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

14:00 on 30 April 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
	Various Regulatory Experts
	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 and Matters Arising

- Minutes from 27th February meeting approved as a true and accurate record by the panel
- Minutes from 26th March meeting approved as a true and accurate record by the panel
- No matters arising.

Additional Findings Since the Last Meeting

1. **Responses to Report 3:** The latest PFAS and health report received the largest volume of responses, about five times more than any previous report. Some responses are more relevant to Report 4 but will still be addressed in Report 3 and shared with Kelly's team for future consideration.
2. **Additional Meeting:** An extra meeting was held last week to consult with water treatment experts about technologies like ion exchange resins. The minutes from this meeting will be shared after verification.
3. **Meeting with Former Policy Maker:** The panel met with a former deputy and policy maker to discuss various issues, which will help shape Report 4 and future reports.
4. **UKMPS Inquiry:** Ian mentioned that the UKMPS has launched an inquiry into the risks of PFAS, calling for expert evidence by May 26th. There is a suggestion to forward Report 3 to them, even if it is not finalised.

Experts Introductions

Julia Hartmann introduced herself as a representative from the Dutch National Institute for Public Health and the Environment (RIVM). She has been involved in drinking water research and has contributed to various reports on PFAS and drinking water. Additionally, she has worked on deriving a drinking water guideline value for PFAS over the past few years.

Gloria Post introduced herself as a recently retired toxicologist and human health risk assessor from the New Jersey Department of Environmental Protection, where she worked for almost 39 years. She developed numerous health-based drinking water guidelines and has been involved with PFAS since 2004. Gloria has also served on several advisory panels for the US, WHO, and IARC related to PFAS health effects.

Toke Winther introduced himself as a representative from the National Food Institute at the Technical University of Denmark. He mentioned his close collaboration with the Danish Environmental Protection Agency (EPA) on PFAS and drinking water quality. Toke has been working with the Danish EPA for around 10 years, focusing on PFAS regulation.

Hans Peter Birk Hansen introduced himself as a geologist and team leader at the Danish Environmental Protection Agency (EPA). His area of work focuses on water supply and groundwater protection in Denmark. He leads a unit of around 15 people working on these topics.

Sebastian Castano introduced himself as a technology advisor at Oasen Drinkwater, a drinking water company in the Netherlands. He mentioned that he would share their experiences with PFAS presence in water sources and discuss their treatment options, particularly those involving membrane-based technologies.

Presentation from Regulatory Expert Julia Hartmann

Julia Hartmann began her presentation by providing an overview of the PFAS situation in the Netherlands, with a specific focus on drinking water. She introduced the Dutch National Institute for Public Health and the Environment (RIVM), explaining its role within the regulatory landscape. The RIVM, owned by the Ministry of Health, Welfare, and Sports, is an independent knowledge organisation that provides scientific advice to the government. Julia emphasised that while the RIVM derives health-based drinking water guideline values, the responsibility for setting legal drinking water limits lies with the Ministry of Infrastructure and Water Management, which considers additional factors such as technological feasibility and economic impact.

Julia provided an overview of the drinking water supply in the Netherlands, highlighting that there are ten large public drinking water companies serving the general population and industry, as well as about 250 small water supplies for campsites and recreational parks. She noted that approximately two-thirds of the population receives drinking water from groundwater, while the remaining third receives it from surface water. This distinction is important because surface water in the Netherlands contains higher amounts of PFAS compared to groundwater.

Julia discussed the historical and current regulatory landscape for PFAS in the Netherlands. Before 2020, the Netherlands had two drinking water limits for PFAS: one for PFOA and one for GenX substances. These limits were based on higher threshold values, and at the time, PFAS concentrations in drinking water were below these limits. However, the publication of the European Food Safety Authority (EFSA) scientific opinion in 2020 introduced a much lower tolerable weekly intake (TWI) of 4.4 nanograms per kilogram body weight for four PFAS compounds, known as the EFSA-4. This new limit value is protective against the most critical human health effect, the decreased response of the human immune system, as well as other health effects.

Following the EFSA opinion, the Ministry of Infrastructure and Water Management requested the RIVM to derive a new drinking water guideline value for PFAS. Julia explained that the RIVM uses a mixture risk assessment method, incorporating relative potency factors (RPFs) to account for the varying toxicity of different PFAS compounds. This approach allows the EFSA TWI to be applied to a broader set of PFAS.

