REPORT ON PROCEEDINGS BEFORE

SELECT COMMITTEE ON PFAS CONTAMINATION IN WATERWAYS AND DRINKING WATER SUPPLIES THROUGHOUT NEW SOUTH WALES

INQUIRY INTO PFAS CONTAMINATION IN WATERWAYS AND DRINKING WATER SUPPLIES THROUGHOUT NEW SOUTH WALES

CORRECTED

At Macquarie Room, Parliament House, Sydney, on Friday 6 December 2024

The Committee met at 9:00.

PRESENT

Ms Cate Faehrmann (Chair)

The Hon. Scott Barrett
The Hon. Greg Donnelly
The Hon. Stephen Lawrence
The Hon. Aileen MacDonald
The Hon. Taylor Martin (Deputy Chair)
The Hon. Cameron Murphy

CORRECTED

The CHAIR: Welcome to the first hearing of the Committee's inquiry into PFAS contamination in waterways and drinking water supplies throughout New South Wales. I acknowledge the Gadigal people of the Eora nation, the traditional custodians of the lands on which we are meeting today. I pay my respects to Elders past and present, and celebrate the diversity of Aboriginal peoples and their ongoing cultures and connections to the lands and waters of New South Wales. I also acknowledge and pay my respects to any Aboriginal and Torres Strait Islander people joining us today.

My name is Cate Faehrmann. I am the Chair of the Committee. I ask everyone in the room to please turn their mobile phones to silent. Parliamentary privilege applies to witnesses in relation to the evidence they give today. However, it does not apply to what witnesses say outside of the hearing. I urge witnesses to be careful about making comments to the media or to others after completing their evidence. In addition, the Legislative Council has adopted rules to provide procedural fairness for inquiry participants. I encourage Committee members and witnesses to be mindful of these procedures.

Dr IAN WRIGHT, Associate Professor, Environmental Science, Western Sydney University, affirmed and examined

The CHAIR: Welcome, Dr Wright. Thank you for making the time to give evidence. Do you have a short opening statement?

IAN WRIGHT: Yes, I do. Clean and safe drinking water is a basic human right. This has been recognised as a United Nations sustainable development goal—number 6. Thorough, repeated and consistent PFAS testing, along with other harmful chemicals, is needed across all New South Wales drinking water supplies. It needs to be coordinated centrally and clearly communicated to all communities. It needs to be done in an open, transparent and timely manner. Right now we are far from that, with our largest drinking water utilities, WaterNSW, who provide water to Sydney Water, and Sydney Water blindly aware of PFAS contamination of their Blue Mountains supply—perhaps for decades. If this happens to our best resourced water supplier, what must happen in the regions?

New South Wales needs an enforced code of practice to ensure all water supplies are tested. That's both source water—reservoir, river or groundwater—treated water and customer taps, regularly. High-risk suppliers need to be tested more frequently. Quarterly testing, to me, would be the minimum. All major New South Wales rivers also need to be assessed. It is an issue for wildlife and for primary production. If there is a flow gauging station measuring the flow of the river, that would make a really good testing point for PFAS. Reporting needs to be against the current and proposed Australian Drinking Water Guidelines. People in both metropolitan and regional Australia deserve best practice. And don't forget the hundreds of thousands of people that rely on private, roof-harvested tank water supplies.

The CHAIR: I will just proceed with a couple of questions. On 15 June 2024 Sydney Water said on ABC Radio that it regularly consults with WaterNSW and NSW Health to assess any potential risk to Sydney's drinking water supply and that there are no known PFAS hotspots in our drinking water catchments. Did Sydney Water lie on ABC radio?

IAN WRIGHT: I remember hearing that statement and it was repeated many times. I've seen it written. I had to read it several times. I don't think they had the data to substantiate that claim. I don't know that they were lying; I think they were probably factually correct. We didn't have the data because we hadn't looked; we couldn't see the hotspot.

The CHAIR: You said in your opening statement just then that Sydney Water may have been or was blindly aware, potentially for decades. What do you mean by "blindly aware" of PFAS in drinking water?

IAN WRIGHT: The PFAS is likely to have been there—and I'm particularly talking about the case study in the Blue Mountains: Medlow Bath, between Blackheath and Katoomba. That is contaminated by PFOS, which is largely associated with firefighting foam, which was outlawed a long time ago by the fire authorities in the military. I have sampled it twice. I don't think Sydney Water were particularly happy that I found that with Fairfax; it was quite straightforward to sample that.

That is likely to have been there for probably decades, potentially associated with a large petrol tanker crash in 1992, when the practice—quite appropriate at the time—was to spray a burning petrol tanker with lots of firefighting foam. But it was there they made statements assuring Sydneysiders and the wider public that there were no known hotspots. I had already done sampling, strangely enough involving platypus, and I knew there were hotspots in the Warragamba drinking water catchment. But my assessment is that they hadn't done the testing to substantiate that claim. It was probably correct, but it was like a hollow truth.

The CHAIR: What you seem to find in these drinking water supplies—and even in the Belubula River, again, your testing uncovered quite significant PFOS contamination in the foam—seems to differ from what the EPA reports or Sydney Water reports. Would you care to explain what you think is going on there and why there seems to be so much difference in the results?

IAN WRIGHT: I'm heartened that the EPA are testing the Belubula River. It came as a big surprise to me, and it's really thanks to citizen scientists. The landholders there are really concerned about impacts from mining and other sources in a beautiful high-conservation river. But if you sample just the water column—remember, PFAS is hydrophobic. It is a really useful material because it resists oil, grease and water. So the smallest part of PFAS in the system is likely to be in the water column. My results line up with that of the EPA, but the sediment is about 25 times higher in terms of the concentration. The citizen scientists there—and I've followed up with research that we have under review; there have been clumps of foam up to half a metre high that are forming, which is not surprising because PFAS is a foaming agent—they had it tested for PFAS and it is in

the order of 20,000 times more concentrated, with both metals and with PFOS. So we need look at the whole system.

I have a PhD student, Kat Warwick, who has tested the livers of dead platypus that have been handed in. It accumulates in the livers of wildlife and of people. Those samples have shown us—one from the Hunter River, Newcastle; one in Ourimbah Creek; and one was the Wingecarribee River in the Warragamba catchment—enormous levels of PFOS. So we need to look at the whole system—wildlife, the sediment in the bottom of the river, the water column and any foam or anything else, as it is a foaming agent.

The Hon. TAYLOR MARTIN: Thank you for appearing here, Dr Wright. In your submission you rightly note that the US Environmental Protection Agency revisited their safe levels of PFAS in drinking water in the United States. That happened in April of this year. Are you able to give us a bit more of an overview as to why they did so and the reaction to that?

IAN WRIGHT: The US EPA have done a tremendous job. It is a fantastic resource because, for a complex topic, they break it down really nicely. The US water supplies have been severely affected in places, particularly in places like Minnesota, where the 3M company was manufacturing a lot of these chemicals. US EPA recognised that, a bit like lead, there is no known safe level for PFAS. Many of these chemicals are a relatively recent invention, so it is still emerging what the impacts are on the environment, wildlife and people. They have set very ambitious levels which are very close to, basically, the limit of detection. They are down to nanograms. It's really hard to conceive of this, but one nanogram of water, or part per trillion, is like an eye drop in 20 Olympic swimming pools. Analytical chemistry has come a long way. They can test at that level, but basically the US EPA recognised that there's no known safe level, so they've basically set it at the limit of detection for ones like the PFOS type of PFAS. That has really sent a shockwave around the water authorities of the world because it is really hard where it is ubiquitous. It's in so many different water supplies. It is really hard to treat it to get it down to that level.

The Hon. TAYLOR MARTIN: Are you in a position to give us a bit of an overview as to what the health impacts are on humans and animals, should it be accumulated in nearby humans and animals?

IAN WRIGHT: It's such an important point. It's a bit outside my expertise. I've read enough, particularly from the American literature, that the more we know—there are studies published every single day on this, but it's one of those things that adds to the burden of disease for people: cancers, cholesterol and liver issues. There's a whole series. But it is outside of my—the edge of my expertise.

The Hon. TAYLOR MARTIN: You mentioned a few minutes ago a series of suburbs and areas that have PFOS detected. How widespread do you believe this issue is in New South Wales—or Australia, at least?

IAN WRIGHT: That's a really good point, and it frustrates me enormously that it's really hard to get information on that. I'm reasonable at finding that, and the best source of information has been a map across Australia from Friends of the Earth that brings together as much information as possible. That's been really helpful—and, frankly, the media: ABC and Fairfax. Carrie Fellner's work has been fantastic. And then it depends on your water authority. The Victorian Water Authorities are really quite good at this. I think Hunter Water is good at it, and different councils. Sydney Water are catching up; I don't think they're great at it yet. But it is really hard even just for people to know that their water has been tested and it's okay. That's actually really important information.

The Hon. TAYLOR MARTIN: Is it fair to say that there is not uniform testing from region to region?

IAN WRIGHT: Absolutely.

The Hon. TAYLOR MARTIN: It's basically incumbent on either local councils or local water authorities or, as you said, local media to go out on their own and test.

IAN WRIGHT: Yes, it is falling to that.

The Hon. TAYLOR MARTIN: That's concerning.

IAN WRIGHT: That's one of the reasons Fairfax asked me to help them with some testing. But I'm very conscious about the burden on local government, who run so many water supplies, and it is difficult. Some are doing a really good job, but some of the submissions I read were really helpful and I can feel their angst.

The Hon. AILEEN MacDONALD: What are some of the options for treating PFAS in drinking water? I'll start broad and then narrow down.

IAN WRIGHT: There are enormous options. Again, I'm probably not the best placed person. I think I have a colleague from the Uni of New South Wales who has more expertise in that engineering, but it's a really fast-emerging field. Just as an aside, one of the treatments is actually called foam fractionation, where they bubble air through it and it attaches and actually floats to the surface, creating a foam. It's actually a really simple technology. It has to be carefully run, but this is such a fast-emerging area right around the world.

The Hon. AILEEN MacDONALD: For, say, people at home who are concerned and don't know, is a home filter effective for people who might be concerned about chemicals in the water?

IAN WRIGHT: That's a really, really important point and so many people ask me that. Yes, absolutely, but you need to be very careful about what filter. I wrote an article in *The Conversation* a few months ago that tried to provide some basic information. Reverse osmosis is a good filter but, again, we actually need to be careful because if you over-filter your water, it can actually then remove the minerals, which can actually leach out of our body and bones and teeth. Regional people know a lot about filters because they often have to use them for substandard supplies.

The Hon. AILEEN MacDONALD: Your research—my colleague, the Hon. Taylor Martin alluded to it—emphasises PFAS bioaccumulation in wildlife. What mitigation strategies could you suggest to protect those ecosystems?

IAN WRIGHT: It's so important. Again, at the moment, we hardly know anything about what is in the general wildlife. We've published our research on PFAS accumulation in platypus. They are an apex predator of freshwater streams and rivers in New South Wales. As it moves up the food chain, the levels of concentrations build up. It biomagnifies. Testing is needed, and something like DPI Fisheries looking at what is in fish, because the concentrations, particularly in rivers, is higher than in the ocean. One of my big questions at the moment is are the fish safe to eat? Because fishing in rivers is a very popular pastime. Even just looking at dead wildlife, testing their livers, they're really good monitors of what's around in the environment at the time. That can actually provide some guidance about where hotspots might be, let alone the conservation of that species.

The Hon. AILEEN MacDONALD: You published an article earlier this year in June on the Western Sydney University website where you said the health effects of PFOS and PFOA are still emerging. Is that still the case? If it is, can you explain a little bit more about what you meant?

IAN WRIGHT: Again, it's on the edge of my expertise, but PFOA is one of the group of chemicals in the PFAS group. It's a really confusing list of acronyms but PFOA is recognised as a carcinogen by the World Health Organization. Some of the other PFAS groups are closely watching, and it is likely that they will be recognised as dangerous carcinogens as well. Again, that medical evidence and that advice about their hazard to humans is still emerging, but I would watch that space carefully.

The Hon. AILEEN MacDONALD: You did talk about the Blue Mountains revealing systemic issues in water supply and monitoring. What do you think could be some immediate policy changes that could be implemented that would prevent similar occurrences?

IAN WRIGHT: I read as many of the submissions as I could for this inquiry. I think the EDO submission offers some really helpful advice about the Protection of the Environment Operations Act and the Public Health Act because, at the moment, it isn't enforceable if a water authority, or some agency or local government, finds it should be mandatory to report that and note it. As a start, the source water for each and every water supplier across New South Wales should immediately test and publish the PFAS concentration in their source water as well as their treated water. It is remarkable to me that something like the reservoirs of the Blue Mountains—there's five of them in between Blackheath and Katoomba. It was remarkable to me that they were only first tested in June of this year when this has been known for 20-odd years to be a risk, a substantial risk.

The Hon. SCOTT BARRETT: You touched on very briefly the concerns about water falling on roofs in people's rainwater tanks. Can you talk more to that for me, please? Considering lots of people in regional areas are off tank water, including myself.

IAN WRIGHT: It's one of the things that really concerns me. I've spent several years of my life drinking tank water, and I've drunk some stuff that's pretty ordinary. It's not a good feeling when you hold up your glass of water and it looks like weak tea. I've done studies with landholders around the Cadia area, the Belubula area. They were concerned about dust from the Cadia mine. I did a study of water tanks and found very high concentrations of solid material with metals including lead, mercury and zinc at levels well above drinking guidelines. What I was surprised about was that this was news and there wasn't systemic testing of private water tanks or any way for people to do it, apart from taking samples and going to an analytical lab. I've also now tested with PhD students around the Narrabri-Gunnedah area and even private tanks in Sydney. It is a major exposure. Why should these

people not have clean and safe drinking water or some help to have it tested? Advice is given: Clean out your gutters and clean out your tank. But if you've got one water tank, it's very hard to empty that and clean it thoroughly. I know some people have. Because the concentrations of PFAS are so small, dust containing PFAS—and it can be transmitted in dust—can easily fall on a roof and then get flushed into the water tank.

The Hon. SCOTT BARRETT: Of those contaminants that are in those tanks, regarding the risks in the dangers of them, where does PFAS sit in those risks?

IAN WRIGHT: I haven't tested yet and I absolutely will, probably with landholders in that Cadia area. They are really concerned about this, but I don't think any area is completely free of the risks of contamination. Airborne dust can come for hundreds or even thousand of kilometres. At the moment, I'd say this is a giant information gap.

The Hon. SCOTT BARRETT: There was the mention of the impacts on livestock drinking the water. Are we concerned about the health of the animal or is it the flow-on effects through the food chain?

IAN WRIGHT: I would say both, and that is an active area of research right now. There has been published research, and I gave the reference in my submission. Three nanograms—three parts per trillion—has been associated with the risk of meat contamination. Internally within Australia, we don't test anywhere as thoroughly as some of our export markets do when we export. I've recently travelled, and Australian beef is often highlighted on menus because it has a fantastic, clean reputation.

The Hon. SCOTT BARRETT: We certainly don't want to put that at risk. Is that three parts per trillion the eyedrop in the Olympic pool that you mentioned before?

IAN WRIGHT: That would be three eyedrops in 20 Olympic swimming pools. They're phenomenally small amounts that are dangerous, that can bioaccumulate.

The Hon. SCOTT BARRETT: Do you think you'd see a difference in testing at the source versus testing at the tap?

IAN WRIGHT: Not really, although it's a good point. Some of the testing can be coarse. A lot of the testing can't actually measure down to the four-nanogram level. Specifying exactly what level of testing is required to get down to that four-nanogram level, which is the proposed new guideline for PFOS, is difficult to do, and it's more difficult and more expensive testing than at a coarser 10-nanogram level.

The Hon. GREG DONNELLY: Thank you very much for coming along. Could I reconcile the language you used in part in your opening statement with point two on page 7 of your submission? That is the issue of, in your mind, the scope of appropriate and necessary—and they're my words—testing with respect to this chemical. I got the impression from the opening statement language that it was almost a need for blanket testing with respect to water—certainly water that's consumed by human beings at the very least and perhaps animals as well. But then in point two on page 7, you talk about all public drinking water supplies and then, in the next sentence, about samples collected from certain specific locations. Could you elucidate on your view specifically about what the extent of the testing should be?

IAN WRIGHT: Yes, sure. I think every single public water supplier across New South Wales—and across Australia, really—should test their source water. So for the Blue Mountains that would have been testing Lake Medlow, Lake Greaves—right where they extract the water. But particularly regional suppliers, as we know from the last drought, often their source water changes. Often in very dry weather or after floods it degrades, and a lot of regional suppliers have to shift from surface water storages as their raw water supply to groundwater. Groundwater is generally more contaminated with more issues. So regular testing of source water is needed. Then testing the water at the filtration plant before and after, because that provides some assessment of the effectiveness of treatment.

I recently saw some data from south-east Queensland that included PFAS data that a journalist had got on a freedom of information. It showed that at at least one water treatment plant, the level was about the same because treatment wasn't effective. The next level was really the customer taps, because that is generally the place—because that's what people drink—that a lot of water authorities assess water quality. Because that represents all the pipes that go through in a reticulated water supply, including often the pipes within a private home, to represent what people are actually exposed to.

The Hon. GREG DONNELLY: This is a follow-up question. I suppose what I was getting at is in terms of the specificity—all public drinking supply, so that's every last one. And then there's the added complexity of what you've mentioned with respect to regional supply and how that can move and change according to the volume of water that may be captured on the surface. Normally, I would have thought statistical analysis would be used

in the preparation of stratified random samples to test—a normal scientific method that's used. Are you submitting that that would not be satisfactory, doing the random pipe of stratified sampling and that it needs to have some greater specificity, where it's all and then perhaps some statistical random sampling?

IAN WRIGHT: I think that would be absolutely excellent. I'm heartened to hear you suggest that.

The Hon. GREG DONNELLY: No, I'm not suggesting that. I'm trying to get to the bottom of precisely what you're saying. What you're saying—and, once again, I don't have your opening statement in front of me—is that there should be almost like a universality, if I could use that word, about the testing. What's exercising my mind is what the cost of doing that would be. I'm not saying it may not be worth it. I'm saying what the cost of a universal testing, sampling exercise would be versus what I would've thought is the more normal scientific method of when you're looking at a situation, providing a proper sampling exercise and testing on that basis.

IAN WRIGHT: It would be costly. But for each water supplier, the levels of PFAS, the concentrations, can be highly variable. When I sample an area, I would take multiple samples at one time. Probably one of our best datasets is Sydney Water's PFAS data for North Richmond. They extract from the Hawkesbury River. They've already made an association between higher PFAS concentrations in wet weather, when there's more flow and more transport, presumably, of pollutants. So multiple samples, multiple occasions and under different conditions. Again, WaterNSW's sampling of Lake Medlow has shown differences at the surface and at different levels of the reservoir. Again, they differ to what's pumped out at the filtration plant. So repeated sampling with good statistics to enable a solid generalisation is required. It would be expensive, but it's really important information.

