the video will be available online on request by emailing the Regulation Enquiries mailbox on RegulationEnquiries@gov.je. This will take a couple of days to make sure the observers are anonymised.

There being no further business, the meeting was closed.

To note that the Panel can be emailed via PFASpanel@gov.je.

Details of meeting dates and times can be found at PFAS in Jersey (gov.je)