Julia discussed an intake study conducted in 2021 to assess the intake of the EFSA-4 PFAS compounds by the Dutch population through food and drinking water. The study concluded that food contributes more to PFAS intake than drinking water. Following the WHO guidelines for drinking water quality, this validates the use of a 20% allocation percentage for drinking water in deriving the guideline value. The resulting drinking water limit value is 4.4 nanograms per litre in PFOA equivalents.

Julia presented the results of an updated intake study published in 2023, which included more PFAS compounds and more recent data. The study analysed 770 drinking water samples from all Dutch drinking water companies, distinguishing between surface water and groundwater sources. The study found that TFA, PFOA, and PFHxA were significant contributors to PFAS exposure from drinking water. Although the total PFAS intake was above the EFSA TWI, the ingested quantity via food and drinking water was 40% lower than previously calculated.

Julia noted that the derived drinking water guideline value of 4.4 nanograms per litre is not yet implemented in Dutch regulation. Currently, the Netherlands follows the Drinking Water Directive's sum of PFAS limit of 100 nanograms per litre for 20 PFAS compounds. However, the Ministry of Infrastructure and Water Management aims to implement the lower limit value in the future, working with the drinking water sector to develop a policy framework.

Julia concluded that, based on the analysis, Dutch drinking water is safe with respect to PFAS, as none of the analysed samples exceeded 22 nanograms per litre. However, action is needed as two-thirds of the drinking water samples from surface water exceeded the 4.4 nanograms per litre guideline value. The presentation ended with a Q&A session, where Julia addressed questions about the potential impact of the IARC report on PFAS health effects and the use of RPFs in regulatory calculations.

Summary of Q&A:

1. **Health Tolerable Levels and IARC Report:** Julia confirmed that no changes have been made to the health tolerable levels for PFAS in light of the IARC report.
2. **Relative Potency Factors (RPFs):** Tony Fletcher inquired about the use of RPFs and their impact on the goodness of fit to immunological data. Julia noted that this question would need to be forwarded to a colleague for a detailed response. Additionally, it was clarified that the Drinking Water Directive does not mandate the use of RPFs; instead, it requires the simple summation of PFAS concentrations.
3. **Comparison of RPF-Based and Simple Summation Methods:** Steve Hajioff sought clarification on whether using RPFs would result in significantly different values compared to simple summation. Julia explained that while the RPF-based method can be, depending on the composition of the sample, more stringent. Based on data between 2015 to early 2021, RIVM concluded that the Dutch drinking water complies with the 100 nanograms per litre limit set by the Drinking Water Directive.
4. **Timeline for Regulatory Implementation:** Ian Cousins asked about the timeline for making the health-based guidelines regulatory. Julia indicated that it is still uncertain, with the first update on the policy framework expected in the summer, suggesting a multi-year plan.
5. **PFNA Contribution to PFAS Exposure:** Ian also inquired about the significant contribution of PFNA to PFAS exposure from drinking water. Julia explained that PFNA's high relative potency factor (RPF) of 10 means that even low concentrations contribute significantly to total exposure.

Presentation from Regulatory Expert Gloria Post

Gloria Post began her presentation by explaining the regulatory framework for drinking water contaminants in the United States. She highlighted the existence of both federal and state Safe Drinking Water Acts, which provide general requirements and processes for developing drinking water standards. These acts do not typically include chemical-specific standards but direct environmental agencies on how to establish such standards. The regulatory standards, known as Maximum Contaminant Levels (MCLs), can be set by the federal government or individual states and are enforceable regulations requiring monitoring of public water systems. Private wells, however, are not regulated in most states, leaving it up to homeowners to test and treat their wells if necessary.

Gloria discussed the differences between state and federal standards, noting that some states, like New Jersey due to its industrial background, have a long history of developing their own drinking water standards. States can have stricter standards than federal ones and can regulate contaminants not covered by federal standards. She provided examples of states with their own standards for PFAS and other contaminants, emphasising the increased attention to PFAS regulation in recent years.

Gloria provided a historical overview of regulation of drinking water contaminants, noting that before 1986, there were very few national standards for drinking water contaminants. The 1986 amendments to the Safe Drinking Water Act required the EPA to adopt standards for 25 contaminants every three years, leading to the adoption of many new standards in the 1980s and 1990s. The 1996 amendments changed the process, requiring the EPA to decide whether to regulate at least five contaminants every five years, with a high bar for positive determinations. The PFAS MCLs are the first new federal MCLs for contaminants since the 1990s.