The Hon. CAMERON MURPHY: Thanks, Dr Wright, for coming along today to give evidence. I don't know whether this is squarely within your area of expertise, but I wanted to see if you could help the Committee by explaining to us in relation to branched PFOA entering the environment from PFAS precursors, and whether that's something we should be looking for, testing and monitoring. Is that in your area of expertise?

IAN WRIGHT: No, I think that's a bit out. The chemistry is very detailed, and I think that's a really important point, but it's probably best directed to a specialist in that area.

The Hon. CAMERON MURPHY: Sure. In terms of that, can you explain to us in layman's terms what that issue is about? It's precursors that end up going through an oxidisation process, don't they, that then pose the same carcinogenic risk to people at the end of that process. Is that right?

IAN WRIGHT: Again, I would be a bit uncomfortable going into any of that chemistry detail. To be honest, I would often go and talk to one of my chemist colleagues with a question like that and then try to keep up with them when they try to explain it to me. It is an important point, though.

The Hon. CAMERON MURPHY: So it is something we should also be looking at?

IAN WRIGHT: Yes, absolutely. There are thousands of different chemicals in this group. I don't think we've even got a handle on how many have been created. As they do degrade—they do; some very slowly or almost not at all. But those are really important points.

The Hon. CAMERON MURPHY: As the science evolves, it seems to me that we are discovering that many, if not all, of those chemicals end up becoming carcinogenic as that evidence emerges. Is that right?

IAN WRIGHT: Yes, absolutely. Again, it's a bit like lead. There's now no recognised safe level for lead, but you can do testing of PFAS at a coarse level and sum up all the different forms of it—and you can test for 30 of the more common, or down to five. It is expensive, and I think water authorities would appreciate some guidance on which ones to go for and what testing is appropriate.

The CHAIR: You made the point about the testing, the fact that PFOS is hydrophobic, you said, and that the smallest part is likely to be in the water column and that, therefore, you've tested foam and sediment, not just the water column. If we're talking about drinking water, could you explain why that matters? I think this is the EPA's argument, Sydney Water—and the Government occasionally has criticised your work to be saying that, "Well, they are testing the foam, and they are testing the sediment. It's the water we're worried about." So why is that an issue? Why should we be concerned, in your view, about what's in the sediment when it's drinking water that we are worried about?

The Hon. SCOTT BARRETT: Sorry, Chair. Can I add another aspect to that question? Is that okay?

The CHAIR: Yes.

The Hon. SCOTT BARRETT: I'm not changing the question. My concern is, after flood events, does that stir all that up and change the testing results?

The CHAIR: Go with mine first and then address his.

The Hon. SCOTT BARRETT: I just thought it was the same sort—

The Hon. TAYLOR MARTIN: Supplementaries.

The CHAIR: They're kind of two separate questions.

IAN WRIGHT: In answering that question, our starting point was finding highly contaminated PFAS levels in dead platypus. By the way, we didn't kill the platypus; those are dead platypus that are drowned in yabby traps or attacked by dogs are handed in by people, via Taronga Zoo. We found very high concentrations. One was found at Berrima, Wingecarribee River. Again, Sydney's drinking water catchment—where is it? We looked. We took samples, and we looked in the water. Sometimes we found it. I'd say something like—and this data is under review for publication at the moment—probably 20 or 30 per cent of samples had it. But we found it—

The CHAIR: The samples of the platypus or the river?

IAN WRIGHT: Samples of the river. We were trying to work out where that contamination in the platypus comes from. It was found at trace levels, often not at detectible levels in the water. We then took samples. It's not glamorous science, but we jumped into the river and took samples of the sediment—that's the mud, silt and sand at the bottom of rivers. All reservoirs and all rivers have this, and it was in nearly every sample we looked. We went around the main drinking water—Warragamba catchment, the main rivers. That's where the highest concentration was found. It was the same in the Belubula River. The concentration in the water, in terms of parts per trillion, it was 25 times higher in the sediment. One of the reasons I suggest that if you're doing a risk assessment—and I saw the New South Wales Government's submission for this inquiry. They had done a risk assessment for Sydney's drinking water catchment. I don't think they had done adequate testing to inform that risk assessment.

The first place I'd go to now would be the sediment. Do the water at the same time, because sometimes if you've got both, you've got a really bad situation. Then, thirdly, if you can, look at the wildlife—in the livers of fish, for example. Similarly, it's not advised that anyone catches fish upstream of the Harbour Bridge—the Parramatta end of the Harbour Bridge—because of dioxins that are in the sediment. A small part of that recirculates into the water column of Sydney Harbour. They last discharged pollution from the Homebush Bay area probably 50 or 60 years ago. Sediment is often the reservoir, and PFAS grabs onto that sediment. To your point about wet weather, where you get turbulent flow, it often recirculates that sediment and makes it available for the water column. Again, as a source of water for those water suppliers that use river water, they had all types of problems providing clean drinking water after the floods and after the drought in the past decade.

The CHAIR: Are there any other questions? I can keep going.

The Hon. SCOTT BARRETT: I've got two more. There was a theory about the contamination of a watercourse being from a truck fire many years ago. How much of the contamination that we're seeing is from incidents like that and how much is—I'm trying to think of a better word—just environmental?

IAN WRIGHT: I've thought the same thing; I've questioned the same thing. With the truck, we're talking about a Great Western Highway truck crash in 1992. That's just a theory. It's really hard to test something like that. For the waterway below that, that's the only explanation I would have. There is the Rural Fire Service. Often the foam has been used in firefighting by the New South Wales fire brigade and volunteers, as well as military bases. But in Australia, it has been mainly associated with military bases—lots of training, lots of use of foam. I think we're only just learning about other sources.

I note that a few submissions talk about biosolids, which is the solid, processed fraction from sewage treatment that has been used. That has now become a recognised risk. It was spread on paddocks—great fertiliser—but it had this unknown, lurking PFAS associated with it. I don't think we've got great data yet. To answer your question, I don't think we really know how many have come from incidents and accidents that happened over a point of time rather than a factory, an industrial source or a training base that used lots of foam.

The Hon. SCOTT BARRETT: You mentioned Sydney Water. I think you sort of touched on this. Are you worried about the capacity of smaller regional councils to maintain this testing regime?

IAN WRIGHT: I really am. I'm more concerned about the regional councils. I think it's fair to say, based on data that I've seen—I've done some testing—that the further you get away from the coast in any part of Australia, the more challenging it is for water suppliers to provide high-quality drinking water. About eight years ago, Infrastructure Australia did an assessment and noted that it is really hard for regional water suppliers across Australia to have the technology, the rating base—because they've got small populations—and even the expertise

of personnel to keep up with the standards that we expect in capital cities. I looked at as many submissions as I could. I could feel that as well from councils that run water supplies. They're going to need a lot of help to provide and ensure clean and safe drinking water, both in terms of assessing problems but also treating it to achieve that.

The CHAIR: With your water testing of the Belubula River and what you've found there, what was your communication with the EPA about that? Was that left with the community because you were undertaking the testing with the community? Did you send the samples reasonably quickly to the EPA? What did that look like at the time? Was it back in June when it first started, or was it May?

IAN WRIGHT: The first sampling of the Belubula River, the community did it. The Cadia Community Sustainability Network did sampling. My first sampling was in very late July. I saw their results and I was alarmed. I did my own results. I kept control of my samples and took them to the lab. I wanted to publish it to have that scientific scrutiny. But very early on I organised a meeting with the EPA. I met with Tony Chappel, I think, on 12 August and a group of his staff at Parramatta to let him know the seriousness of it. In the foam, it wasn't just the PFAS; it was also the concentration of metals. This is part of our research. PFAS is like a liquid glue. I remember that in the foam the levels of copper were 1,500 times higher than they were in the water column. This foam, like a lot of foaming substances, will break down and actually liquify in time. I let the EPA know in August about the seriousness of it, and I don't have that much contact but I am heartened that they have been doing assessments and they also recognise that PFAS is a major issue in the Belubula.

The CHAIR: That level of contamination—including copper, as you said, and heavy metals—in any river is of interest or concern, but the Belubula River is listed as a particularly protected, ecologically significant river. Could you remind us what that is?

IAN WRIGHT: Sure. It's listed as an endangered ecological community, and I think that is under the Fisheries Management Act. It's one of the declining habitats for Murray cod. This is part of the Lachlan River catchment. So the Belubula River all the way up to—I think at Carcoar there is a dam that is specified that protection. My reason for going there is also because it's one of the last western-flowing rivers that's a known platypus habitat, and platypus researchers like Tom Grant have highlighted what a regionally significant population it is. It has high conservation value, but it has enormous importance for primary producers. It's used for lucerne production, for vineyards, cattle and sheep as well. It's really important on the agricultural productivity side as well.

The CHAIR: With PFAS, I think it's important to explain the way it interacts with the environment in terms of the spreading nature. If you look at, for example, the Williamtown contamination and the documents and the discussion around that, it's always about this kind of spreading plume, isn't it, of groundwater? And unless it's addressed, it's not going to magically resolve itself. Why does it spread? In terms of those chemicals, why do they spread in the environment?

IAN WRIGHT: The Williamtown example was particularly associated with a groundwater plume, and, again, was similar to a lot of places in the United States where they rely a lot on groundwater. It gradually disperses. Solutions move from high concentration to low concentration. Groundwater often slowly moves. There are concerns in the Cadia area. It could be associated with the Cadia mine, which has a tailings dam. Tailings dams often have a plume under them.

The CHAIR: Do you mean the tailings dam that had the wall that collapsed?

IAN WRIGHT: Yes, I do. There are two walls. An internal wall for the second of the tailings dams collapsed. The lower downstream one held, fortunately. Tailings dams generally have a discharge plume under them into the groundwater, and the results I've seen from the mine's monitoring—EPA has recently done some monitoring—there does seem to be some transport from there into the groundwater. The foam in the river appeared to be a hotspot of hyper-accumulation of PFAS, and that would have been a great point, I thought, to put booms across and collect the contamination, but we, sadly, watched it go downstream. I was trying to encourage the EPA to look at this as studying the problem but also perhaps a great way to trap it and remove it from the environment.

The CHAIR: Was a direct request made to the EPA to do that?

IAN WRIGHT: No, it wasn't. It was a suggestion of a phenomenon that I was studying at the time and encouraged them to test and recognise the risks associated with the foam. Bakers Shaft is a public reserve on the Belubula River. I've seen kids swimming in it and people fishing. I have no doubt people are dropping a billy in the water and drinking it. But the foam—it worries me that a child would look at that like bubble bath. It is the most horrifically dangerous stuff I have ever encountered.

CORRECTED

The CHAIR: This is my last question, because we are almost out of time. Have any signs been erected along the area that you have tested and found to be contaminated? Has any government agency—NSW Health or the EPA—put any signs about that, not to swim or drink?

IAN WRIGHT: Not that I know of. I have suggested, both through journalists and with the locals, that warning signs be installed. I have spoken with a couple of community groups too, to share that, and some of them said they had no idea. It's a beautiful-looking river at this point and very popular. You can get 20 or 30 people camping there.

The CHAIR: That's the problem; you can't see it unless it's foaming, I assume.

IAN WRIGHT: Absolutely.

The CHAIR: Thank you so much, Dr Wright, for your great work, your submission and for appearing today. The Committee may be in touch if there are additional questions for you.

(The witness withdrew.)

Professor DENIS O'CARROLL, Deputy Head of School (Research), Water Research Laboratory, University of New South Wales, before the Committee via videoconference, sworn and examined

The CHAIR: Professor O'Carroll is in Canada. He has only just arrived and stepped off the plane. Professor, do you have a short opening statement prepared?

DENIS O'CARROLL: I'm somewhat prepared. I'm a bit jet-lagged, as well, as you might imagine. As a professor in water quality, I have conducted a range of studies looking at the fate of PFAS in the environment, including in surface and groundwaters globally. I have looked at literature data. Also, I do quite a bit of work looking at ways that we can remove PFAS from water and, let's say, other materials like soils.

The CHAIR: We have your submission. Thanks very much for that. We will jump to questions. You probably haven't had a chance to read many of the submissions to this inquiry, but the New South Wales Government's submission states that its management of PFAS is informed by the best science and evidence. Do you believe that's true, based on what you know and the work that you're doing?

DENIS O'CARROLL: For our PFAS study, we collected over 45,000 data points, water sample data, from across the world and from both surface and groundwaters. We put the data into sites that had a firefighting station or some kind of fire activities nearby, some that had some kind of industrial activity where we would have PFAS and other data points where there was no known source. Particularly in the no known source, we found that a surprising number of those samples were above international drinking water standards. So that is kind of like, let's say, in the Blue Mountains, where WaterNSW wouldn't have expected it to be there, but it was there. So I think that's maybe a gap. We need to get out there and sample our source waters. We don't have to sample it every quarter or anything, but we need to do a baseline sample of where humans are going to be exposed to it and just see whether or not it's in there. Our results were somewhat surprising to us in that it's there, and sometimes we don't understand why it's there.

The CHAIR: You did the 45,000 water data from across the world, which is extraordinary to think about. Could you explain to the Committee what you found in New South Wales or Australia, but largely if you could stick to New South Wales for our benefit?

DENIS O'CARROLL: The hard part is that there isn't a lot of data in New South Wales. That's why, by analogy, I'm looking at the whole world. From my perspective, there's no reason to believe, other than we didn't have manufacturing activities of PFAS in Australia—we are an industrialised nation—and where we used PFAS. There's no reason to believe that the findings that we found globally aren't consistent with New South Wales. The Blue Mountains is an example, but we sample routinely around Sydney. At the UNSW Kensington campus, we have a class, and we sampled the groundwater, the bores, on campus, and it has PFAS in it. We're not drinking it and we're doing it as a sort of a demonstration, but it's there. I don't know why it's there, but it is there.

The CHAIR: From your research you would suggest PFAS is probably in all of our water. We've heard from Dr Ian Wright before who talked to us about the studies into the platypus bodies—the dead platypus that was found—and I think what he didn't say was that the only platypus in that research that didn't have PFAS in it was one that was in Taronga Zoo its entire life and didn't swim in natural waterways. Do you think Australia is behind in its work largely on this, compared to what you're seeing in like jurisdictions like the EU and the US? Do you have any idea why that's the case—any thoughts as to why that's the case, if so?

DENIS O'CARROLL: If I could just say something about the source waters, I wouldn't say that all source waters have concentrations of PFAS above drinking levels, which are very low.

The CHAIR: No, I wasn't suggesting that.

DENIS O'CARROLL: Are we lagging behind? I wouldn't necessarily say lagging behind because certainly other nations aren't proactively sampling as well, but I think we could do better. Certainly, some nations are sampling more and getting out there and doing more. I wouldn't say that Australia's behind, but I think we could do more, given how tight the limits are.

The CHAIR: I think the frustration with you, as well, is that there's not the data. For example, we've heard regular testing of data of, I assume, local water utilities across the State. Sydney Water seems to have just started doing it and instructing the local water utilities, but there's no mandatory requirement. That's what would be suggested by you. Would that be a correct assertion?

DENIS O'CARROLL: Yes. In the past, utilities used a risk-based approach, so what they would look to say is, "If there's no reasonable thought that there's a source of PFAS coming into the catchment, then we won't test for it." But I would suggest it shows up where we don't think it's going to show up, and that is a problem.

The CHAIR: My final question before I throw to others on the Committee is this: Would you care to comment about the range of PFAS that we are currently testing for, including the revision of the drinking water guidelines and the range of the PFAS chemicals that we're testing, perhaps again compared to some other jurisdictions, and what you would recommend?

DENIS O'CARROLL: Sure. PFAS is a group of over 14,000 chemicals, so there's a lot of them. Routinely when you send that out to a commercial lab, you might send that out and get 28 of them measured, or let's say 40—more than that's regulated in Australia. But the utilities are only required, when they do—they only report the ones that are subject to regulation in Australia. That would be currently three PFASs, with a fourth one upcoming. I would suggest that there is no likely difference in cost. They should be reporting the wider suite of PFAS out there, and for a variety of reasons—and also so that we can benchmark how much PFAS is in our water compared to, let's say, the European Union standards, because the European Union standards would have a broader scope of what's subject to regulation.

The Hon. SCOTT BARRETT: Professor O'Carroll, in your submission you talk about the occurrence of PFAS declining, or the concentrations of PFAS declining. Can you touch more on that, please? Is it unfortunately ending up in dead platypuses and not in the system?

DENIS O'CARROLL: When I was looking at literature studies in the human body—and I'm not a health expert, so I look to that body of research—for some PFAS, and certainly for PFOS and PFOA, the ones that are most currently subject to regulation in Australia, blood levels have been decreasing for the last 20 or 30 years. They have been decreasing, including before they stopped manufacturing them. It's a bit of a surprise to me.

The Hon. SCOTT BARRETT: How much continues to go into the environment compared to historically?

DENIS O'CARROLL: That's a great question. I don't know that I can answer that. I'm not sure. Certainly, PFAS still continues to be added into the environment, but hopefully at lower levels. I'm not sure if other speakers have talked about what's called precursors. I don't want to use too much jargon. There are four PFAS that are going to be regulated in Australia, but there are some other PFAS that, when they are released into the environment, will degrade into those four. We call those precursors. We can still import those precursors, to some extent, into Australia. They will be banned, but there is still a limit—there is still allowable contamination in consumer products that are brought into Australia. They can still contain a little bit of PFAS, which could be a concern.

The Hon. SCOTT BARRETT: One other question that I put to the last witness as well is do you think there would be a difference in results by testing at the source versus testing at the tap?

DENIS O'CARROLL: There hopefully is, but you never know, because the drinking water treatment plants aren't necessarily—some are now, and you can see the one at the Cascade in the Blue Mountains is now. They have added new treatment systems to remove PFAS, but typically that wouldn't be the case. It might just be the same; you don't know. I should say that in sewage treatment plants the amount of regulated PFAS going out could be higher than coming in, and that's because of that changeover of these precursors. In the wastewater treatment plant, they convert them—that's what the microbes do in there—and they increase the concentration.

The Hon. CAMERON MURPHY: Professor O'Carroll, I was reading your upcoming article entitled *Characterization of PFOA isomers from PFAS precursors and their reductive defluorination*. I wonder whether you could explain to the Committee, in layman's terms, what some of the issues are around branched PFOA entering the environment from those PFAS precursors, and whether there is anything in particular we should be testing for? Can you outline the dangers first, in relation to that?

DENIS O'CARROLL: The branched PFOA is, I would say, probably one relatively small amount of the PFAS that we are introducing. We looked to see what PFAS are out there, and that was one that we found, surprisingly. It is subject to the ban in consumer goods coming into the country, so we wouldn't be allowed to bring that in—I think it's next year or the following year when we won't be allowed to bring it in. Questions around its health impacts are uncertain because it is PFOA but it's a branched PFOA. In some jurisdictions, it would be subject to regulation, and then the NHMRC has said here that it's not. There's uncertainty broadly with PFAS, including with this one that they were looking at. Does that help?

The Hon. CAMERON MURPHY: Yes, it does. The thing is, it's out there in the environment. What is it that poses the risk? Is it an oxidisation process in the environment that then could turn it into one of these carcinogenic forms of PFAS? Is that effectively what you're saying?