Gloria explained the complex process for developing new MCLs, including the Contaminant Candidate List (CCL), Unregulated Contaminant Monitoring Rule (UCMR), and regulatory determinations. The criteria for regulating a new contaminant include potential adverse health effects, occurrence in public water systems at levels of public health concern, and the opportunity for meaningful health risk reduction.

Gloria highlighted the reasons for concern about PFAS, including their widespread occurrence in drinking water, persistence in the environment, bioaccumulation in humans, and multiple types of animal toxicity. She emphasised the compelling evidence for human health effects even at general population exposure levels and the higher exposure from contaminated drinking water compared to other sources. Infants are particularly susceptible due to higher fluid intake and exposure through breast milk.

Gloria reviewed the history of EPA Health Advisories for PFOA and PFOS, noting the dramatic decrease in guideline values over time. She provided a graph showing the trend of decreasing state and EPA guidelines for PFAS since the early 2000s, culminating in the current federal MCLs of 4 nanograms per litre for PFOA and PFOS.

Gloria described the process leading to the development of federal PFAS standards, including the EPA's positive determination to regulate PFOA and PFOS in 2021, the review by the EPA Science Advisory Board, and the finalisation of the rule in April 2024. The MCLs for PFOA and PFOS were set at 4 nanograms per litre, based on the lowest feasible level for reliable measurement by laboratories. The EPA concluded that both PFOA and PFOS are likely human carcinogens, setting the Maximum Contaminant Level Goals (MCLGs) at zero.

Gloria explained the health effects basis for the PFAS MCLs, noting the use of human epidemiology data for the first time in EPA PFAS risk assessment. The EPA considered decreased vaccine response, decreased birth weight, and increased serum cholesterol as key health effects, resulting in Reference Doses far below previous values. The MCLs for mixtures of four other PFAS were based on non-cancer effects in laboratory animals, using the Hazard Index approach.

Gloria briefly discussed the cost-benefit analysis conducted by the EPA, which estimated the costs and health benefits of the PFAS rule. The analysis concluded that the health benefits justified the costs, with monitoring and treatment costs estimated at $1.548 billion per year and health benefits at approximately $1.549 billion per year.

Gloria outlined the implementation schedule for the PFAS rule, noting that monitoring must begin within three years of the final rule, with quarterly sampling for surface water systems and large groundwater systems. MCL violations are based on the running annual average of sampling results, and systems have five years to comply if there is an MCL violation. She also mentioned the legal challenge to the rule and the current hold requested by the new administration, with information on how the new administration plans to proceed regarding the legal challenge expected on May 12th.

The presentation concluded with a Q&A session, where Gloria addressed questions about the analytical limits for PFAS, the review process for drinking water standards, and the establishment of target concentrations for non-cancer effects. She clarified that the practical quantitation level of 4 nanograms per litre is based on what most commercial labs can achieve, and the six-year review process for federal MCLs considers new health effects information and analytical capabilities.

Presentation from Regulatory Expert Toke Winther

Toke Winther began his presentation by introducing his role at the National Food Institute at the Technical University of Denmark. He explained that the institute has a contract with the Danish Environmental Protection Agency (EPA) and the Danish food authorities to provide science-based advice on various issues, including setting drinking water quality criteria. Toke’s presentation focused on the process of setting quality criteria for PFAS in Denmark, providing a historical overview and discussing the implementation of these criteria in Danish regulation.

Toke provided an overview of the PFAS substances for which Denmark has established groundwater and drinking water quality criteria. He highlighted that Denmark primarily uses groundwater for drinking water. The criteria cover 22 PFAS substances, with different sources and overlaps among them. He detailed the timeline for the introduction of these criteria, starting with the sum of 12 PFAS in 2015, the sum of 4 PFAS in 2021 based on the EFSA tolerable weekly intake, and the sum of 22 PFAS in 2023 based on the EU Drinking Water Directive.

Toke explained that the 2015 quality criteria for the sum of 12 PFAS were based on a background report by Larsen and Giovale, which focused on the effects of PFOS and PFOA on the liver in rats. Due to insufficient data for PFOSA, its toxicity was assumed to be equal to PFOS based on structural similarity. The Danish EPA administratively added nine additional PFAS identified in groundwater near firefighting foam usage areas, resulting in a combined quality criterion of 100 nanograms per litre for 12 PFAS.

Toke discussed the 2023 quality criteria for the sum of 22 PFAS, which were based on the recast of the EU Drinking Water Directive adopted in December 2020. Denmark chose to implement the sum of 20 specific PFAS from the directive, adding two more substances (6:2 FTS and PFOSA) that were part of the 2015 criteria but not included in the directive. This resulted in a total of 22 PFAS being regulated in Danish drinking water.