DENIS O'CARROLL: We would suggest that it is there in the products. It's there in firefighting foam initially, but then also there are these precursors that would convert some of the other PFAS that are there to this branch—PFOA—as well in there. So you're getting more of it with time. When it's converted, it could be converted through microbial action—so oxidation. Then the health impacts and the ecosystem impacts—that's what we need to figure out. It's definitely a PFOA, and the question is this: Is it as toxic, more toxic or less toxic than the linear PFOA—the related compound?

The Hon. GREG DONNELLY: Thanks very much for making yourself available and sharing your expertise. I'm trying to imagine the dimension of what testing should look like if we're setting this up to deal with a matter that is concerning us. I will just use the example of your statement that PFAS, as an umbrella term, has over 14,000 chemicals—please correct me if I am wrong—and that, as an example, I think you mentioned that testing might accommodate 28 of those. How would we set up—if we were looking to set up—a quality standard testing methodology in Australia for this umbrella group, noting that there are only 28 being tested out of the 14,000? The second part to the question is whether we should be testing for those examples within the 14,000 and/or the precursor chemicals—because unless we're dealing with testing for those, it seems to be missing out a large component part of what could be the problem, to the extent that there's a problem.

DENIS O'CARROLL: Hopefully I'll remember the question, but stop me if I haven't quite got it. The US EPA has established methods that are quite good. I think, in the first instance, it is testing and reporting what's under the fairly comprehensive methods that they have. It might be 40 or 30; it's not that many. That's getting at some of the ones that would be routinely measured internationally. In the second question you're talking about precursors, which is an outstanding question, and I agree. They're imperfect, but there are ways to estimate the total amount of precursors there. One is called the TOP assay, and your colleague to your right was alluding to that just now. That would be one way that you could do it. There's another one called—the acronym is PIGE, and I can't remember what the acronym stands for. But there are ways to get at the total fluorine in a sample, and measuring that will get you an estimate of the total amount of PFAS there and then the precursors.

The Hon. GREG DONNELLY: If we were setting up a standard testing regime, taking your point that presently there appears to be a limited amount of data, would it be best to set it up to test for at least some of the elements of the PFAS family and precursors? Should we be doing both? If we didn't, is that a deficiency from the get-go, in terms of what we're trying to deal with here?

DENIS O'CARROLL: I guess I'm also thinking about the necessity for New South Wales to invest in developing new analytic methods, which could be costly, so we're relying on establishments. At the moment, an issue is that water utilities don't measure and report to the public all of the PFAS that they could, relatively easily. If they're only measuring four, it would probably cost them the same to measure 28 or 40. Then it'd probably cost them a little bit more to use these other assays—the TOP assay or the PIGE one—to get more information. So I don't know that a new method needs to be established; when you collect a sample, one needs, when they send off to a commercial lab, to tick a few more boxes and spend maybe a couple of hundred dollars more per sample and get more information and report that to the public.

In government reports, when there is concentration information—and this is a source of frustration for me—that information is readily available to the public. There's tunnels going under Sydney Harbour at the moment and the Government or consultants collected an awful lot of soil samples for that, and it's in tens of thousands of pages of PDFs. I sent an email to the consultant or Transport for NSW or someone and asked for the information in a digital or Excel format and they said, "No, we're not going to do that." It would take me hundreds or thousands of hours to get that data when it's already readily available, so some of that data sharing would also be incredibly helpful.

The CHAIR: Can I just ask in relation to data sharing, a couple of the submissions talk about the Defence data and how difficult it is to get that even. Some documents I've seen after Parliament agreed to a release of Government documents—and there's a hell of a lot of boxes of that, some of which I think may be the incomprehensible data sheets that you're referring to, Professor O'Carroll. The Defence department seems to be particularly reluctant to release its data from its various RAAF bases. Have you requested data before from Defence and been given that? Is that your experience?

DENIS O'CARROLL: I would say equally, unfortunately, to the New South Wales data, as well, of Sydney Harbour, in that it is released in locked PDFs. So then what I have to do is go through and laboriously extract it, so it does take time. It is typically there but it's in a PDF document that takes a lot of time. They could be careful but release in an Excel sheet or in a database of some sort. I think for Defence, they were concerned about the amount of time it would take to black out confidential information about, let's say, if there's PFAS in someone's backyard—things that they don't want to release publicly, like the location.

The CHAIR: Thank you. That's very useful. Can I also ask you about the treatment of PFAS in terms of removing chemicals from the water if you have expertise in that? What methods are available, firstly? Also we understand the difficulty potentially of treating those chemicals actually taken out of the water when it is treated. Where's that up to in terms of the science? I know there's a lot of work on this in other countries, particularly like the US.

DENIS O'CARROLL: Yes, and there's work in Australia that was funded by the Australian Research Council that we've been fortunate enough to receive. PFAS can be relatively easily removed from water sources, such as in the Blue Mountains, using something like activated carbon or an ion exchange resin—things that you would have in your house. A Zip tap or BRITA filter—they would have filters that could remove PFAS from your water. Those just concentrate the PFAS—this is what you're alluding to. They're concentrated on the activated carbon and then you have to do something with the activated carbon because then it really has high concentrations. You have to send it off to an incinerator or put it in a landfill. That costs an awful lot of money, and there's a big carbon footprint associated with that. Then there are other methods that I try to develop, as well as researchers around the world, to break apart the PFAS molecule. We try to use electrochemical methods to separate the carbon-fluorine bond, but that's largely underdeveloped internationally and is still a challenge. So we need to keep at it.

The CHAIR: Just to be clear, you're undertaking that work—I mentioned the US, but it's happening here—in Sydney in a lab at UNSW. You're looking at ways to treat PFAS. The machine that was brought in—I think it was a cost of maybe $3 million to treat the Cascade Water Filtration Plant. Do you think that is world's best practice, what we're doing there? Do you have any comments on that method? I assume it's similar to what other jurisdictions are doing. I've had some people communicate with me about this, concerned about where the PFAS that's being treated is going to go. You may not know that answer.

DENIS O'CARROLL: If there is a source water that has high PFAS concentrations, then bringing in an established technology like activated carbon, which I think is what they have brought in there, is what one typically would do because you know it is going to work and you don't have much time to get people their drinking water. What's going to happen to the activated carbon afterwards is a concern, but there are options in Australia. You could send it to an incinerator, but I don't think there is an incinerator in New South Wales and it costs a lot of money to ship the activated carbon down to, I think, Victoria. There are significant costs associated with what to do with that laden waste.

The Hon. AILEEN MacDONALD: Professor O'Carroll, in your submission you emphasise the need for ongoing research into PFAS's environmental and health impacts. What specific areas of PFAS research should New South Wales prioritise to support their policymaking?

DENIS O'CARROLL: I think that there are a few things that could be done, like, certainly, further investigations into the health impacts of PFAS and ecosystem impacts, and further expenditure looking at the fate of PFAS. When it does get into the environment, where does it go? Source control is a really important one. For me, if we have PFAS in our wastewater and in our landfills and then it gets into us, how does it get into us? Only an estimated 20 per cent might get into drinking water. What are the other ways that we can eliminate PFAS from the environment, the easy wins? That would be very useful, and, of course, to continue to work and fund water treatment technologies that I'm working on but also other people are working on in New South Wales as well.

The Hon. AILEEN MacDONALD: You advocate for increased funding for PFAS treatment technologies. What type of technologies show the most promise and how can New South Wales encourage their development and deployment?

DENIS O'CARROLL: I'm obviously biased, but I think electric chemical ones that we're working on—and that's why we work on it—are good technologies. There are certainty plasma technologies that colleagues at the University of Sydney are working on. There is a range of technologies. One technology isn't going to suit all needs. We need to have a range of technologies. For example, if you go to the Blue Mountains, inlet concentrations are probably pretty low, whereas if you go to a landfill or, let's say, a RAAF base where concentration is really high, you probably would adopt maybe a different technology.

The Hon. AILEEN MacDONALD: I think you alluded to New South Wales reporting being often difficult to read and analyse. What changes would you recommend to make PFAS data more accessible to researchers and the public? I think you've touched on that before.

DENIS O'CARROLL: I think it's a culture change. When someone requests information, if it's readily available, then supply that information.

The Hon. AILEEN MacDONALD: That then goes on to communication. There is communication about PFAS in drinking water. What would a transparent and effective communication strategy look like and how would it address public concerns?

DENIS O'CARROLL: I'm not a communication expert. It's nuanced. It's really complicated. I think when a water utility says that the water is fine today, and then the NHMRC changes the guidelines the water utility then has to say, "No, sorry, it wasn't okay when we said it was okay." Somehow coming up with messaging and having a plan to address the nuances and recognise that PFAS regulations are probably, in my career—the regulations have changed incredibly fast. They continue to evolve. I think what we have to expect is they will change again and to somehow be prepared for that and not say, "Don't worry, everything is fine, we've got it covered," and then in six months have them say, "Oh sorry, we've changed our minds and it's not covered."

The CHAIR: I will jump in with a question about biosolids. At the moment, I know this inquiry is looking at drinking water, but a number of submissions have mentioned biosolids. I wanted to get your views on that. From what I've read, it appears that one of the key concerns about the use of biosolids from sewage treatment plants that is then used for fertilising crops and agriculture, as well as landfill sites, is the potential for it to bioaccumulate, if you like, into cattle that are eating the grass that has been fertilised. This is potentially an issue that the Government needs to address. Have you done any work, or would you care to comment on the lack of a regulatory environment so far for biosolids? Maybe just stick to the fact that it does accumulate that way and whether you've done any research to that effect.

DENIS O'CARROLL: As a disclaimer, I am funded by the Australian Research Council training centre in transforming biosolids.

The CHAIR: Okay, great.

DENIS O'CARROLL: I have an interest in biosolids and I do work with water utilities. My thoughts on biosolids is they're an incredible resource that I think we should work to try to use. They're full of carbon, nutrients and nitrogen phosphorous that we want to apply to land because it does enrich our agriculture. However, there is a possibility that we are putting low levels of PFAS and other contaminants that will accumulate with time, and this gets into the source control. We really need to figure out how we remove PFAS so that it's not in biosolids.

Also, an issue with water utility is that we, as a society, put PFAS into the sewage treatment plant. We can't blame the sewage treatment plant. We can't turn it over and say it's their problem, because we're creating it. We need to figure out how to do it so it doesn't get into the sewage treatment plant. If it does, we don't want it in our effluent; we don't want it in the water that comes out of the plant; and don't want it in the biosolids. We're going to have to put it somewhere else. That's something that we're going to have to work on and figure out. It is a challenge. It's the same as activated carbon and sending that to an incinerator or for thermal treatment. It may not be the best idea to send all the biosolids from around the country for thermal treatment because that might be quite costly. We have to be a bit careful and look at the carbon footprint associated with it.

The Hon. CAMERON MURPHY: I had a follow-up question. You were discussing incineration as a method of disposal. I presume that PFAS would be collected in some sort of carbon filter. I think the way you put it to us was that that would be high concentration which would then be incinerated. Isn't that just going to send it back into the environment if it goes through an incineration process?

DENIS O'CARROLL: No. It will break apart the carbon-thorium bond.

The Hon. CAMERON MURPHY: Does it break it down or does it just go into the atmosphere?

DENIS O'CARROLL: Theoretically and, in practice, from my understanding—I'm not an incineration expert—it does break it apart. This fluorine, or F molecule, would not be released. They'd be careful with the emissions to the environment as well. Fluorine is naturally occurring. It's in water. We just have to manage it carefully.

The CHAIR: Interesting. Any other questions for Professor O'Carroll, who is very valiantly answering questions as his jet-lagged self?

The Hon. CAMERON MURPHY: No.

The CHAIR: Professor O'Carroll, thank you so much for making yourself available at a time when you're travelling. We really appreciate it. We may be in touch with additional questions. We're continuing hearings in the new year, in February. In the meantime, enjoy—I'm not sure if it's business or pleasure—your travelling. Thanks so much for making yourself available. We really appreciate it.

(The witness withdrew.)

CORRECTED

(Short adjournment)

Mr LEIGHTON DRURY, State Secretary, Fire Brigade Employees Union of New South Wales, affirmed and examined

Mr JONATHON WRIGHT, Senior Organiser, Fire Brigade Employees Union of New South Wales, affirmed and examined

The CHAIR: Welcome back. We'll commence with our next witnesses. Will you be making a short opening statement?

LEIGHTON DRURY: Yes, both of us will be. We thank the Committee for inviting our union here today. We consider the experience of firefighters to be unique and highly relevant to this inquiry. The FBEU represents over 6,000 members as an industrial body for professional firefighters in New South Wales. Our members work across the whole State and are involved in all manner of every emergency response that happens. I have been a firefighter for over 20 years. As end users of firefighting foams containing PFAS, firefighters have a long history with this forever chemical. PFAS-related foams were used extensively in our job both in training and operations. As noted in our submission, these foams were phased out of use by Fire and Rescue NSW between 2007 and 2014.

PFAS foams were introduced to the industry as non-toxic economic solutions to putting out fires. I think we can all agree now that neither is correct. PFAS has left us a toxic legacy and firefighters have been exposed to the worst of it. There is a significant body of research correlating high levels of PFAS in the blood and adverse health effects in firefighters. This includes high cholesterol and elevated cancer risks. The work of firefighters is dangerous enough. We can be exposed to more than 70,000 different chemicals in a structure fire. It is for this reason that we have presumptive cancer legislation in New South Wales for firefighters so we can have some access to workers comp for work-related cancers.

In 2022 the World Health Organization reclassified our profession as cancer-causing. Recently this has led other Australian States and Territories to expand the list of firefighter diseases covered by presumptive legislation. In Queensland that list was increased to 23 and now includes coverage for penile cancer, ovarian, cervical, pancreatic and several other cancers. Currently, New South Wales only covers 12. The FBEU have been lobbying both sides of government to provide New South Wales firefighters with the equivalent protections. I see that in the New South Wales Government's submission to this inquiry that presumptive legislation is referenced. What is not said is that New South Wales is yet to move on expanding this legislation. Our strong recommendation to this Committee is that this be urgently addressed to ensure New South Wales firefighters have the same protections as others across the country undertaking the same work and in the same dangerous conditions.

JONATHON WRIGHT: We have a second recommendation in our submission, which speaks to the need for appropriate funding for Fire and Rescue to commence a suite of decontamination work relating to PFAS in scope, in consultation with their workforce, that will be dedicated to prioritising firefighter health and minimising occupational carcinogen exposure pathways. We've seen some great work done by interstate fire brigades that have led the way in terms of PFAS remediation. That leads to minimising liability in a public sector sense. They're also developing some really great expertise that we would like to see maybe some more knowledge sharing around. New South Wales is lagging behind, we would say, in that respect.

There are two things we want to get across here. One is about our relationship as a union with the fire brigade as an employer. When we work together with shared goals of prioritising workers' health, we can do some pretty important things. Recently we have worked with Fire and Rescue to help them identify a decent proportion of excess PFAS stock that remained in fire stations up until last year despite it being phased out in theory and on the books between 2007 and 2014. So this is chemicals stored in a pretty precarious way in the back ends of fire stations, at odds with what the manufacturer says we should be storing them in, bearing in mind that they shouldn't be there in the first place at all. That's the sort of work that we're doing together to make sure that PFAS doesn't continue to be a legacy problem in ways that we don't expect.

We're also consulting with Fire and Rescue, through our consultation framework that we have in our award, on better procurement decisions about PPC to protect firefighters from chemical exposure. We're working with them on an agreed design standard for fire stations. A lot of Fire and Rescue worksites are not fit for purpose in a lot of respects but, relevant to this Committee, also in respect to the way that we store chemicals and the regulator expects us to store chemicals. We're working with them on agreed standard, in consultation, for fire stations that is appropriate but also scalable for community need when community risks grow. Last year we also reached an agreement with Fire and Rescue to undertake PFAS blood tests for firefighters and cancer screening free of charge. The initiative is founded on early identification, monitoring and intervention, and giving firefighters both knowledge of their risks and their options. We consider it to be a very important endeavour.

Despite these examples, we have large sections of Fire and Rescue which continue to reject consultation as part of their public sector remit. We consider this pretty dangerous. Yes, we helped identify some historic PFAS in worksites but, to be honest, we had to drag the department kicking and screaming. We had to lodge an industrial dispute. We had to set up a meeting with the EPA. We had to involve SafeWork NSW, and only then did we have an audit of fire stations. We've got PFAS blood testing, but that was supposed to be implemented within six months. We're a year late on that. We've got sections within Fire and Rescue which, frankly, appear to disagree with what the research says about cancer risks and the occupation, and that's unclear why. We've got health and safety reps that are demanding some genuine consultation around exposure pathways for firefighters; that's not happening either.

Just this week we learnt of an issue involving Fire and Rescue's class A foams, which is their existing foam, and a risk that perhaps certain elements of that stock, if it's 10 or more years old—despite it not having PFAS in it, according to the regulator and the manufacturer, it may have been cross-contaminated with some stock from the testing regime. We had to hear that second-hand through an interstate fire brigade. It doesn't speak volumes about the relationship that I think PFAS requires public sector agencies to develop, which is my point.

I think the PFAS problem, in our experience, calls for greater transparency and collaboration. Things like consultation cost an agency nothing but they buy a great deal of goodwill and help us make improved decision-making with public money. We need to, I think, identify and address the deficiencies in our public sector agencies to substantially improve our response to problems like PFAS. There's a lot more that we could be doing specific to firefighter exposure and many other things that are perhaps a bit more tied into your terms of reference for this inquiry. But we need to ensure that those initiatives are funded and that we have the right calibre of public service that wants to work together and get on top of these issues for the sake of everyone.

The CHAIR: Thank you both for your opening statements. Mr Wright, when you referred to an issue with the Fire and Rescue class A firefighting foam, you said that you've learnt from your Victorian counterparts that it may be cross-contaminated from a testing regime. Would you care to expand on that more? What does that mean? What's it contaminated with?

JONATHON WRIGHT: We can expand as much as we know, which is quite limited. It appears that there is some potential "for class A foams to be tested with the same equipment as PFAS foams 10 years prior. We understand Fire and Rescue are undertaking an independent audit of these foams. They're liaising with the supplier and they will be speaking to our relevant stations should they identify any potential issues." I think there's also an intention from Fire and Rescue to remove that foam. That's all we know about it. The point is that we're hearing about this second-hand, and it's something that affects our members directly.

The CHAIR: To inform the Committee, what is the history of when some of the PFAS chemicals were removed from the foam, or we got a different type of foam—was it a decade ago or something?

LEIGHTON DRURY: The union actually had to put on what we call our code reds—which is industrial action—which bans the use of 3M foam, roughly in 2007. It convinced Fire and Rescue to take that out of circulation somewhat over a 14-month period—around that. Different foams have been brought in and out as, over the years, obviously contracts change. I think one of the problems that we're all finding now is that, as we move from different types of chemicals, we're not quite sure what the effects of any of these things are as we move forward. Even firefighting retardant is obviously great to stop fires but has knock-on effects, as you can imagine, if you pour a lot of it into the environment.

The cross-contamination stuff, we think, is probably a very small problem, but it's still a problem. Through some of our HSR work, we discovered I think it was 27 sites last year that still had historical old foam being stored. That's after, I think, three audits of stations. There were still 27 out of 335 work locations we've got at the moment. It is unfortunately a lingering problem for us in a pure sense, but also then the forever chemical that is sitting certainly in my body as I know it, and certainly other firefighters of my vintage.

The CHAIR: With the storage of the old PFAS firefighting foam stock—Mr Drury, you just called it the 3M foam.

LEIGHTON DRURY: Yes.

The CHAIR: You said that's being stored at 27 sites. Was that a result of the work you undertook to find out whether that's still stored? It was the work of the FBEU, as opposed to the EPA or Fire and Rescue?

JONATHON WRIGHT: That's right. In the appendix to our submissions, which I'm not sure were published as part of the process, we have detailed the sites in question. That was the process of Fire and Rescue undertaking an audit. Our interest was sparked prior to that, and we enabled the audit because we had members

telling us that they were seeing this stuff and asking questions directly to us. That was the problem. It was identified by our members, channelled through the union and, to tie this back in, this is the importance of consultation. This is the importance of firefighters having a seat at the table to minimise the department's liability and make sure we make good decisions.

The CHAIR: How is it being stored? Are they big, metal drums? How are these chemicals being stored—or the foam. Is it foam?

LEIGHTON DRURY: Yes.

The CHAIR: What does that look like?

JONATHON WRIGHT: We're talking about the existing foam and retardant?

The CHAIR: The 3M foam that was phased out.

LEIGHTON DRURY: Our understanding at the moment is that it has been picked up and disposed of.

The CHAIR: At all sites now?

LEIGHTON DRURY: "We hope so" is the best that we can give you. I think there are two other things—

The CHAIR: Just to be clear, who would have picked that up? Fire and Rescue or the EPA? We have both of them coming this afternoon.

LEIGHTON DRURY: Fire and Rescue are the ones that did the audit and then obviously they did the disposal.

JONATHON WRIGHT: The disposal is an important part, though. These things need to be disposed of ethically and appropriately. You don't want any situation where someone might do something accidentally with it—like pour it down the drain, for example. It's 2024. It's a long way from 2007. This stuff should not be there at all.

The Hon. TAYLOR MARTIN: Thank you both for appearing here today. Can I ask a bit more about the blood testing. I see in your submission that you were successful last year in having Fire and Rescue cover the cost of screening. Before that happened, how were people finding out? Mr Drury, you said yourself you have a level in your body.

LEIGHTON DRURY: They have to go and pay for that test themselves. It's quite an expensive test. Unfortunately, that testing, under the award, still has yet to commence. In my understanding, it is imminent, although now nearly nine months late. But, yes, they had to pay for that themselves.

The Hon. TAYLOR MARTIN: Further to blood tests, in your submission you say that you were successful in getting comprehensive cancer screening provided by Fire and Rescue. Are you able to elaborate a bit more on that and what that includes?

LEIGHTON DRURY: Again, still under consideration by Fire and Rescue about how they believe that the award clause works. We were quite clear on what we thought it meant, and that was that firefighters, if they felt they were at risk—because again it's a volunteer for these types of testing. It is yet to be rolled out and yet to be implemented so, again, we're dragging behind nearly every other State and Territory at the moment. Kicking and screaming is, unfortunately, the way Fire and Rescue seems to like operating.

The Hon. TAYLOR MARTIN: Understood. Are you able to give us a bit more of an idea as to the morale in Fire and Rescue, in the firies, and what their thoughts are on this subject? There's been a lot reported in the media for years now on these substances. Are you able to give us a bit of an idea?

LEIGHTON DRURY: I think firefighters are frustrated, certainly the ones that dealt with these chemicals a lot through their career. There's certainly levels of frustration and anger, but not necessarily because of the fact that they were exposed. I don't think they necessarily blame Fire and Rescue for putting them in that situation. Rather, it is the lack of "How do we fix this going forward?" As Jonathon said, we knew there was a problem in 2007 and 2008, and now we're in 2024. The first legislation for presumptive cancer was entered into the Federal Parliament, I believe, in 2012. We only introduced it under the Liberal Government in 2018, and here we are now, two years later, after having conversations about adding the next cancers and we're not seeing anything there either.

JONATHON WRIGHT: I think there's probably an important point there. When you look at the language that's used around PFAS and environmental concerns, or with government departments, it's about properties. There's this phrase that gets bandied about called the "precautionary approach". Now, the precautionary approach

is also, in principle, something under the health and safety Act. Firefighting is an industry where we have always looked at the harm it does to those workers retrospectively. There's always going to be another PFAS, it's a dangerous bit of work, but the precautionary approach and principles aren't being applied to the way that we talk about firefighters' health. That is one of the things that makes our members most frustrated, and it's not difficult to address. It's about providing a level of comfort, about acknowledging the risks of the work, and just putting in some very basic scoping to assist—like the testing regime that we won in the award.

LEIGHTON DRURY: There's a further point to this as well. I don't necessarily blame Fire and Rescue to this point but certainly the Government, and I say all governments, certainly the preceding one and the current one—Fire and Rescue has over 400 sites that may or may not have been exposed to PFAS. At this stage, the number of sites that have been under active investigation is 23. The number of sites where investigation has not even started is 358. This is all about money. There's not enough money going into Fire and Rescue to fund—to get the testing done.

Obviously, this foam, as I said, was used in drills, was used in training, and a lot of that training was done at the fire station. A lot of those fire stations are in residential areas. They are in areas that now have day cares and schools next to them where, obviously, playing in the dirt is how you get exposed to some of this stuff, and that is becoming quite a problem. We have, I think, 90 sites that may or may not have been affected by PFAS that are now not in Fire and Rescue's hands. We know that some of those are now turned into day cares or they're turned into houses—because it's quite trendy to buy an old fire station as a house—and none of this has been tested. Again, that comes down to a lack of funding that the Government needs to provide to Fire and Rescue to get that done.

The Hon. TAYLOR MARTIN: Has the union reached out to any other unions in other jurisdictions overseas, like the US and Canada? I imagine a lot of Fire and Rescue equivalents in the US are run by municipalities as opposed to how they're run in States here. Have you had any experience reaching out and getting some background from overseas as to how they've grappled with this problem?

LEIGHTON DRURY: US laws are a little different. They're certainly a little bit more lax than I would suggest they are here. But certainly, interstate, we've been doing work with Queensland. The lead on this really is Victoria, to be fair. Obviously, they had massive problems down there with the Fiskville problem. They've been out there, front and centre, on that. There is some good information from other States.

JONATHON WRIGHT: The publicly available information from overseas points back to presumptive legislation. That is a key component. There is also a lot of dialogue about PFAS being included in the manufacturing of PPC and turnout gear. That's another level of discussion, but it's evolving. Going back to our original point, the knowledge sharing around this space could be a lot better because there's plenty to learn.

The Hon. AILEEN MacDONALD: I'm not sure who to address my question to. I thank you all—you successfully advocated for PFAS blood testing, although it has been delayed. This follows on from the Hon. Taylor Martin's question. What can you do to make sure it happens? I believe we need that information in order to follow through with some of your recommendations there. What is causing the delays, and what can the New South Wales Government do to expedite it?

LEIGHTON DRURY: My understanding is that there is a cost to the testing. We're not sure whether Fire and Rescue has been given the budget to deliver on that. As I pointed out, our members are across the State, and there was a slight issue in finding a provider that could do across the State, because it is quite specific testing around PFAS. But you're quite right: The information is necessary because when we looked at air service firefighters, they had a massive amount of testing done, and all the people pre-2012 did have a significantly higher level of PFAS in their body than post-2012. Obviously, that's becoming a very big problem for them. Hopefully things are moving along, but certainly the Minister wouldn't mind opening his purse strings to get that money out to make sure that we're not robbing Peter to pay Paul on this one either. Unfortunately, when you don't have enough money and you've got to pay for this over here, then we lose something over there that's just as important.

JONATHON WRIGHT: I think we could be a little bit more sceptical, too. We're talking about this with a backdrop of having won the PFAS testing regime last year in our award bargaining, in a 2023 award, and having won consultation clauses in our 2023 award that are very important to us. Now we're in an arbitration process about our current award. We're not going to sit here today in this Committee and talk about wages, but consultation arrangements seem to be Fire and Rescue's only interest in attacking in that arbitration. They want them out. So there is a cultural problem around consultation in some of our agencies, including Fire and Rescue, and the point is that it's not leading to good outcomes at all.

The Hon. AILEEN MacDONALD: You mentioned legacy and environmental issues with the PFAS. With the storage currently, how can we ensure that it is being stored properly and then disposed of? How do we avoid more contamination and environmental degradation?

JONATHON WRIGHT: There are probably two points. One is record keeping. One of the historic problems with PFAS is the record keeping of the emergency services sector. That has improved for Fire and Rescue, but you still have agencies that can't even tell you how many volunteers they've got on the ground. We've got a lot of work to do in establishing public money spent and what we are getting out of it, and having it measurable and documented.

The second thing is, if we're talking things like chemical storage—of any chemicals—as I said, we're trying to develop an agreed standard for fire satisfactions that considers what SafeWork says about the storage of chemicals and considers what the manufacturer says about the storage of chemicals, but that's going to cost money and investment, and Fire and Rescue's budget for their properties is alarmingly underwhelmed. What's the figure?

LEIGHTON DRURY: We're currently at an $800 million underfund in regard to what the next 10 years looks like for New South Wales fire stations. The average age is way over what they should be. Obviously, bringing it all in line with safe working practices, not just for firefighters in their clean and dirty areas but around how you store chemicals, how you store fuels, our fire stations have not had any of that upgrade since they were built. So the new ones are fine, but at this rate we will still be having this conversation in 50 years.

The Hon. AILEEN MacDONALD: As our Chair pointed out we have got further on in our witness list—what kind of questions would you suggest that we ask them? I've got some questions that I have pre-prepared.

LEIGHTON DRURY: It's an interesting question because the commissioner, in a lot of ways, is doing somewhat the best with the money that he has been given. I'm not quite sure if he's going to answer particularly honestly around—

The Hon. AILEEN MacDONALD: Maybe he will take it on notice.

LEIGHTON DRURY: But certainly, yes, the commissioner needs as much money as he can to deal with this problem. It is as simple as that. We only got a briefing—I think it was last week or the week before—from the PFAS team. They're concerned that it's going to take them 50 years to get through identifying the sites that they've got—testing them and working out whether they get remediated or not. I just don't think we should be doing that for the next 50 years, in my view.

The CHAIR: You've just said "PFAS team". Is this a team been within the FBEU?

LEIGHTON DRURY: No. It's Fire and Rescue.

The CHAIR: We can ask them about that.

LEIGHTON DRURY: Yes.

JONATHON WRIGHT: It might be worth asking about the priorities of Fire and Rescue's health and safety team with respect to PFAS. It might be worth having a chat about any cultural issues about acknowledging the research that supports a correlation between firefighters and cancer risks. I think a good question too is when we talk about these issues of properties and funding, sometimes you get to a bit of an unfortunate circumstance where the agency is so used to being told no that they're no longer writing the business cases that push the boundary. We are constantly left in the dark as to whether those business cases are truly being written or not. Because if they were truly being written and the answer was no, then we would know where to go and take that argument, but often we don't.

The Hon. SCOTT BARRETT: Mr Drury, you mentioned the 350 sites. I am presuming that what was implied there was that these are sites with high levels of PFAS on them that potentially, or most likely, are further contaminating surrounding areas.

LEIGHTON DRURY: Put it this way: There are 23 that are under active investigation right now. The number of those sites with limited or low priority—which means there's low exposure—is six. So not all the stations have a high exposure, but there would be levels of exposure. I would say about 80 per cent of those 358.

JONATHON WRIGHT: Can we just add too that one of the limitations of Fire and Rescue's original scoping of which sites to prioritise is that it was limited to a very basic survey that looked like that. It asked questions of our membership, about their historic use of PFAS. It's one way to approach it, but it's also limited. You might be speaking to a cohort of firefighters who never used this stuff at that time. And, as far as we can tell, the scoping was limited to that survey. That's it.

LEIGHTON DRURY: To put it into context as well, the number of sites that have been remediated is five.

The Hon. CAMERON MURPHY: I want to come back to the issue about record keeping. I think it's a really important point that you make. Could you expand on it? You've highlighted the safety risk. We've got these new foams and new chemicals that are being used as effective substitutes for PFAS. It may well be that in 10 years time we discover that they're just as dangerous as PFAS. They've got carcinogens in them or something. What would be best practice in terms of that record keeping? Should we have a publicly available register that lists every item that's used by location in each fire station, for example?

LEIGHTON DRURY: One of the things that we're pushing for in our award is an exposure register. Part of that exposure register—we're talking about what was at the fire, which is obviously very hard to do whilst they're fighting it. It's generally done in the clean-up, and you go, "Right, there were these chemicals in there and that"—blah, blah, blah. We're asking firies to maintain a register of who attended those fires, what we think was in there, what foams were used and what other things were used as well, because obviously, down the track, the next foam might be the next PFAS. Again, they're fighting that. They think that's a bit too time-intensive, what would be the point, so forth and so forth. Again, it probably comes down to cost. Certainly, we would think it would be appropriate that nearly any chemical that we use across our industry, whether it be for training or not, is put down as an exposure and put down on the register—even for the firefighter, who then has to struggle to work out how they're going to get workers comp down the track.

The Hon. CAMERON MURPHY: You gave the example of former fire stations being sold that are being repurposed as homes or childcare centres or whatever. Without a register like that, you just don't know what has been stored there in the past or for years unless you can track down firefighters who worked there and might have some knowledge.

LEIGHTON DRURY: Absolutely. It was only last week when we were talking to that team and they were speaking to the union's State committee that we identified for them the old Bathurst Fire Station, which is now a childcare. To my understanding, it wasn't on their register. You're right—a register like that, moving forward, when going back as far as possibly that they could, would be very useful.

The Hon. CAMERON MURPHY: Would it be an important factor to have it as a publicly available register rather than something that might just be contained within a government agency—Fire and Rescue or somewhere else?

LEIGHTON DRURY: I'd have to think on it more broadly, but I wouldn't see why it wouldn't be open and transparent. We are in consultation with Fire and Rescue at the moment around Lithgow Fire Station. They've just purchased a block in the middle. They're going to be bringing the two fire stations together, but that block is reasonably contaminated with PFAS as well from mines rescue, because mines obviously were using a lot of foam as well. I suppose my point to that is there are blocks on the market out there at the moment that people may or may not know if they have PFAS on them or not.

The Hon. CAMERON MURPHY: I'm coming at it from the perspective of not repeating the same mistake where you don't know it's out there, and it's very difficult to go back and audit it and figure out who is exposed and where. If we're using other chemicals that might pose the same risk or, because of trade secrets, we don't know exactly what the formula of it is, having that register now of where it has gone will be useful to deal with that risk later if it emerges.

LEIGHTON DRURY: Yes, I totally agree, Mr Murphy. Did you want to add about the retardant?

JONATHON WRIGHT: Even the fire retardant that's being used in aerial firefighting, which is a booming concept in Australia all of a sudden, which we've made reference to in our submission—we learned a lot through GIPAAs. That's about the only place we learn stuff. So 23 million litres of fire retardant was dropped through aerial firefighting by the RFS during the 2019-20 bushfire season. One drop included some issues of potential legal liability when that retardant was dropped on someone's organic farm. We're unclear about what happened there. But the only thing that's publicly available about the risks of that retardant is a very small statement from NSW Health, and it's unclear.

There's a lot of work to do. We put an FOI into the Department of Defence, who organised some testing of this particular retardant that we've referenced in the submission; it's called Phos-Chek. We got something back that it was tested on earthworms, and that's about it. We said, "Where's your scoping document?" Because if you've asked for someone to do an investigation, surely you've scoped what exactly they were looking at, and there are no documents to be found yet. I think we've got a lot of work to do in this space, and it all comes back

to the lessons learnt from PFAS. It's not enough just to remediate it. We need to have a look at all of our government sector arrangements.

The Hon. CAMERON MURPHY: Are there any jurisdictions from around the world that you're aware of that do have a best practice system for keeping registers? Is there any one country or one area that does it better than anybody else?

LEIGHTON DRURY: I would suggest that most are doing it better than New South Wales. To point one out, we would have to look into that for you.

The Hon. GREG DONNELLY: Thanks, gentlemen, for coming along today. With respect to SafeWork NSW—as you know, there's also the national body that deals with workplace issues involving all the States and Territories—where, if at all, do they or have they fitted into this matter with respect to fire brigade employees in New South Wales and Australia?

LEIGHTON DRURY: I couldn't specifically say to this issue, unless you've got the information.

The Hon. GREG DONNELLY: We're talking about regulators.

LEIGHTON DRURY: Up until very recently, it has been very difficult to get SafeWork to address some issues within Fire and Rescue. That historically comes off the back of, "We're a government department; why would we go after you?" Our understanding, under the current Minister, Sophie Cotsis, is that attitude needs to change and will change. Hopefully, that is true. Obviously just because you're the Government doesn't mean you're immune to being a crap boss, to be honest. Certainly some of the things that we see in the emergency services sector are probably worse than some of the worst building industries. It has been hard for us to get the regulator to move on some of the issues for us, especially in that space.

The Hon. GREG DONNELLY: Could I invite you to be more frank? Are they currently dealing with or have they historically dealt with any matters to do with PFAS and your concerns?

JONATHON WRIGHT: We involved them in the PFAS audit issues we were having last year. To be frank, it was pretty wet. There was a bit of a change of a regime, but we're not seeing it down on a SafeWork inspector level. We'd like to. It is a bit reactive. It's a bit like, "Give the employer another go." It's not great. That's the experience not of the union but of our health and safety representatives, so our firefighters who are subject matter experts who are putting in PINs, putting in issues to the regulator, and having conversations with the inspectors. I think it needs a lot of improvement. There needs to be some teeth in it too.

The Hon. GREG DONNELLY: Mr Drury, you have very helpfully raised examples of sites and those in different categories of, dare I say, seriousness, from some which are perhaps highly problematic and down a scale. Does that capture the universe of firefighting in New South Wales with respect to State government-controlled sites or are there gaps in there? In other words, we don't even actually have an audit of the universe to actually know that what we're dealing with are the actual boundaries of the problem?

LEIGHTON DRURY: It's a very good question. That is a rabbit hole for all of you to go down. Obviously we did things at training sites. We can specify those straight down to an address. That's where the fire station was. But the operational side of things—

The Hon. GREG DONNELLY: That's what I'm particularly interested in, yes.

LEIGHTON DRURY: —there are plenty of petrol tankers that have caught on fire. There are plenty of petrol chemical fires that we've attended to as part of our work over the past 130-odd years—whatever it is—that Fire and Rescue has been around for.

The Hon. GREG DONNELLY: I'm specifically interested in the sites.