Toke detailed the 2021 quality criteria for the sum of 4 PFAS (PFOS, PFOA, PFNA, and PFHxS) based on the EFSA tolerable weekly intake (TWI). The EFSA set a TWI of 4.4 nanograms per kilogram body weight per week for these four PFAS, protecting against immune effects in children exposed via breastfeeding. Denmark used this TWI to establish a drinking water quality criterion of 2 nanograms per litre for the sum of these four PFAS.

Toke explained the methodology for calculating drinking water quality criteria in Denmark. The tolerable daily intake (TDI) is derived from the TWI by dividing by seven. Denmark uses an allocation factor of 10 for substances where drinking water is not the primary exposure source, and an ingestion rate for children of 0.03 litre per kilogram body weight per day. This approach resulted in the low quality criterion of 2 nanograms per litre for the sum of 4 PFAS.

Toke concluded by summarising the coexistence of the quality criteria for 22 PFAS (0.1 micrograms per litre) and the sum of 4 PFAS (2 nanograms per litre) in Danish regulation. He emphasised the importance of these criteria in ensuring safe drinking water and protecting public health in Denmark.

Presentation from Regulatory Expert Hans Peter Birk Hansen

Hans Peter Birk Hansen began his presentation by explaining the regulatory framework for PFAS in Danish drinking water. He highlighted that 99% of Denmark's drinking water comes from groundwater, with no use of surface water for drinking purposes. The principle of minimal treatment is applied, where groundwater is usually only oxygenated and filtered. Additional treatments are implemented only when pollution cannot be avoided. Water quality is regulated by Danish laws and executive orders, which implement the EU Drinking Water Directive.

Hans Peter described Denmark's decentralised abstraction and distribution system. The country has major public and private waterworks, with 87 public utilities owned by municipalities and around 2,400 consumer-owned utilities. Additionally, there are about 50,000 private utilities serving fewer than ten households each. This decentralised system ensures widespread access to drinking water across Denmark.

The Drinking Water Directive is implemented in Denmark through the Water Supply Act and its derived orders, particularly the drinking water order. This order sets quality standards for specific chemical compounds, primarily to protect human health. Some standards, especially for pesticides, are established due to political considerations. The responsibility for water quality is shared among waterworks, municipalities, and national health authorities. Waterworks are responsible for supplying and monitoring water quality, municipalities ensure compliance and report data to the national database (Jupiter), and health authorities provide guidance in case of pollution.

Hans Peter presented data from the Jupiter database, showing the presence of PFAS in groundwater and drinking water. Out of 15,600 groundwater samples, 700 showed PFAS presence, representing 4.54%. However, these samples were mostly from monitoring wells, not drinking water boreholes. In drinking water, Denmark has two quality standards: 100 nanograms per litre for the sum of 22 PFAS and 2 nanograms per litre for the sum of 4 PFAS. No exceedances were found for the 22 PFAS standard, but 2.3% of drinking water samples exceeded the 4 PFAS standard. All exceedances were mitigated through cooperation between waterworks, municipalities, and health authorities.

Hans Peter shared a case study from Fanø, where the source of PFAS in groundwater was sea spray from the North Sea. PFAS accumulated on surfaces and were transported inland by wind, leading to elevated PFAS levels several kilometres from the coast. The Fanø waterworks initially had PFAS levels of 3-4 nanograms per litre in drinking water. They implemented a combination of activated carbon filtration and ion exchange resins, reducing PFAS levels to 0-1.5 nanograms per litre. Hansen presented data showing the effectiveness of this treatment process, with significant reductions in PFAS concentrations after each treatment stage.

Hans Peter concluded by summarising the regulatory and treatment approaches for PFAS in Danish drinking water. He emphasised the importance of cooperation between different authorities to ensure safe drinking water. The presentation ended with a Q&A session, where Hansen addressed technical questions about sea spray transport and the impact of aerosols on PFAS levels in groundwater. He clarified that sea spray aerosols, rather than foam, are the primary transport mechanism for PFAS from the sea to inland areas.

Preliminary Discussion with Experts

An initial observation was raised regarding how, with the exception of the U.S., most health-based threshold levels for PFAS appear to be based on immunotoxicity rather than carcinogenicity, which, it was noted, may not significantly alter risk assessments unless differing assumptions are made about acceptable carcinogen exposure. Ian Cousins agreed, noting that despite different national approaches, similar threshold values are often reached, although the underlying assumptions—such as allocation factors—can notably shift the resulting limit. For example, Sweden and the

Netherlands use similar percentages leading to a value of 4 ng/L, while Denmark's use of 10% results in a lower threshold of 2 ng/L.