LEIGHTON DRURY: I think you will see that some of the stuff in the Blue Mountains, around the Medlow Bath area, is due to us attending incidents and pouring hundreds and hundreds of litres of PFAS foam to put out an emergency. I'll be fair to Fire and Rescue; I don't think they're backing away from sticking their hand up and saying, "That's exactly what we did because that's exactly what we had to do."

Do we have a register of every one of those things? I would go back to Mr Murphy's point around data collection.

The Hon. GREG DONNELLY: Can I draw you back to the sites? I'm talking about the fire stations. You've dealt with the training facilities. Are the fire stations, in your view, being satisfactorily audited?

LEIGHTON DRURY: No. They're part of the 358.

The Hon. GREG DONNELLY: That's good, thank you.

LEIGHTON DRURY: But again, going to those operational sites—

The Hon. GREG DONNELLY: Yes. I'm not dismissing those.

LEIGHTON DRURY: —that is probably an even bigger great unknown.

The CHAIR: You were just mentioning, Mr Drury, what was happening decades ago with, for example, a petrol tanker accident and the crew having to put that out. Recognising that some of those PFAS chemicals aren't in the foam being used now, you have also said—and I think we've expressed the same—that we don't know whether in a few years time what's being used now is also potentially carcinogenic and not great to be released into the environment. How is it different to how that foam is contained and managed and the decisions made as to whether to use it or not compared to obviously a few decades of free-for-all and the videos of people up to their necks in the foam—stories I've heard—for fun actually? But the difference now in terms of applying it at a site, is it more contained? Are the requirements as to whether to use it stricter standards or, if there is a petrol tanker, you would just go hell for leather anyway and just spray whatever you need to and it's not contained?

LEIGHTON DRURY: It's a hard question to answer, Ms Faehrmann. Have training and operational guidelines improved? Yes, they have. As you could imagine, operational situational problems vary all the time. If you have a petrol tanker alight on the M1 and you only have one fire truck there, you are putting water and foam on it at the start to obviously minimise it. You're not blocking drains. But if you have three appliances there, you can obviously start blocking drains and start containing it but, again, that comes down to how many resources you have on the ground, which is why—

The CHAIR: Sorry, even just in terms of blocking drains—you're dealing with the Committee here—that's important information for us to know. That's what I'm asking I think as well. You are able to do that potentially?

LEIGHTON DRURY: Yes, absolutely.

The CHAIR: It wasn't happening 15 years ago or whatever, I suppose.

LEIGHTON DRURY: It was 15 years ago but it was certainly not a priority. The priority was probably to put the fire out and then start looking at all the run-offs. But it does go back to, though, our response times. The quicker we are and we get to these events—it exponentially grows the problems to the environment and the community the longer that we take to get there. It's as simple as that. Fire and Rescue, we are the all-rounders. There is a saying that if you don't have to shoot it or put a needle in it, we do it. That goes from hazmat through to storms through to tempests. Every firefighter now comes out of the college trained on how to block drains, how to dam, build ponds—the whole lot. One of the big parts of our job now is overhaul and salvage. It's not just about putting the wet stuff on the red stuff but certainly making sure that run-off doesn't go anywhere else, or as little as possible.

JONATHON WRIGHT: I think what we're also talking about is education and about tactics of last resort on the firegrounds. We're talking about the work of professional firefighters. We have circumstances right now where we have a commitment for 600 new firefighters over two terms of government, which is important because they did not budge over a 10-year period, and we can't get them trained. But at the same time, we're seeing increased expenditure on things like the Rural Fire Service, urban pumpers—equipment that's designed for structural fires and suburban fringe areas—being spent in south-west Sydney areas and areas with growing community risk, and we can't get our members trained. There has to be some balance. We've suggested in other forums that we really need a proper review of the emergency services sector funding: Who is getting what and what can the Government demonstrate the community is getting out of the funding. We need to stop the erosion of professional firefighting. We need to back it in, and it's subject matter expertise.

The CHAIR: Mr Drury, going back to when you said you can't get some of your members trained, what were you referring to?

LEIGHTON DRURY: We certainly don't have the resources at the moment to put as many people through the training college as we need. That's certainly required at the moment because we are 300 firefighters short in our permanent ranks. In our retained ranks, we are 600 short. It is becoming quite a problem, obviously. But the risk only continues. You have Badgerys Creek airport, with planes landing sometime in the next couple of years. There is no fuel pipeline going out to that. That's all going to be carried by B-double trucks, and you can imagine how much fuel will be floating along the M4 and the M7 daily, and the risk that will put onto the community. That's the sort of thing that the Government needs to be taking into account as well when we start looking at the capability that's required to deal with that risk.

The CHAIR: That's an interesting note to finish on. Our time is up. Thank you very much for making yourselves available. We really appreciate it. We will be in touch if we have any further questions for you.

(The witnesses withdrew.)

Mr TONY CHAPPEL, Chief Executive Officer, NSW Environment Protection Authority, sworn and examined

Mr STEPHEN BEAMAN, Executive Director, Regulatory Practice and Services, NSW Environment Protection Authority, sworn and examined

The CHAIR: Good morning, Mr Chappel and Mr Beaman. I assume you have an opening statement.

TONY CHAPPEL: I do, thank you, Chair. Good morning. Before I begin, I acknowledge the traditional custodians of the land on which we gather, the Gadigal people, and extend my respects to their Elders, past and present, and to any Aboriginal or Torres Strait Islander people in the audience or on the Committee. PFAS contamination of waterways and drinking supplies in New South Wales is a complex and challenging issue. With this in mind, I'd like to start by providing some context on the role the Environment Protection Authority plays in the New South Wales Government's response to PFAS contamination.

Since 2016, the New South Wales Government has implemented a whole-of-government approach to investigate and provide the community with advice on legacy PFAS contamination. It involves taking a risk-based approach to identify potential risks using agreed national policies and standards such as the National Environment Protection (Movement of Controlled Waste between States and Territories) Measure 1998 and the National Water Quality Management Strategy. When it comes to the EPA specifically, since 2016 we have delivered the largest PFAS investigation program in the country. This program is guided by appendix B to the PFAS National Environmental Management Plan Version 2.0, which lists out the priority sectors for investigation.

Through this program, we have systematically assessed more than 1,100 sites in New South Wales. We have identified 51 sites in New South Wales with significant PFAS contamination. This means they remain a high priority and require continued investigation, remediation or monitoring. The EPA also advocates on behalf of the community impacted by significant pollution caused by the Commonwealth Government, such as that stemming from defence bases. To ensure that those risks are assessed and managed, we work as hard as possible, even though we do not have legislative power or jurisdiction to do so directly.

When it comes to drinking water quality, that is the responsibility of NSW Health under the Public Health Act. NSW Health regulates and works with water utilities to ensure they have assessed risks and have undertaken monitoring for PFAS where it is identified. The EPA supports NSW Health with this work. In New South Wales, we've also established a whole-of-government team of experts known as the technical advisory group, or TAG, which is chaired by the EPA and consists of government experts from the EPA; NSW Health; the Department of Primary Industries and Regional Development, including Fisheries NSW, Agriculture and Biosecurity, the NSW Food Authority; and science from the Department of Climate Change, Environment, Energy and Water.

The TAG reviews investigation and scientific reports and sampling results to help develop tailored and general precautionary advice on actions impacted communities can take to reduce their exposure. The TAG also assesses ongoing monitoring reports for specific sites, such as RAAF Base Williamtown, and undertakes detailed risk assessments used to formulate specific tailored dietary advice for safe levels of consumption as precautionary advice for the community. Additionally, the New South Wales PFAS expert panel provides strategic advice to us, the EPA, to assist in developing coordinated responses to PFAS issues. Established under the Protection of the Environment Administration Act, the expert panel is chaired by the NSW Office of Chief Scientist and Engineer and consists of senior officer representatives from the same agencies that make up the TAG.

The work the EPA is involved in in the PFAS space doesn't stop there. The EPA assists authorities to comply with the New South Wales Government ban and restriction on the use of long-chain PFAS-containing firefighting foam, unless it's being used for fighting catastrophic fires. Thanks to the passing of the Environmental Legislation Amendment (Hazardous Chemicals) Act in March of 2024, New South Wales is also now aligned with the national Industrial Chemicals Environmental Management Standard, known as IChEMS. Under IChEMS, PFAS chemicals PFOA, PFOS and PFHxS will be prohibited from being imported, manufactured, exported or used in Australia from 1 July next year. The EPA is also focusing on stopping PFAS from being included in everyday products and packaging, like compostable packaging, because of the risk to waste streams and other uses.

This work includes guidance on how to test and report on PFAS in fibre-based food content packaging and how to find alternative materials. Earlier this year in the paper *NSW Plastics: Next Steps*, the New South Wales Government and EPA proposed specific actions to remove dangerous chemicals from plastic products generally. The focus of EPA actions is on managing existing PFAS-contaminated sites and preventing further contamination from occurring. The issue of PFAS contamination remains complex and the science is continuing to evolve. This is why the EPA continues to review and, when necessary, update the measures we are taking alongside other

New South Wales and Commonwealth government agencies to ensure we protect the environment and human health from PFAS contamination.

The CHAIR: Let's go to those 1,100 sites that the EPA has investigated over time, and then there's been 51 sites that have been identified with significant PFAS contamination. What was the process of the 1,100 sites? How were they determined? Are they all firefighting sites, for example? How were they identified to begin with?

TONY CHAPPEL: No, it's a whole range of sites. We use the National Environmental Management Plan 2.0, which lays out a number of industrial and other legacy uses of these chemicals, and we work through those on a catchment basis. But I might ask my colleague Mr Beaman to give you a bit more detail of the process.

STEPHEN BEAMAN: Our knowledge from 2016 to now has really evolved. What we started with were the sites that had been notified to us. There's a range of data sources that we pulled in. It wasn't one data source. We looked at the sites that had been notified under the Contaminated Land Management Act more generally—so what were those sites, did we have any data on those sites. We looked at appendix B of the NEMP. That has in it a whole range of activities, and that's grown over time—the national standards—about the types of land uses and activities that occurred on sites that warrant further investigation.

We wrote to every local council in 2016 and 2018 to ask to do a sweep of local government and say, "Are you aware of it in your particular areas?" Local government, in particular, has a really good understanding of their areas. But the initial program really started with looking at the areas that had really high historical uses of PFAS foams, and they were places like the RAAF bases and major airports. Where people did a lot of that fire training were the areas that had the greatest contamination and risk.

The CHAIR: We just heard evidence from the FBEU and it has been in the media as well about the firefighting foam. Just one example is that possibly the source of the Medlow contamination was a big accident. But also there has been the Black Summer fires and fire retardant was being used—or maybe it was historic fires. It's more than just the 51 sites, though, isn't it? What is the EPA doing more broadly around the risk of PFAS in the broader environment—in our waterways and bioaccumulating in our wildlife? What does that work look like?

STEPHEN BEAMAN: It's a really interesting point. The original program started to look for those. We had to triage it, really. That has really been the work of the last seven or eight years. It's where do you put your effort to the areas of greatest risk? We've really seen the NEMP come into that. We share a lot of information with the other EPAs around the country that are doing this. One thing I would point the Committee to is a really interesting report published by the Victorian EPA in October 2022, where they had done some ambient monitoring in the environment. Interestingly, that work showed you will detect PFAS in 100 per cent of samples in urban environments and almost 75 per cent for PFOS even in agricultural environments.

There has been a body of knowledge growing about the ubiquitous nature of this in the environment. That's why, as a chemical, it concerns us, because it has those three characteristics about being persistent, it bioaccumulates and it has toxicity to it. When we do our site assessments, we often start at the site and then work our way out from the site, looking at what those pathways are. You will hear us talk about "identify source"—this is using the national framework. We will identify the source, what are the pathways, and then what are the receptors—the receptors being both human and ecological. We work through that systematically. When we have done work, particularly around the big defence bases, we are looking at those impacts on aquatic environment—on fish, prawns and yabbies. We have been looking at those impacts more broadly.

I listened a little bit this morning. I think the work that we have been doing with the community at the upper reaches of the Belubula has been an example of that—looking for those particular sources in the upper part of the catchment—and we're now working our way systematically through what are those exposure pathways into the environment more generally. But, to be really clear, it does concern us. It has been in the literature—it's the expanding thing in the literature—the nature of this contaminant. That's what concerns us about it: its bioaccumulative characteristics and its persistence in the environment.

The CHAIR: Just to be clear, the EPA is concerned about the extent of what you're hearing over the years, but are you concerned about the extent of PFAS chemicals generally in the environment?

STEPHEN BEAMAN: Yes, I think the literature is showing that the chemical is actually persistent and bioaccumulates in the environment.

The CHAIR: That's the literature. What's your research showing—the EPA's work?

STEPHEN BEAMAN: We see that type of accumulation happening in the food chain. When you do a study on a defence base and then you go and do the biota sampling in the area around the community, you do detect PFAS in fish and other wildlife.

The CHAIR: How long has the EPA known that this has been a concern?

STEPHEN BEAMAN: This is the work that has really stemmed from 2016. Every time we have done work in that community—I'll take Williamtown, for example—the reason you do the work on biota is to give the community dietary advice. We have been very transparent. For example, at Williamtown we doorknocked almost 750 people. We have been very transparent in trying to give the community the best information that we can, using the latest science, so people are aware of what those harms are.

The CHAIR: You are saying since 2016—that came about as a result of the focus and the attention on what was going on in Williamtown. The EPA has known that there has been—you are concerned about the level of contamination in the environment. Has the EPA or did the EPA ever suggest to water utilities, to Sydney Water, and to the rest of government that they should be testing, mandatorily, the drinking water across the State, and why hasn't that happened?

TONY CHAPPEL: The regulation here is quite clear. NSW Health is the regulator for the drinking water standards and works with the utilities—

The CHAIR: Yes but, with respect, the EPA is the organisation that has just said it has been aware of the contamination in the environment for some time. The literature—you are concerned about the levels of PFAS chemicals in wildlife and in waterways. Why has the EPA not, over many years, strongly urged all of the water utilities to test their drinking water?

TONY CHAPPEL: I think there are a few elements there. The EPA doesn't have jurisdiction as the regulator for drinking water. The catchment managers are responsible for managing the delivery of that water. As I said in my statement, there has been a whole-of-government technical advisory group and expert panel chaired by the chief scientist. It is important to acknowledge that the science on this issue has been evolving. It has evolved quite rapidly, and when the science shifts we shift and we take as proactive a posture as possible. But, in terms of the health implications and the delivery of safe drinking water, really, the approach taken by NSW Health is something that I can't speak to.

The CHAIR: Just to be clear, though, Mr Chappel, the EPA is responsible for alerting NSW Health to any concerns. For example, if you find any contaminants in the air or the water, surely, at a certain point, you do notify NSW Health. I understand from communication I have received from an SO 52—one example is the Belubula River detection—that NSW Health were quite concerned that you did not notify them of your test results and the concerning issue there for some time. NSW Health expects you to notify them; that's for sure.

TONY CHAPPEL: We do. We talk to Health very regularly, but we rely on Health for the environmental health advice, the health expertise and the evolving understanding of the health implications of these kinds of chemicals. We partner very closely with Health. I'm sure there are examples where perhaps our communication can improve, but we are in very regular communication both at the senior official level, through technical advisory groups, as I laid out, and just in our regular meetings with environmental health from NSW Health.

STEPHEN BEAMAN: I would also add that we have been really clear with Health. They sit on the technical group, so we are part of this ongoing discussion all the time with Health. It is probably one of the agencies I talk to the most continually—NSW Health. We have been very clear for a long time to say to them that they should be guided by what's in the National Environment Management Plan—NEMP 2.0, appendix B. So the advice they should give the water utilities is, if those activities in appendix B occur in those drinking water catchments, then they need to do those risk assessments. We have been really clear with Health about what our expectations are. There certainly hasn't been any radio silence.

The CHAIR: Just to be clear, at no point before citizen scientists and *The Sydney Morning Herald* investigation by Carrie Fellner discovered that there was PFAS in our drinking water—since 2016—did the EPA think it was necessary to suggest that drinking water across the State should be tested for PFAS, based on what you knew about PFAS in the environment.

STEPHEN BEAMAN: I think the other way to say that is that we have been really clear with Health to say they should be guided by the national principles and they should—

The CHAIR: By the national principles and not by what you know, as the EPA, is in the environment—that PFAS is in the waterways and it is in wildlife. You have admitted that, Mr Beaman, but you are now saying that NSW Health should just refer to the principles at the national level and not the evidence?

STEPHEN BEAMAN: No, we directed them to what the activities are that are specified in the national guidelines that they need to do—those risk assessments and those calculations. The local water authorities or the State water bodies need to do those assessments.

TONY CHAPPEL: There's a long list. If you refer to appendix B, it's things like landfills. It's all the sources—firefighting grounds, manufacturing sites.

The CHAIR: But at no point did you tell them. The EPA never told—you're the EPA.

TONY CHAPPEL: No, I don't think that's fair or accurate, Chair, with respect. NSW Health and the EPA have been in regular discussion about this issue since 2016 in a technical capacity, and in an operational and strategic capacity. The regulator for drinking water quality is NSW Health. They choose the regulatory posture they take; it's obviously informed by advice from a series of agencies.

The Hon. SCOTT BARRETT: Mr Chappel, you mentioned 1,100 sites that are being tested. Is that finished now, or is the testing ongoing? How many of them are you testing every year?

TONY CHAPPEL: It's certainly ongoing, and it's based on latest state of knowledge. Earlier this year Mullumbimby Fire Station was a site that Fire and Rescue detected PFAS in the groundwater. EPA worked with Fire and Rescue. We doorknocked the surrounding community. When we do that what we're seeking to do is understand if people are using groundwater or if there's a pathway. As my colleague Mr Beaman said, we look at the source, the pathway and the receptor. For example, some people might have an unauthorised water extraction system or they might be using groundwater on their own vegetables. If PFAS is detected, we give them precautionary advice about their own practices and how to make sure how they break that pathway. Do you want to add to that?

STEPHEN BEAMAN: I probably point the Committee to the national standard approach about how you go about this type of work. It's called the Assessment of Site Contamination National Environment Protection Measure—NEPM; we follow that. The water might not be always tested at 1,100 sites, but you work through a systematic process to get through to that. Some are assessed and they drop out of the process just at assessment, some are assessed and then tested, and then some are assessed, tested and then further risk assessments are done. So there's this gateway approach in the assessment framework, what we call the preliminary site investigation. If that determines that there's a risk there, then it moves to a detailed site investigation. If the detailed site investigation still identifies there's a risk, we move to doing the risk assessment process. There's a very standardised process that we use for each of those sites. We're currently at about 1,100, and we just keep working through them consistently.

The Hon. SCOTT BARRETT: So with the case of Mullumbimby that you mentioned before, I inferred from what you said that was sort of a reactionary thing.

TONY CHAPPEL: At times.

STEPHEN BEAMAN: That was identified as part of the triage program that Fire and Rescue are doing. We work with Fire and Rescue. They are systematically going through their sites. They'll do some preliminary testing. When we get that testing we say that there's a result in that that concerns us—there may be PFAS in the soil. We look at then what are the nearest receptors—so how close people are to that location and particularly a fire station. In that case we went and doorknocked the 80 residents that live around that site. We are asking them then, when we do that, "What's your water usage? Are you using groundwater to water your plants?" At that stage we offer people—the community—free testing of their water and their soil.