Steve Hajioff introduced the regulatory dilemma of whether to define a health-based threshold with a separate detection-based regulation or set a single regulatory value. Hans Peter Birk Hansen elaborated that Denmark had ensured laboratories were prepared for stringent limits before introducing new quality standards, underlining the importance of providing laboratories adequate time to adapt. This prompted a broader discussion on detection versus quantification limits. Gloria Post highlighted the distinction, noting that in the U.S., enforceable standards rely on the quantification limit, which must ensure precise measurement. Ian Cousins clarified that quantification limits are typically ten times the standard deviation of a blank sample, as opposed to detection limits, which are lower and offer only a basic indication of presence. All agreed that clarity in terminology is crucial in regulation.

Julia Hartmann inquired about the ingestion values used in calculations. Toke Winther explained that Denmark's guidelines, although 20 years old, are based on exposure estimates for children, using the median. Steve Hajioff clarified for observers that dietary intake is the primary exposure route in uncontaminated areas, while drinking water becomes the dominant source in contaminated zones. Ian Cousins further noted that the specific PFAS compound also matters—short-chain PFAS often lead to water-dominated exposure, whereas long-chain PFAS typically bioaccumulate through food.

Tony Fletcher queried the rationale behind using children's water intake values rather than converting maternal serum values, as done by the UK FSA. Toke Winther responded that although default values used children as a reference group, recalculations for adults yield similar results. Tony also expressed surprise at the low number of exceedances in Danish water supplies, especially when compared to higher figures from the U.S., attributing potential differences to Denmark's heavy reliance on groundwater. Ian Cousins and Gloria Post confirmed that many U.S. exceedances are found in inland areas affected by agricultural biosolids, while Danish sources are more variable and less understood.

On the issue of treatment technologies, Tony Fletcher observed that PFAS appeared to saturate granular activated carbon filters rapidly, with ion exchange also showing slower signs of saturation. Hansen confirmed this observation and noted varying success between facilities using different technologies. Sebastian Castano added that PFAS breakthrough occurs much more quickly in activated carbon filters compared to other contaminants, emphasising the complexity of treatment.

As the conversation neared its conclusion, Steve Hajioff acknowledged the value of the two-stage treatment system observed in Denmark and flagged it for further exploration, particularly whether the first stage pre-filters organic matter that could affect ion exchange resin performance.

Before ending, Gloria Post raised a question about the Dutch RIVM's application of Relative Potency Factors (RPFs) in deriving water guidelines. She questioned whether it was appropriate to apply RPFs derived from liver effects in male rats to human infant immune responses. Julia Hartmann and Ian Cousins clarified that the most recent internal RPFs are in fact based on immunotoxic effects, not liver toxicity. The external RPFs used for the assessment of drinking water, are derived from liver effects. By applying these RPFs, it is assumed that the differences in harmfulness also apply to other effects which can be caused by PFASs, including immune effects. The RPF method also takes account of the possibility that individual PFAS in mixtures can cause different effects. The method proposed by RIVM is not perfect but probably approximates the mutual potency differences in terms of immune effects by PFASs more effectively than the assumption that the various PFASs are equally harmful.

Presentation from Water Treatment Expert Sebastian Castano

Sebastian Castano began his presentation by providing an overview of Oasen, a drinking water company in the Netherlands. Oasen is not the largest but also not the smallest water company in the country, serving over 700,000 clients through more than 300,000 connections. The company produces approximately 47 million cubic metres of water per year across seven locations. Sebastian highlighted that most of Oasen's water comes from riverbank filtrate, which offers advantages such as natural pre-treatment and more stable water quality compared to surface water.

Sebastian discussed the sources of PFAS contamination in Oasen's water supply, noting the influence of the chemical company Chemours, which is located upstream of some of their wells. This has led to higher concentrations of PFAS in certain wells. He presented data showing PFAS concentrations in two wells and the Rhine River, using PFAS equivalents to account for relative potency factors (RPFs). Oasen actively participates in lobbying efforts to achieve zero PFAS discharge from Chemours and other sources, working with national and international water associations.