The Hon. SCOTT BARRETT: If something is going to be taken off the books of Fire and Rescue and sold, is there an automatic—does that need to be tested before it's moved on, as an identified high-risk, or potential high-risk, site?

STEPHEN BEAMAN: If they're selling a site?

TONY CHAPPEL: You mean selling a property owned by Fire and Rescue?

The Hon. SCOTT BARRETT: Yes, if they're selling a fire station, would there be automatic testing done before it's handed away from government hands?

TONY CHAPPEL: We probably can't answer what Fire and Rescue do. There are obligations to declare sites or notify about sites if they are contaminated. I think that's the program that Fire and Rescue has been working through with all of their sites. I'm not familiar with how they approach the sale of their properties.

The Hon. SCOTT BARRETT: In the last session we heard of possibly 350 sites that hadn't been tested that were of concern. Is that concerning for you to hear or is that what you are moving through at the moment, as far as your testing regime?

STEPHEN BEAMAN: What we have worked out with Fire and Rescue is a triage system. They clearly can't do all 358 in one go. It will take a little bit of time to work through. We've got a triage approach with them and we start with the highest ones. The highest ones are where there has been regular and consistent training with foam and then you work your way through. We are just doing it in a systematic way, categorising them into low risk and high risk, and working our way through it.

The Hon. SCOTT BARRETT: You are confident with that assessment process?

STEPHEN BEAMAN: Yes.

The Hon. GREG DONNELLY: Thank you very much for coming along and thank you for the submission. Can I take you to page 10 of the submission, please?

TONY CHAPPEL: The government submission?

The Hon. GREG DONNELLY: Yes, please, the whole-of-government submission and specifically 2.1.3 "PFAS Expert Panel" in conjunction with 2.1.4 "NSW Technical Advisory Group", which goes over the page. Those two parts. On the matter of enhancing or improving or expanding water testing, has that been placed onto the agenda in light of the emerging thinking? If we use 2016 as a date and look forward from there at the proactive work that has been done, is the issue of more systematic water testing on the agenda being discussed?

TONY CHAPPEL: We can give maybe a more detailed answer. I will throw to my colleague in a moment. I understand that around 2019 there was quite an extensive discussion and analysis of the regulatory approach and the methodology that Health used that was shared with the committee. It has been, really, I think, a matter of regular engagement through those forums since then.

STEPHEN BEAMAN: The last meeting of the panel was in October. Unsurprisingly, one of the things we talked about was the recent release by the National Health and Medical Research Council of the new proposed standards that are being released for consultation. Again, you've got all the experts in the room having that discussion. The answer to that question is yes. We are looking at what is the science coming out around the world and out of the US and Europe. That's used to inform what the standards are. We operate under an intergovernmental agreement, with all the states and jurisdictions agreeing. That's where organisations like enHealth and the NHMRC—they all have the health science experts. They analyse the data. That draft that was put out got a really detailed discussion with the expert panel about what it means, what are the next steps and where we move forward on it.

The Hon. GREG DONNELLY: With respect to the New South Wales technical advisory group, are you able to elucidate a bit more about what it actually does and how it operates?

STEPHEN BEAMAN: Yes, the EPA chairs that one. It has all the technical experts. I would say that's the group where the rubber hits the road. It is the engine room of the whole PFAS program, really. I will use the NSW Fire and Rescue as an example. They would organise for a consultant to do a technical report and then the report comes into the EPA. We give that technical report to the technical advisory group and their job is to pull that apart and do their analysis on it. Is there something missing? Have they corrected the right data? Have they analysed it against the right laboratory standards? Are the findings of that report robust? They are the real engine room of giving that whole-of-government perspective on the data that is coming through. We often use it when we are doing our own work.

For the work that we are doing, say, out of the Belubula, when we package that up, we will take that to the expert panel. It often has a range of impacts. You might want to look at what the impacts might be on livestock or what the impacts might be on recreational fishing and people consuming fish. You want those agencies from DPIRD—Fisheries and Biosecurity—to be part of that technical discussion. We often use some of those technical experts and I'll use my colleagues in Fisheries. We'll actually engage with them to go and collect the fish for us so we can get it tested at the lab. That technical advisory group is where there's a really strong, whole-of-government collaboration looking at the data and then, where they need to, feeding that back up to the EPA.

The Hon. GREG DONNELLY: My next question is a technical one, and you might need to take it on notice to answer because you might not have the details before you. If we take lead, for example, it is in the vernacular that there is no safe level of lead. That's a community view, and it's manifested through the historic information we now have with respect to that metal. There is perhaps a view that with respect to the PFAS family of chemicals—of which I have learned from evidence this morning that there are potentially over 14,000, to say nothing about the precursors of those over 14,000 subsets of the PFAS family of chemicals—the issue is that there is no safe level or, in other words, zero tolerance. How is that dealt with in an organisation like yourselves? Where

the science is rolling and moving forward, and the way in which the issues are being addressed and looked at, improving the regulation, how does one manage that call for zero tolerance and no safe level?

TONY CHAPPEL: I'll ask my colleague to maybe add to this. When the science shifts, we shift, and we do always take a precautionary approach. You would have seen the release of the *NSW Plastics: Next Steps* paper, which has got quite a breakthrough approach on this issue. As you say, there are the most common, particular chemicals—PFOA, PFOS and so on—but there are potentially hundreds and thousands of other chemicals which haven't been widely studied.

The strong advocacy from our agency—and you've seen this endorsed by the Government in the proposal for the plastics reform—is that we not only have a blacklist of chemicals that cannot be used and that are prohibited but also, for things like packaging and plastic, we have a green list where we know the chemistry, we understand it well and it's demonstrably not in this persistent, bioaccumulative category. We give that advice and regulate to that standard. That's a real quantum shift, or a step change, in regulation. It's really designed to help us eradicate the sources of these chemicals, because they have been prolific since the 1950s in clothing and cosmetics, and obviously in firefighting foams and other chemicals. We need to ensure we're taking them out of the system and replacing them with safe chemistry. That's really the approach we take. Do you want to add to that, Steve?

STEPHEN BEAMAN: I'll start generally with just contaminants. This is really the challenge for all of us around risk communication with the community, because we don't live in a zero-harm environment. There are harms everywhere. The risk posed to people and the environment is based on three factors: It's the toxicity of the specific containment, it's how receptors are exposed to it, and it's the frequency and duration of exposure. It's a bit like UV radiation. If you take that as a contaminant, how do you minimise your exposure to it? You get out of the sun, sunblock, hats—whatever. That's the real technical basis when you try and build the risk framework around chemicals and contaminant management. You can insert lead or a whole bunch of other things. You'll have heard us, probably this morning, talk a little bit about the intergovernmental agreement. All the States agreed that they'd all move together on this—I think in 2018—and we'd all move together consistently so each State wasn't making up its own rules.

The Hon. GREG DONNELLY: This is on PFAS?

STEPHEN BEAMAN: On PFAS. I would direct the Committee to have a look at—it's called Food Standards Australia New Zealand. I actually just know it as FSANZ. FSANZ have published—the way that they do this is they can actually calculate—they get the scientific literature that's predominantly around laboratory rats and PFAS exposure. They then do whatever magic they do to extrapolate that to a human value and you can actually work out what we call a tolerable daily intake. This is where it gets really interesting. For PFAS generally, all types of it, they work out how many micrograms per kilogram by body weight per day. You can actually work out how much before you get what they think is an unacceptable effect. All of our work stems off that tolerable daily intake.

If you get to look at the NHMRC consultation paper, they run through the calculation about how they've come up with the new numbers and that's the approach that they use. I completely understand it from the community's perspective, where they hear something—everything is a harm. When you get taught at uni—milk is a harm to the environment. If you pour it into a creek, you kill everything in it. Everything has a toxicity if you put too much of it or it has a high concentration. This is about minimising—the advice we are really about providing is how do people practically minimise their exposure to all contaminants, including PFAS.

TONY CHAPPEL: That's the advice. When we're giving tailored advice on those 1,100 sites, it's about precautionary dietary advice based on these values that will ensure anybody, even if they're doing it every day, stays below those thresholds where the health advice says the impact needs to be kept below that level.

STEPHEN BEAMAN: What that practically might look like—I'm just recalling one. It might be the Hawkesbury where we've done testing of—fish had been tested in the Hawkesbury. Then we can say to people, "You can eat so many serves of fish. An adult can eat so many serves of fish per week. A child can eat so many serves of fish per week." We use that mathematical formula to do that calculation.

The Hon. GREG DONNELLY: That has been helpful.

The CHAIR: Can I go back to the issue of the testing of wildlife, for example? You mentioned fish, Mr Beaman. Did you say that Fisheries are testing fish in certain waterways for different contaminants, including PFAS, and the EPA is getting those results?

STEPHEN BEAMAN: We often commission Fisheries to collect those samples for us because they're the experts at catching them and they do it through their own ethical research requirements and they'll deliver the samples to us.

Can I just add one more thing? Often too, that's the work you do in the community because you're trying to find out what fish is consumed. There have been examples where—I'm thinking Maitland, where particular community groups might eat something like eel that isn't often eaten by other communities or some communities might eat more of this particular species of fish. Fisheries give us advice about what are the commonly edible fish in that community and they're the ones that they go and test for us if we require that testing.

The CHAIR: Have you found any fish or eels or any aquatic life that has concerning levels of PFAS anywhere across the State?

STEPHEN BEAMAN: Yes, the obvious one is Williamtown where there are bans on—where we don't want people consuming the fish from those areas.

The CHAIR: Other parts of the State?

STEPHEN BEAMAN: I'd have to take that on notice. I can't remember. I've done lots of these.

TONY CHAPPEL: There are definitely some. We'll give you the data based on our list of sites.

STEPHEN BEAMAN: Yes, we often will issue precautionary advice which typically aligns the FSANZ advice more generally about seafood consumption, that people shouldn't consume more than two or three serves of fish generally—not just for PFAS but more generally. That's the general health advice they give. Typically when we do the PFAS testing, that two to three serves advice is about right.

The CHAIR: Has Fisheries undertaken any testing of any fish or other life in the Belubula River near where you've tested the water and the contaminated foam and sediment has been found?

STEPHEN BEAMAN: No, that's the work we're doing next. That's part of what I was saying. You build the program from your preliminary investigation and then we're working our program.

The CHAIR: How long does that program roll out for?

STEPHEN BEAMAN: We've been talking with the community, saying it will probably take about six or seven months for us to identify—you need to identify—it was interesting, we've just released a paper—

The CHAIR: Just to go back, six to seven months. I think you started testing when?

STEPHEN BEAMAN: In May.

The CHAIR: You started testing in May and it's now December. That's water; you haven't got to fish yet?

STEPHEN BEAMAN: No, because we've had a few examples of times where we haven't been able to go out because it has been flooding out there and hasn't been safe to send staff.

The CHAIR: There have been quite a few days where it hasn't been flooding.

STEPHEN BEAMAN: It has delayed our—we programmed it in, because that sampling team does a lot of stuff around the State.

The CHAIR: Mr Chappel, you said that when the science shifts, the EPA always takes a precautionary approach. Do you think that people fishing in the Belubula River, swimming in the Belubula River, eating the fish, maybe, if they catch anything in the Belubula River, that there should be concerns about that at this point, in terms of your precautionary approach?

STEPHEN BEAMAN: It currently meets the guidelines for recreational use, so swimming in the river. There's no reason why people can't swim in the Belubula River.

TONY CHAPPEL: I think it's an important distinction about contaminants. Some are what you'd call "acute" and some are what you might refer to as "chronic". We talk about tolerable daily intake because generally these chemicals can build up over a lifetime. We want to make sure, over a lifetime, people are not having that kind of exposure.

The CHAIR: For example, we heard today that foam is being collected and has been like half a metre high in some places in the Belubula River. That foam has been tested. It's thousands of times above what is safe, what's in the water guidelines. The EPA is here today. Would you advise kids not to swim in that foam if they saw all that foam in the water? That could be a fun thing for kids to do.

STEPHEN BEAMAN: The advice, generally, is not to—you shouldn't be playing in the foam.

The CHAIR: Don't swim in the foam.

STEPHEN BEAMAN: No, exactly right. We've sampled the foam and we're doing work on what that foam—the chemistry around foam creation and then PFAS acetate is not simple; it's really complex. There is research still coming out of the States. It's easy to make some very broad statements about it. We actually want to do the work on it and get the science—

The CHAIR: Mr Chappel, in terms of the precautionary approach and how to apply it in this situation, would it kind of not be the right thing to do to put some signs at the Belubula River at this point, saying, "Don't swim in this river. Don't eat fish caught out of this river"? Sure, remove them if your tests, Mr Beaman, come back and say everything is hunky-dory. But right now, Mr Chappel, in terms of that precautionary approach, wouldn't it be wise to pop those signs down there?

TONY CHAPPEL: I think that's conflating a few different risks. The testing that we are doing there will give us a detailed picture of the risk.

The CHAIR: Back to the "precautionary principle" thing.

TONY CHAPPEL: The precautionary principle says that in the absence of full scientific certainty, the absence of that certainty should not be an impediment to taking cost-effective action to manage a risk. You've heard our approach on dietary advice generally, and I'm sure that advice applies in the Belubula River too. The water in the river that we have tested doesn't pose any kind of acute risk. I know that there is a variety of tests that we've done but also tests that others have done. We always ask the community and scientists to share those results with us. They haven't been shared in terms of some of this work, which makes it harder for us to quantify any particular risk that that data might show.

I think when you're doing sampling for something like this, it's really important to use nationally accredited methodologies and have a calibrated, methodological approach to give you an accurate picture. That generally requires multiple datasets over different time horizons, and that's what this program is doing in the Belubula River. We're obviously working with the community. We want to be as informed by community insights as possible. That will enable us to take the right approach. As I mentioned, the data—certainly, that I'm aware of—shows that 90 per cent of the risk, generally, for human uptake of PFAS is through food, and about 10 per cent through water. We know that our food in Australia has much lower levels than Europe, the US or China. In water, we obviously see those issues in particular contexts, but I think that it's just not accurate to say that there's an acute risk that is evident, based on what we know for swimming in that water.

The CHAIR: Just to be clear, I didn't say "acute". I didn't say that word.

TONY CHAPPEL: But that's what would trigger more substantive action in terms of a precautionary approach.

The CHAIR: This summer, for example, if there are families picnicking on the banks of the Belubula River and there are kids who want to jump in and there's foam around there, the EPA says, "That's fine, jump in"?

TONY CHAPPEL: No. We say, as my colleague said, you shouldn't swim in foam. The literature here is very complex, but there is some literature that indicates that foam actually attracts and concentrates a variety of chemicals, some for PFA or PFOA as well. We would always say you shouldn't swim in foam. No-one here is suggesting anything other than that.

The Hon. AILEEN MacDONALD: The New South Wales Government's submission outlines ongoing efforts to improve PFAS monitoring. Does the EPA ensure that the data collected from the PFAS-affected sites is made accessible and comprehensible to not just the general public, but also researchers? The reason I ask that is we had a researcher witness earlier who said that sometimes the way the reports are formatted makes it difficult to drill down. If a researcher is having difficulty, the general public would surely have more difficulty.

TONY CHAPPEL: We go to great lengths to communicate clearly, simply and comprehensibly with each of these communities. It's a very major undertaking. The Chair referenced the Standing Order 52 documentation. One of our teams has many thousands of documents in that category that go to this kind of detailed engagement we do door by door. We try to make that very simple. Perhaps the way reports are packaged might not make them easily extractible for data. Do you want to talk to that, Steve?

STEPHEN BEAMAN: There are probably two avenues here. I sort of agree with the researcher here for some of that. For the work that we do at the EPA—I'll use the Belubula one. We published this week our latest round of sampling. We try to make that data really accessible to people. It's in simple diagrams, maps and simple

tables, whereas when you get to some of the bigger sites and it's data that's actually owned and developed by someone else—not so much by government but we get it to review it—that can come, particularly in this space, in thousands of pages. That's the thing about how do you make that information really accessible to people so they can make really good, informed decisions.

We worked with others, and I'll use Defence as an example, about trying to have the data available online. Defence, for each of the RAAF bases in particular, have good data on their website, but they've also got to put really simple, informative interpretations across the top so people can access that information, because it is very complex. I can hear the plea around "This data gets collected, but it's often held"—it's done by a company for their own site or done by another government agency. How do we make that data readily available to researchers and the community? I'm not sure we've actually worked out a good way to do that yet.

The Hon. AILEEN MacDONALD: It may be something to work on.

STEPHEN BEAMAN: Yes.

The Hon. AILEEN MacDONALD: When you have information about an affected site, how do you then—and you've mentioned that you would go doorknocking in the affected communities. Not everyone accepts information in the same way. Some people are visual and some like the facts and figures. How do you ensure that, when you are doorknocking, each person clearly understands the information so that you can address their concerns, but also provide support—because not everyone would understand.

TONY CHAPPEL: The community is always front of mind for us in engaging on these issues. The reason we doorknock is so we can actually understand—and make sure the household understands—the scope of the issue, and really understand how they use water or vegetables or chickens and what their particular context is in that household. We have a lot of work we do on building meaningful engagement and relationships with Aboriginal people, for example. When we engage with communities that might not have an English-speaking background, we have fact sheets and other things in other languages. We can make sure we are doing whatever is required to have the right communication so that we're confident the person has understood the issue, and then shared with us, in their own context on their property, how they use water. What do they eat that they grow, or what do they catch, fish, or how does that work in their life? Then we can give them precautionary advice about breaking those pathways.

The Hon. AILEEN MacDONALD: You also mentioned you have a triage system. When you're working with agencies such as First and Rescue NSW and WaterNSW and other agencies to identify, monitor and mitigate PFAS contamination—can you talk me through that triage system?

STEPHEN BEAMAN: Yes, we'd be looking at what was the historical use of the site, like were they using lots and lots of materials, or was it just a one-off? I think the initial sites we've particularly done with Fire and Rescue have been about fire training grounds where they'd set a car on fire and everyone would turn out and do their training about how to put that motor vehicle or a housefire out. And they're going through their own records, going did they have a particular event and how did they clean out their hoses when they came back from a job. We're just working through systematically with them what was the quantity used on each site, because it's about the volume of PFAS that often gets left in the soil. The terrible thing about PFAS is it is water soluble. Once it's in the soil, it actually can move a long way and move quickly.

The Hon. AILEEN MacDONALD: Do you send something out to the organisations with those questions that will then identify which ones you go to first?

STEPHEN BEAMAN: Yes, we've worked with the fire agencies together about what that triage might look like, and let's agree the method. I'd rather the teams worked together on it, rather than us debating it, so the teams have come up with an agreed approach. I think the teams meet at an officer level roughly monthly. They're just working through what's been done, what's been sampled, what's coming up next, and then just working through that program systematically. It means we can gear up to be able to respond to their information when it comes in.

The Hon. AILEEN MacDONALD: On aquatic life and habitat, does the EPA have any plans to enhance that monitoring?