Sebastian detailed the treatment technologies used by Oasen to remove PFAS from drinking water. The company employs both activated carbon and membrane technologies, including reverse osmosis (RO). He explained that Oasen has two locations fully equipped with RO systems and two more with partial RO processes. RO is favoured for its robustness and high removal efficiency across a wide range of PFAS. However, the production of concentrate, which contains high levels of contaminants, poses a challenge.

Sebastian provided a technical overview of the RO process, explaining that it involves using pressure to push water through a membrane, resulting in two streams: permeate (clean water) and concentrate (contaminated water). Oasen's RO systems achieve a water recovery rate of 80%, meaning 80% of the input water becomes permeate, while 20% becomes concentrate. The concentrate has a concentration factor of about five, making its disposal challenging. The cost of producing drinking water with RO is approximately $0.23 per cubic meter, with energy being the largest cost component.

Sebastian presented data from Oasen's Nieuw Lekkerland plant, showing that the RO process effectively removes PFAS, resulting in non-detectable levels in the drinking water. He also discussed the shared RO process used at other locations, where only part of the water undergoes RO treatment before being mixed with conventionally treated water. This results in some PFAS remaining in the drinking water, particularly compounds like TFA, which are difficult to remove with activated carbon.

Sebastian addressed the management of RO concentrate, noting that the best available technology for Oasen is discharging the concentrate to wastewater treatment plants. This process requires emission approvals and periodic impact analyses to assess the effects on surface water and wastewater treatment. Oasen is also exploring further research and technologies to improve concentrate treatment and reduce environmental impact.

Sebastian concluded by emphasising Oasen's commitment to addressing PFAS contamination through a combination of treatment technologies, source control, and active participation in regulatory and lobbying efforts. He highlighted the importance of collaboration with other water companies and stakeholders to achieve long-term solutions for PFAS management.

Final Discussion with Experts

Steve Hajioff opened the discussion by expressing concern about the 20% water loss associated with reverse osmosis (RO) and its implications for water security, especially in areas with limited water supply. Sebastian Castano confirmed that RO systems indeed result in a 20% water loss, requiring 20% more capacity to produce the same amount of water. He noted that this loss can be mitigated by increasing pressure or recovering water from other process streams, but it remains a significant consideration for water management.

Steve Hajioff inquired about the size and logistics of RO systems, particularly for areas with narrow roads like Jersey. Sebastian Castano explained that RO systems have a relatively small footprint compared to conventional treatment processes. The size of the vessels depends on the number of modules they contain, with each module being about 1.5 metres long and 15 centimetres in diameter. Typically, Oasen uses six modules per vessel, resulting in a total length of about 12 metres. Despite the compact size, multiple vessels are often configured in a train to achieve the desired treatment capacity.

Ian Cousins asked about the water loss associated with nanofiltration compared to RO. Sebastian Castano responded that nanofiltration generally has lower water losses, around 5%, making it more efficient in terms of water recovery. However, nanofiltration is less effective at removing short-chain PFAS like TFA and PFBS, achieving about 80-90% removal compared to the 99.9% removal efficiency of RO.

Ian Cousins also inquired about the motivation for implementing RO at Oasen as early as 2017. Sebastian Castano explained that the initial motivation was to ensure long-term water quality stability, anticipating future pollution. RO is a robust technology that removes a wide range of contaminants, including pharmaceuticals and micro-pollutants, making it a forward-thinking choice for water treatment.

Tony Fletcher asked about the cost-effectiveness of using a second RO stage to further concentrate the 20% waste stream. Sebastian Castano noted that while it is technically feasible to achieve up to 89% water recovery, the additional costs in terms of chemicals, energy, and CO2 footprint make it less attractive. Instead, Oasen focuses on implementing other water reuse technologies to reduce water losses more sustainably.

Tony Fletcher also raised the issue of discharging the concentrate back into the river, questioning whether it would increase pollution. Sebastian Castano explained that the feasibility of discharging concentrate depends on the background concentration of contaminants in the river and the flow rate at the discharge point. In the Rhine, high dilution factors make it less challenging, but it requires careful evaluation and emission permits.

Hans Peter Birk Hansen highlighted the challenges Denmark faces with membrane technology due to the disposal of concentrate. The Water Framework Directive poses significant hurdles for disposing of wastewater, making it a major challenge for Denmark and potentially other European countries.

The discussion concluded with a consensus on the need for careful evaluation of treatment technologies and their environmental impacts. The panel acknowledged the complexities of managing PFAS contamination and the importance of considering both technical feasibility and regulatory requirements in decision-making.

Any other business

No other business was raised by the panel.

Date of next meeting

Wednesday 29th May 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)