STEPHEN BEAMAN: That's a good question.

TONY CHAPPEL: Just to be clear, NSW Health is the regulator for drinking water, the catchment authorities or owners and WaterNSW manage delivery of that water, and the Department of Climate Change, Energy, Environment and Water, through their water team, conduct monitoring of water in New South Wales. The EPA's role is when there's a pollution event or a contaminated site and we'll then come in. We'll obviously

provide support to those other agencies with technical expertise. I think that question might be best answered by my water colleagues.

The CHAIR: Who's got overall authority or responsibility for investigation and assessment of PFAS? Does it depend on whether it's in the water or on land or at a contaminated site? Is that correct?

TONY CHAPPEL: Yes.

The CHAIR: I just wanted to get your response. One of the researchers this morning said in relation to water testing that PFAS is hydrophobic. The smallest part of PFAS is likely to be in the water column. That's why more of it accumulates in foam and in sediment. Is the EPA taking that into consideration and testing the foam, the sediment and all parts? Or is what you're reporting—for example, in the Belubula River—just the water column tests?

STEPHEN BEAMAN: We're working on a whole bunch of the sampling media. We do the three common suites of PFOS, PFOA and PFHxS. We don't just pick one; we look at all three. You need to work out where to put your sampling effort, and that's what the sampling thing has done to date. If we hadn't gone upstream of Flyers Creek on the Belubula, we would have missed a whole story that's probably going to play out in the Belubula. Now that we've done that extra sampling, we can see where the major contributions are coming through that catchment, and that's where you then target the sediment in the stream, the water column sampling and your biosampling, because it can now be targeted to the information that we now know. That's the rationale of the sequential steps of doing it the way we've done it.

The CHAIR: To be clear, in the reports that are coming back, where you've undertaken the tests in the rivers, is it a combination of sediment as well as foam that is publicly reported? When you say the tests are reporting levels that are within the—is it recreational water guidelines?

STEPHEN BEAMAN: Yes.

The CHAIR: The levels are within that. Is that a combination of all of them or is that just the water?

STEPHEN BEAMAN: That's the water, because your exposure bit is the water. You have to compare the water to the water guidelines and the sediment to the NEMP guidelines.

The CHAIR: When you're saying it's the exposure bit, exposure in what way?

STEPHEN BEAMAN: You've got to use the right guideline to do the right comparison. You're using the water quality guidelines to do the recreational water standards. That sets the recreational water standard, so that's the one you test against. But if you want to know the ecological limits, which are different again because it's bioaccumulative, you look to another set of standards. There are different standards for the reason for your testing. But I think the answer to your question is that we have done the water quality testing both at the surface and down the water column. What we'll do next is soil testing, and we'll also probably look at doing some biota testing.

The CHAIR: Based on the ecological water guidelines—because that area of the Belubula River, or perhaps the whole Belubula River, is a particular threatened ecosystem. Explain to me what that is. It's a protected ecosystem?

STEPHEN BEAMAN: Further downstream.

The CHAIR: That's right—further downstream. You've tested water against those ecological guidelines, have you?

STEPHEN BEAMAN: Yes, the ecological guideline limit is actually at the limit of laboratory detection.

The CHAIR: Is what you're finding concerning for this threatened ecosystem when you compare it to the ecological guidelines?

STEPHEN BEAMAN: We're always concerned where there's PFAS in water. We're using the ninety-ninth percentile protective number, and that's the number everyone has agreed to nationally for ecological protection. The reason is that we now know PFAS bioaccumulates. Animals that live in the water are more susceptible to bioaccumulation because they're in that medium all the time.

The CHAIR: On 29 August, in budget estimates, you said you were continuing to find the source of that contamination, including possible links to Cadia. How is that going? What more have you done since 29 August to find out that source?

STEPHEN BEAMAN: There was more sampling done, I think in October. We've released the report today. You need to do sampling for this—not just a one-off sampling exercise; it needs to be over a period of time.

That's why it takes a few months. It needs to be spatial. You need to look through the catchment. The report we released this week showed that the concentrations are higher upstream of the Belubula River. Where the two creeks come down from the Cadia mine, it is actually higher upstream, which made us go and look upstream. What we've identified upstream is we have the township of Blayney. We often find that where there are people you'll find PFAS. We've got a landfill in Blayney, a former abattoir and a major composter. We've sampled upstream and downstream of all those facilities. You can have a very low level upstream and a higher level of PFAS downstream. That's the work we're doing now with the operators of those facilities to look at how they are contributing that PFAS load to the river.

The CHAIR: We are out of time. We have a few more hearings in February next year, at least, so this may not be the last time you appear before this Committee. Be warned about that, but thank you so much for appearing. The Committee will be in touch if we have any supplementary questions for you.

(The witnesses withdrew.)

(Luncheon adjournment)

Commissioner JEREMY FEWTRELL, AFSM, Commissioner, Fire and Rescue NSW, sworn and examined

The CHAIR: Welcome to our last witness for today's hearing. Do you have a short opening statement for the Committee?

JEREMY FEWTRELL: I do have an opening statement, Chair. Firstly, I would like to acknowledge the traditional custodians of the land on which we meet, the Gadigal people, and pay my respects to Elders past and present. Fire and Rescue NSW recognises the concerns around PFAS being per- and polyfluoroalkyl substances and remains committed to a robust and integrated whole-of-government response to minimise community exposure. As commissioner, I also recognise the many individuals, particularly firefighters, that have had high levels of exposure to PFAS, given their employment, and, as such, are at an elevated risk of potential impacts, including health. I'm deeply committed to the protection and safety of our New South Wales communities and firefighters.

Fire and Rescue NSW ceased using aqueous film forming foam, or AFFF, containing PFOS and PFOA as active ingredients in 2007 and does not use any firefighting foams containing PFAS. We've had our current foams independently certified to confirm that. Fire and Rescue NSW has historically undertaken limited training activities at fire stations, with other historic practices including truck wash down, hose clean-out and foam demonstrations on open days. Fire and Rescue continues to monitor and investigate the impacts of PFAS contamination in the environment and works closely with the NSW Environment Protection Authority to identify, assess and manage sites with legacy PFAS contamination. We are guided by the PFAS National Environmental Management Plan, the Australian Government department of health and the national Environmental Health Standing Committee's advice on PFAS, and are committed to being informed by robust advice in our response to PFAS contamination.

We've taken an integrated government approach to dealing with this issue. We conduct our PFAS investigations in close consultation with the New South Wales EPA, which overseas our PFAS program. We also work closely with the NSW Rural Fire Service and chair a working group with members from other Australian and New Zealand fire and emergency services to share experiences, resources and approaches to PFAS management for consideration in all programs. Fire and Rescue works to create greater collaboration, information sharing and coordinated responses between all government responses to enhance community safety. We have a dedicated PFAS project team and a governance structure in place, via an internal working group, to assess risks and implement mitigation strategies. Progress is monitored by our audit and risk committee, which includes three independent members, and is established in accordance with Treasury policies to provide independent assistance and assurance by monitoring, reviewing and providing advice about governance processes, risk management, internal control frameworks and external accountability obligations.

Fire and Rescue regularly engages with industry and relevant associations to stay across remedial technologies and facilitate trials for new technologies. Key actions in the last year include the engagement of NSW Public Works to manage our tender and remediation works for Fire and Rescue's PFAS program; the establishment of a remediation contractor panel with five appropriately qualified remediation contractors in consultation with Public Works, where their full technical capabilities relating to PFAS remediation were assessed; the development of remediation action plans and site improvement plans for multiple sites; the completion of remediation at five sites, which is a combination of private properties and council land; the development of an extensive process and templates required for property remediation in consultation with Public Works and suitably qualified environmental consultants to ensure a consistent approach to remediation; and the engagement of three site auditors, who each have multiple sites, to expedite investigation and remediation works and support Fire and Rescue with more pragmatic and practical approaches to dealing with these sites.

We are currently managing 35 sites out of a potential 600-plus sites that may be impacted by PFAS. These are being prioritised on a risk-based approach. Fire and Rescue engages suitably qualified environmental consultants, who are required to follow and comply with the appropriate national and State-based guidelines in undertaking site investigations. Results into our investigations are provided to the NSW EPA or the accredited site auditor, which reviews the information and provides recommendations in relation to the requirements for monitoring and mitigation of contamination to impacted environments and ecological receptors.

Fire and Rescue's PFAS investigations are focused on its training sites, current and former fire stations and off-site properties—primarily, where PFAS has migrated through surface and/or groundwater from a Fire and Rescue NSW site. We prioritise investigations where there are potentially complete exposure pathways and sensitive land use, such as schools. On-site risks for sites tested to date, from a human health perspective, have been deemed low and acceptable based on their commercial and industrial land use categorisation. Fire and Rescue

supports a coordinated and nationally consistent approach in the management and remediation of PFAS, noting there are limited proven infield remediation technologies for soil treatment. We continue to prioritise our current funding where possible to resource our PFAS program and seek increased investment to expedite site investigations and remediation work.

In regard to protecting our firefighters, I take the possibility of long-term effects on firefighters from PFAS exposure extremely seriously. The Workers Compensation Legislation Amendment (Firefighters) Act 2018 enables eligible firefighters diagnosed with any of 12 specific primary cancers and who meet minimum periods of service to automatically be presumed to have developed the cancer because of their firefighting work. We will continue to work with the Fire Brigade Employees' Union and other government agencies, including icare and the State Insurance Regulatory Authority, on achieving the best possible outcomes for our firefighters. Fire and Rescue NSW is monitoring and supporting current and former firefighters diagnosed with a range of cancers, irrespective of their cause, through a holistic program, and we support the right of firefighters diagnosed with prescribed cancer types to seek workers compensation.

Further, Fire and Rescue is actively involved in working groups with unions and other emergency services as part of a federally funded research program and longitudinal study currently being undertaken by Monash University in Melbourne. We are also collaborating with the Fire Brigade Employees' Union regarding a comprehensive revised health screening program that includes PFAS testing. Procurement for a testing provider is currently in the final stages, with testing to commence in the first quarter of 2025. Fire and Rescue has undertaken extensive efforts to ensure that legacy firefighting foams that contain PFAS have been removed from our sites and disposed of in an appropriate manner.

In conclusion, we are committed to staying across emerging technologies, both internationally and within Australia, while also partnering with remedial technology providers to facilitate trials and new technologies that enable a more sustainable and cost-effective approach to PFAS management. Further, we will continue to assist other agencies and authorities with their PFAS investigations, including the provision of incident reports, assessments and interviews with staff, to better inform decision-making around PFAS management. Fire and Rescue will continue to be guided by the advice from the relevant agencies and work closely the with the NSW EPA to ensure program alignment with the proposed guideline changes when responding to PFAS contamination and minimising the community's exposure.

The CHAIR: Thank you, Commissioner. First up, I want to turn to the sites. I think you said that you've cleaned up five sites.

JEREMY FEWTRELL: In the last 12 months.

The CHAIR: You said there were something like 600-odd sites.

JEREMY FEWTRELL: Yes, potential sites. We have categorised them based on an environmental risk rating and then focusing our efforts on the areas of the highest concern.

The CHAIR: The 600-odd sites, are they stations, like existing stations or maybe closed stations?

JEREMY FEWTRELL: The sites are a mixture of our current fire station sites, former fire station sites and training locations . They can be Fire and Rescue training locations or other venues where crews might have trained using foam, and then also locations that we know of where there were incidents where foam was used.

The CHAIR: Did you say 600-odd sites that had been audited or that are potentially contaminated that you would need to assess?

JEREMY FEWTRELL: They're ones we've identified. We did a comprehensive data search with our workforce and with our records, and we've identified in the vicinity of 600 sites from that.

The CHAIR: Remind me again what that program is called?

JEREMY FEWTRELL: We've got our dedicated PFAS program that we're doing this work under. We have two dedicated staff for this.

The CHAIR: You've got two staff in Fire and Rescue. Do they go onto the ground to assess anything, take samples or test anything? Or is it just based on the historical use?

JEREMY FEWTRELL: The two staff that we have, one is an expert project manager. She has developed an extensive area of expertise around PFAS over the number of years that she has been working in this field. The other staff member is a specialised environmental contamination expert. He provides the scientific, professional expertise. Their work is more managing the range of sites that we have and then coordinating with a number of

different environmental contractors that we will use to go onto sites to take the samples in the field. Those consultants will take the samples, use their testing facilities, maintain the custody of those samples and then know the integrity of the testing that they put them through, rather than our people collecting samples and then trying to pass them on to a third party.

The CHAIR: Those two staff work full time, do they?

JEREMY FEWTRELL: That's correct.

The CHAIR: Is Fire and Rescue NSW responsible for paying for the clean-up that has to take place? You said that this year you've cleaned up five sites. Who does that and who pays for it?

JEREMY FEWTRELL: The funding, or the payment for the remediation of those sites, depends on the tenure of them. The position of the insurer has been that for any sites not owned by Fire and Rescue, the insurance policy provides coverage for us to cover the remediation costs and the treatment costs. For sites owned by Fire and Rescue, we're responsible for funding the remediation ourselves.

The CHAIR: Does that make a difference in terms of what sites are cleaned up?

JEREMY FEWTRELL: No. The sites are prioritised purely on their environmental qualities and the impact of any potential environmental receptors that may be adjacent to the site. It has been developed with that approach. That has been reviewed on a number of occasions with our work with the EPA to then make sure that they're comfortable with the prioritisation order that we've determined.

The CHAIR: The transparency around those 600-odd sites—or there are 30 sites, actually, that you said are of concern, roughly, did you?

JEREMY FEWTRELL: Yes.

The CHAIR: Is that all publicly available?

JEREMY FEWTRELL: Yes. We've been very consistent all the way through. We've been having a really focused lot of work on this for the last seven years. That information has been placed on our website throughout that whole time. There are various site reports that are available to the public, and they're updated as there's any significant development in the progress on each site.

The Hon. SCOTT BARRETT: I want to keep going down that path, if that's okay. Commissioner, you mentioned there are 600-plus sites, 35 of which are being managed. Is that 35 a constant number—some come in and go out?

JEREMY FEWTRELL: The number does vary. At the moment, we've got 35.

The Hon. SCOTT BARRETT: How long is a site managed for?

JEREMY FEWTRELL: It's very variable across the complexities of the site. There are some that we've been working on for seven years and we're still working our way through that. They are sites that might have multiple tenures, multiple tenants and multiple contributors to the PFAS contamination beyond Fire and Rescue NSW. Some of them are very complex. It depends on what the environmental concerns are, whether it's purely just soil or whether we're worried about surface water or ground water as well. Amongst all of those, it does vary between sites as to how long.

The Hon. SCOTT BARRETT: If you've got 35 sites that you're managing on the books at the moment and they can take up to seven years, that's a long time to get through 600-plus sites.

JEREMY FEWTRELL: It is, but a large proportion of that 600 may not need active management given their position in the landscape, their land use categorisation and the level or likely level of contamination that may or may not be there. We've sort of done a catch-all, and that's what we've got. We've identified the ones that are of the greatest concern. We're starting from that and working our way down, with the highest priorities getting the attention first. But I do accept that it's going to take a long time to work our way through that.

The Hon. SCOTT BARRETT: What mitigation measures have been put in place on those remaining 565 to ensure that the PFAS isn't spreading and contaminating further throughout that community?

JEREMY FEWTRELL: A lot of them were not an environmental concern because we think the likely level of PFAS is incredibly low and there's no further contamination spread into other sensitive environmental areas that is likely. But if there's any work at any our sites, they're checked for PFAS so we can get an assessment of what's there and then it can be managed accordingly.

The Hon. SCOTT BARRETT: A couple of specific examples have come up this morning—a new fire station or the expansion of a fire station in Lithgow into a former mine rescue site. Are we confident that PFAS there is at a safe level?

JEREMY FEWTRELL: I can provide some explanation to that. The PFAS levels that have been detected on that site are below the thresholds related to the commercial land use categorisation. It's suitable for the land to still be used. In addition to that, the measures we'll be putting in place will make sure—there's extensive use of concrete that will seal the site for the hardstand areas around and also not growing any vegetables or anything that people will eat out of the soil on the site there as well. We have comprehensive steps to be able to manage that and not have any exposure pathways to our staff.

The Hon. SCOTT BARRETT: When you sell off former stations, do you have to get it to a certain level? Are there tests that have to be done or does that risk transfer on to the new owner?

JEREMY FEWTRELL: We have responsibilities under the environmental legislation that we're the polluter for the purposes of any PFAS contamination if it's one of our sites. We can't off-load it and flick that problem to someone else. In the past several years, and probably since that 2018 period where we've had more focus on this, we've instigated processes where before we dispose of the site, part of the due diligence we do before we put it on the market is to test for PFAS and then we manage that and remediate that as is required according to the land use categorisation at that site. That wasn't previously the case. There were previous fire station sites that were disposed of in prior years that we've subsequently become aware of that had PFAS contamination, and we have taken steps to manage those.

The Hon. SCOTT BARRETT: What year was that transition?

JEREMY FEWTRELL: I would say we have been doing that sampling before disposure—I will take it on notice, but it's certainly in the vicinity of the past five years or so.

The Hon. SCOTT BARRETT: There's one in particular in Bathurst that we would like to put people at ease if we could.

JEREMY FEWTRELL: I can give you some assurance on that one. We did undertake some investigations into that one probably about six or seven years ago when we were in the early stages of this program. The old Bathurst fire station site was disposed of, I think, in 2007. That predated our work in sampling before disposal. With the change of land use, there were obviously requirements and testing that would have been required, but also we checked the site and there's extensive removal of the soil but then also concrete and sealing of the land that was at the site. The exposure pathways that could be present have been mitigated.

The Hon. SCOTT BARRETT: Given a lot of what we heard today that there's no tolerable level of PFAS, what do we need to do to contain it on these sites or address the other 600-plus sites?

JEREMY FEWTRELL: We will keep working our way through that risk categorisation and committing whatever resources we can to that. That work will remain ongoing. As I said before, if there are any changes to the land use or development work that we undertake on our sites, we will test before that work is undertaken to have a good understanding of what may be there and then manage that accordingly.

The Hon. AILEEN MacDONALD: We had the Fire Brigade Employees Union here earlier. They mentioned that PFAS blood testing and cancer screening has been delayed by over a year. What are the specific reasons for the delay and when can they see that the testing will start taking place?

JEREMY FEWTRELL: We've gone through a fairly extensive process of negotiating with the union to understand what both parties want and need out of that. There have historically been a range of different perspectives around blood testing. I think over the past several years we have progressed through a lot of that and got a better understanding through some of the other research that has been done. There is probably a greater level of comfort now between the parties about undertaking that. Also, making sure that we could find a provider that could deliver what we need at an appropriate level of cost for us and the Government. We've gone through the procurement for that and we're anticipating that testing should be able to get underway in the first quarter of 2025.

The Hon. AILEEN MacDONALD: That's good. How are you communicating this information to the firefighters? And what interim measures are you putting in place for monitoring and addressing health concerns that they may have?

JEREMY FEWTRELL: There haven't been any direct interim measures as such because, as I said, the previous guidance and recommendations were quite hesitant to go into the testing space. A number of other fire services in Australia have started doing the testing. What's been identified is that it's really important that you

don't just take a pathology sample, get a reading from the lab and then give people their results. There needs to be a level of support and explanation around that and then each individual will need to have a conversation with their medical practitioners to work out the best approach for them and what can be done, if it's considered to be of concern in their individual case. We will communicate more fully to the workforce once we're in a position to have all this finalised and ready to go. There is a lot of interest around it. I'm keen to get that word out to our firefighters so they understand where we're up to with it. It's not something that we've just ignored or left on the backburner, but we'll be able to give them the full information and then guide them into the testing program.

The Hon. AILEEN MacDONALD: They also mentioned the health and safety branch. What role has it had in implementing this blood testing program? Have they encountered any challenges? You probably have addressed some of that.

JEREMY FEWTRELL: The health and safety branch has been the lead in working through that negotiation with the union in terms of the specifics around the blood testing, but also then the negotiations with potential providers and going through that procurement activity. They have a level of subject matter expertise in being able to interpret what testing regimes each of the offerings might have been able to provide. I'm not aware of any particular issues, other than what I mentioned before about that sort of general, I would say, maturing of the perspectives and the understanding around blood testing, and working our way through that collectively, both within Fire and Rescue, other parts of government and also with the FBEU, and the workforce in general as well, to know that when we get to that spot, everyone's going to be able to have a good understanding and be comfortable with that approach.

The Hon. AILEEN MacDONALD: Are there any cultural or organisational barriers within Fire and Rescue that may have contributed to delays in addressing the concerns of the firefighters?

JEREMY FEWTRELL: Not that I'm aware of. I'm always open, if people have concerns and they want to raise them either directly with me or other people in my team; I am keen to hear those. I think the biggest challenge, though, has been where the medical recommendations and advice sat for a long time. And then, over the past several years, there has been a much greater understanding, both in terms of the general community's understanding but also the scientific knowledge and evidence, to help guide us through what will be the next stages. I don't think it's necessarily a cultural impediment in Fire and Rescue. Certainly, we've had previous challenges around health testing and checks before. But I think this is a good one, where we can actually have a good, positive impact, where there is a clear demonstration that Fire and Rescue wants the best possible health outcomes for our firefighters, aligned very much with what the FBEU will be seeking for its members, and then that can give our workforce a level of confidence that their wellbeing and health is being prioritised.

The Hon. AILEEN MacDONALD: If they do have concerns, there is an open-door policy?

JEREMY FEWTRELL: For sure, yes, and I'd be keen to hear them. Particularly if we are going to be starting on this testing regime in the near future, I'd really like to know of any potential pitfalls or areas where people may be concerned.

The Hon. CAMERON MURPHY: Thanks, Commissioner, for coming along to give evidence today. I just want to start with some clarification. Those 650-odd sites that you're working through, they're all places that were either storage or training sites of Fire and Rescue. Is that correct? We're not talking about public sites where you may have deployed PFAS fighting a fire. They're just your sites?

JEREMY FEWTRELL: No. It's a mixture. It does include public sites.

The Hon. CAMERON MURPHY: Are you able to give us a breakdown of how many?

JEREMY FEWTRELL: I'll take that on notice because there's fairly detailed records on all of that. But when we went to our staff, we asked them for a record or an indication of foam use in their station, foam use in any training locations, whether that was Fire and Rescue locations or other ones, and then also any significant incidents where quantities of foam would have been used that they could recall and identify.

The Hon. CAMERON MURPHY: I want to come back to the issue of the land use category—where you were talking about the rectification work that you're undertaking. You said that you were bringing that up to a commercial land use standard. Is that right?

JEREMY FEWTRELL: It depends on the zoning that the particular site sits in. We are required to get it to within the required levels. A lot of our fire stations sit in a commercial-industrial land use planning category, but some of them sit within residential areas, so that obviously sets a higher level, a higher requirement.

The Hon. CAMERON MURPHY: Why wouldn't you be bringing them all up to a residential standard before you sell them off?

JEREMY FEWTRELL: If the block's in a commercial-industrial area, it's consistent with the rest of the land use around there, and it's unlikely, or we don't foresee, that that would become a residential property.

The Hon. CAMERON MURPHY: Evidence that we heard earlier was that some of these former fire stations have been sold off, then converted to residential premises. One of the other examples was sensitive sites like childcare centres, which are still commercial. I think people would be alarmed if they knew that a childcare centre was brought up to a commercial standard of PFAS rectification with kids playing around in that space. Isn't there a real danger in not bringing it up to a residential standard?

JEREMY FEWTRELL: There's a very significant difference in the levels of detectable PFAS between commercial and residential. I think it's appropriate that we do it to the required level for that zoning, but what we have done—and those examples that you talk to typically have been the sites that have been disposed of prior to our practice of checking before disposal, doing the testing and then addressing it. They're ones where we've been able to subsequently come in after the event, which is never the ideal way to do it. Then, if we're aware of a proposed land use, or use of a block of land, we can provide additional guidance.

The Hon. CAMERON MURPHY: You may not be aware, though, if somebody buys it, uses it for one commercial purpose and then it's onsold and somebody else uses it, or seeks to change the category of land use then to residential. How are people to know the history of the site?

JEREMY FEWTRELL: But where we have identified a level of PFAS present on the site, it might sit below the required commercial-industrial level, or we've remediated it down to that level. When a purchaser is going through their due diligence checks and its whole legal process, that would be identifiable for them in their searches on the property.

The Hon. CAMERON MURPHY: Sure, but that wouldn't stop somebody using it as a childcare centre.

JEREMY FEWTRELL: No, but it should certainly inform the council or land use planning authority to guide what's approved and any restrictions related to that.

The Hon. CAMERON MURPHY: All right. One of the other suggestions that came up earlier in evidence was from the FBEU. They said that best practice would be to keep a register of all of the dangerous chemicals that are used to fight fires—both where they're stored and where training exercises are but also where they're deployed—because it's conceivable that because there are intellectual property issues, trade secrets or we just don't have the scientific research at the moment we may find out in 10 or 15 years that some of the substitutes that are being used for PFAS at the moment are also cancer-causing chemicals. That's the reality, so why wouldn't we be keeping a register of what has been used and where? In the future, if we identify something that we need to go and clean up, we know exactly where it has been deployed.

JEREMY FEWTRELL: We've certainly got much better records than we did previously, and I think we can pretty much achieve that desired impact from the records that we already have. We're required, from a health and safety perspective, to keep a register of hazardous chemicals that are stored in the workplace. We have that element. We've got our records of what items or products we're purchasing, and we're keeping a record of those. We also have our incident records of what may have been used at the site of an incident.

The Hon. CAMERON MURPHY: Is there a requirement to record on each incident record exactly what has been used?

JEREMY FEWTRELL: Yes.

The Hon. CAMERON MURPHY: On every one of them?

JEREMY FEWTRELL: Yes.

The Hon. GREG DONNELLY: Commissioner, thank you for coming along. It struck me when you were providing your opening statement about the number of sites and what have you—in terms of jurisdiction, do New South Wales fire brigades have automatic access to Commonwealth property to deal with the fighting of fires, or is it conditional?

JEREMY FEWTRELL: It's conditional. There are arrangements in place for accessing Commonwealth property. We have a memorandum of understanding with the Commonwealth, and different types of Commonwealth land obviously have different sensitivities. In practical terms, our crews can arrive at those sites.

We will always obviously ask for permission or be granted access before we enter, but most of those practical things have been addressed in the various agreements that sit underneath them.

The Hon. GREG DONNELLY: With respect to that—I'm not asking you to speculate, but perhaps you can take this on notice—in times gone by, there could have been fire emergencies on Commonwealth property, like army bases. Perhaps that is less so for air force bases, because they have their own history and I presume their own firefighting equipment. Obviously you've got the major airport here in Sydney at Mascot. There could have been the use of PFAS foam to extinguish fires on those Commonwealth sites—or is that in the realm of speculation? What I'm getting to is trying to understand the extent to which there may be property affected. Obviously with respect to those sites in your remit as fire stations or training facilities, PFAS was used there and that's known. But in other places where it might have been used by New South Wales fire brigades, does that fall into your consideration about looking at where there could be affected areas?

JEREMY FEWTRELL: I think, without going into the realms of trying to speculate too much—and please let me know if I'm not directly answering your question—there have certainly been well-documented cases of PFAS coming off defence and other Commonwealth land.

The Hon. GREG DONNELLY: Clearly, yes.

JEREMY FEWTRELL: When a site is identified as having PFAS detection, sometimes one of the biggest challenges is trying to work out where and how that came about. I think it's useful for the Committee to understand that Fire and Rescue will never shy away from taking responsibility for any contamination that might have occurred as a result of our actions. We obviously do everything we can to minimise that occurring in the first place. The approach that we've got now is obviously no PFAS-containing foams, and we manage the foam in general in a much more stringent way. But there's a whole range of different PFAS sources out within the wider environment. While firefighting foams is a well-known one, it's not always the major contributing source of contamination. When we become aware of a site that might be contaminated and it might be brought to us, there's a bit of detective work that happens to try to work out—and not just from us but from the EPA and others involved—what would have been the sources of PFAS in this landscape.

The Hon. GREG DONNELLY: I apologise—I'm showing my age—I said New South Wales fire brigade; I meant Fire and Rescue NSW. In the whole-of-government submission—I'm not sure what level of involvement you or Fire and Rescue may have had in its preparation. On page 10 there is a part 2.1.3 about the PFAS expert panel, and below that there's a reference to the New South Wales technical advisory group. I will just deal with the expert panel. I don't see Fire and Rescue being directly represented there, unless I'm missing something. Do you think there is a good reason or an argument that it should be there as part of that expert panel, given they've got so much skin in the game?

JEREMY FEWTRELL: We certainly have other forums across government that we sit on, and I'm comfortable we're represented adequately there. When I look at the list of the members of that expert panel, a lot of them or all of them are really looking at the end receptor type level, and so I think the focus of that expert panel is looking at it from that perspective rather than from the expertise that we'd be able to bring around the use of firefighting foams and operational considerations.

The Hon. GREG DONNELLY: My final question is related to the one I just asked. With respect to dealing with sites that were covered in your opening statement and through questioning about, it'll be over a period of time that they'll be able to be worked through. The actual work done, perhaps even starting with the identification that there's an issue there in the first instance, is not actually done by Fire and Rescue. Is it the EPA that ultimately comes in and takes over the task that needs to be dealt with?

JEREMY FEWTRELL: I probably won't talk for what EPA do.

The Hon. GREG DONNELLY: No, but perhaps what you don't do.

JEREMY FEWTRELL: Oftentimes EPA might come to us and say, "We're concerned about an area. We want to find out more about an area. Can you please provide us with particular pieces of information or undertake some testing on your sites?" Or, if they think that we may be responsible for it, they might ask us to do testing on other sites outside of Fire and Rescue property as well.

The Hon. GREG DONNELLY: But there has obviously been some discovery by Fire and Rescue.

JEREMY FEWTRELL: Yes.

The Hon. GREG DONNELLY: So there's obviously then a communication.

JEREMY FEWTRELL: There is. There's ongoing regular communication between our team in Fire and Rescue working on the PFAS issue and the EPA. At any point where we get new information or we get results or anything, we then forward that onto the EPA for their awareness and assessment.

The CHAIR: With your two staff working on PFAS, have you requested from the Government or the Minister more funding to deal with PFAS?

JEREMY FEWTRELL: We have previously made submissions around increasing the funding available to us, and we continue to work with Government on that. Obviously, it's an issue at the moment, and we'll continue those conversations back and forth.

The CHAIR: What's the scale of funding request? Two people across the State—you've talked about how many sites there are, and that may only be the sites you know about. Surely a bigger team is required, for a start.

JEREMY FEWTRELL: Yes. One of the biggest challenges in this is that it's a very specialised area of expertise with PFAS and contamination, so there's a limited pool of people that are out there who are readily available. Yes, some extra people would help us in that field. I wouldn't want to over-egg things and say we could have a team of 20 or 50 and we'd be powering through it, because the reality is we may not be able to get suitably qualified and capable people to do that. Similarly, with the level of contractors and the available people that are in the market to actually do that remediation work, there's a fairly small pool of suitable providers and fairly steady demand. Again, the only risk would be that we could not be able to get the people we need to do the job for us, even if we—

The CHAIR: Is that actually a concern at the moment? Cleaning up PFAS is a huge industry. In the US, for example, it's becoming a massive industry. Here in New South Wales, are you finding that you can't get—for example, just being able to clean up certain sites? Is that part of the problem, in that you have to wait for the required skilled workers to be able to do that?

JEREMY FEWTRELL: Probably one point I'd make is that I'd be concerned if we got to the point where there was a lot of fly-by-nighters coming into the market who saw the opportunity of putting PFAS on their business card, and then making some quick bucks and not adequately remediating. That's one thing, collectively, we need to keep in mind. Then there are the physical contractors. We might be engaging an earthmoving contractor or some other similar trade to do the physical work.

The supply restriction isn't so great with them but it's more the environmental contamination consultants being able to guide that work and shape up what is actually required to be done in terms of how the remediation will occur—working out the testing and sampling regime; having an understanding of how PFAS might be engaging between the soil, the groundwater and the surface water; and understanding what the contamination receptors or the pathways that would lead it to receptors further down in the environment are. Having that level of understanding and knowing what actions to recommend in a remediation plan—that's the highly skilled area that's probably the most constrained in the market, I would say.

The CHAIR: Yes, I'm sure it probably is. The second recommendation by the FBEU earlier was for the Government to provide appropriate funding to Fire and Rescue to commence a suite of decontamination works—then it goes on. That's one of the barriers—is that what you're saying? You get more funding, for example, from the State Government but, at the same time potentially, the State Government has got to look at training pathways and think about how to skill up a future workforce to get to the bottom of contamination and really start cleaning many more sites up more quickly.

JEREMY FEWTRELL: My concern, Chair, would be that I'd welcome any additional funding in this space, obviously—it helps us address a serious problem—but I'd need to work, and have our team work, carefully in terms of then determining a realistic workload that could be achieved so that we're not setting expectations and not being able to deliver on them if funding were to be available at a greater level.

The CHAIR: Can I also ask you a question about the firefighting foam. What was called the 3M foam has been banned—in 2007, I understand?

JEREMY FEWTRELL: In 2007 we stopped using. Our organisation made a decision to no longer utilise fluorine-containing foams.

The CHAIR: Does that mean that that wouldn't have been used anywhere across the State? When you're saying your organisation made a decision, that means that every fire fought with—

JEREMY FEWTRELL: Yes.

The CHAIR: The new products, though—could you explain to the Committee the type of testing that they have to undergo, if you're aware of that, to assure the community and to assure yourselves that they're less toxic than what you've been working with in the past?

JEREMY FEWTRELL: Our main concern was the fluorine chemistry in the foams. That's the chemical branch that then leads to the chemicals like PFAS and related matters. We have had independent laboratories do chemical analysis on that to confirm that these foams that we're using now are fluorine free. We've had independent testing houses do that, separate to what any statement of claim or information that the manufacturer and suppliers might've provided us.

The CHAIR: So they're independent testing. Is that correct?

JEREMY FEWTRELL: Yes.

The CHAIR: Are they part of the 14,000 PFAS chemicals—the fluorine-free chemicals?

JEREMY FEWTRELL: From my understanding, if we were getting a fluorine-free chemical, then it's making sure that there are no PFAS elements in there, because the chemical make-up of the PFAS is reliant on the presence of fluorine being in the chemical composition.

The CHAIR: With that independent testing, is it possible for the Committee to see that? Obviously this Committee is dealing with PFAS in drinking water. Is it just around the safety of the firefighters or does it also, in terms of independent testing, look at what it does to waterways?

JEREMY FEWTRELL: I'm happy to provide you that specific testing report. It was done a few years ago, but we're still using the same supplier. In terms of foam more generally, foam is a really useful firefighting tool in the right circumstances but needs to be used judiciously and appropriately. The issue of foam was with the removal of the fluorine-containing foams. One of the biggest challenges for fire services around the world was finding alternate products that were robust enough to hold up to the assault that they receive from particularly a flammable liquid fire and maintain their properties to—the idea with the foam is to smother the fire to stop the flammable liquid emitting vapours. Once those vapours are stopped and contained, then the fire will go out.

You need a foam that can withstand the heat in particular, but also the chemical attack as well that the foam receives. That foam blanket needs to be consistent enough to be able to extinguish the fire but then it also needs to be able to maintain the blanket's integrity to stop a reignition. The biggest challenge was finding products that were able to do that to an acceptable level. That is why the PFAS-containing foams were so popular amongst firefighting agencies: because they were so effective. They were chemically very resistant. That's why we're now talking about them as forever chemicals, because they do hold up so long. The challenge was always trying to find an alternative.

We went through an extensive battery of testing over a number of years, testing different products to be a foam replacement for us. People could still criticise the foam we use today to say, "It's not as good as the AFFF of the past", and, yes, they are probably technically right at the most extreme firefighting end. But in terms of finding that balance between something that does what we need to do while also being mindful of potential environmental impacts, I think we have a product that I'm fairly comfortable with and we're in about the best compromise spot with that.

Any foam that enters a waterway, whether it's the newer foams that are fluorine-free, will absorb the oxygen out of the water. They have a high biological oxygen demand. They will take that biological oxygen out of the water. That's when you see, as a result, fish kills. It's important to remember that any firefighting run-off would probably do the same thing with the mix of chemicals that might be coming off a property that's on fire and the water runs down into a waterway. Part of our firefighting operations is always to try and contain that run-off, whether it's firefighting water or foam. The foam is easier to contain, in a way, because it's not as fluid or doesn't run as much as the water does; we can contain it. It's also visible, so we can easily see it.

There's always an environmental trade-off consideration that our firefighters have to make. I guess this goes to some of the challenges that our incident commanders are fronted with or faced with, needing to make very quick decisions in a short time and in an imperfect environment with not being fully informed but having an immediate threat that needs to be rendered safe. We will do what we need to deal with the emergency and put that fire out, and that will factor into the operational decision-making—"If I'm going to use foam, is this right next to a creek or waterway or drain? What can I do to contain it?" And then make sure they're getting the resources in to be able to put that containment in. What sometimes happens is that that is their plan, but there's a short period at the start of the incident before we have sufficient people on the site to be able to put that full containment in and

stop it from entering the drain. We might see a small proportion of foam enter a drain compared to the total volume, but that happens in the very early stages. But we need to make that immediate impact on the fire.

The CHAIR: I understand. That was a very good explanation of that at the end. We're out of time. Thank you, Commissioner, for making yourself available and for the evidence you have given today. If we have any supplementary questions, the secretariat will be in touch. Thank you, again. We really appreciate it.

JEREMY FEWTRELL: Thank you for the opportunity. If there is any further information needed, I am always happy to assist you and the Committee.

The CHAIR: I think you agreed to take something on notice, in terms of that report.

JEREMY FEWTRELL: There were a couple of items I took on notice.

The CHAIR: That is the end of today's hearing.

(The witness withdrew.)

The Committee adjourned at 14:05.