

REPORT ON PROCEEDINGS BEFORE

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

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

CORRECTED

At Macquarie Room, Parliament House, Sydney, on Tuesday 20 May 2025

The Committee met at 9:15.

PRESENT

Ms Cate Faehrmann (Chair)

The Hon. Greg Donnelly
The Hon. Taylor Martin (Deputy Chair)
The Hon. Cameron Murphy

PRESENT VIA VIDEOCONFERENCE

The Hon. Scott Barrett
The Hon. Stephen Lawrence
The Hon. Aileen MacDonald

The CHAIR: Welcome to the sixth 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.

As all witnesses today are appearing from overseas, parliamentary privilege does not apply to the evidence they give. I urge witnesses to be careful about the comments they make during their evidence and to avoid making adverse reflections about others. 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. I welcome our witnesses and thank them for making the time to give evidence.

Dr MAX AUNG, Assistant Professor, Division of Environmental Health, Department of Population and Public Health Sciences, Keck School of Medicine, University of Southern California, before the Committee via videoconference, affirmed and examined

Dr SHIWEN LI, Post-Doctoral Research Scholar, Department of Population and Public Health Sciences, Keck School of Medicine, University of Southern California, before the Committee via videoconference, affirmed and examined

The CHAIR: You have the ability to provide a short opening statement to the Committee. Do you have that?

SHIWEN LI: Yes. I will be giving the opening statement. Thank you again for the opportunity to speak at today's hearing on PFAS contamination in waterways and drinking water supplies. I'm a post-doctoral researcher at the Keck School of Medicine at the University of Southern California, speaking today as an individual with expertise in environmental epidemiology. Several world studies of PFAS to establish whether PFAS adversely harms human health have been done by leading authoritative bodies, including the US National Academies of Sciences, Engineering, and Medicine, or NASEM; and the US Environmental Protection Agency, or EPA. Based on the NASEM report, PFAS is likely to cause kidney and testicular cancer and to have adverse hepatic, immunological, cardiovascular and developmental effects.

Over the past two years, I've published multiple studies on health effects associated with PFAS exposure. Two may be particularly relevant to this Committee. In one epidemiological study in Southern California, we found that individuals living in areas where multiple PFAS were detected in drinking water supplies had blood PFAS concentrations higher than residents in areas without PFAS in drinking water. This strongly suggests that PFAS levels in blood could be lowered by limiting PFAS in drinking water. In the national analysis of US drinking water PFAS levels, we observed that detection or exceedence of proposed permissible PFAS concentrations from multiple PFAS were associated with higher incidence rates of cancers affecting the digestive, oral, pharyngeal, respiratory and endocrine system—for example, thyroid cancer.

Our studies suggest that drinking water is a likely reason for higher PFAS concentrations in humans and that detection of PFAS in drinking water supplies may increase the risk of cancer. Although the design of our study of cancers has some limitations, it adds to an emerging body of scientific evidence that PFAS causes cancer and that reducing PFAS water concentrations could potentially reduce the incidence of cancer. We're happy to answer questions relevant to our studies. Thank you.

The CHAIR: Thank you both so much. Firstly, the latest research paper that you've both been a part of, as well as quite a few other researchers, I understand, from the University of Southern California, has been published in *Nature*, just a few months ago. Is that correct?

SHIWEN LI: In the Journal of Exposure Science & Environmental Epidemiology under *Nature*.

The CHAIR: Under *Nature*, yes.

SHIWEN LI: Yes.

The CHAIR: Your study was peer reviewed?

SHIWEN LI: Yes, it's peer reviewed.

The CHAIR: It states in the abstract:

This is the first ecological study that examined PFAS exposure in drinking water and various cancer risks.

I have read the paper. It's very technical. No member of this Committee is a chemist. I don't think any members have studied chemistry.

The Hon. GREG DONNELLY: We haven't even seen the paper.

The CHAIR: I think it was circulated to members.

The Hon. GREG DONNELLY: I apologise.

The CHAIR: Could you explain, as simply as you can, what you did in terms of the PFAS levels in drinking water in parts of the United States and how much of that, plus where you got the cancer risks from? I understand it was a database. What you did to apply that is particularly important. Could you explain that?

SHIWEN LI: Yes. What we did was we used publicly available data. One is from the National Cancer Institute. It's called the SEER database. Then we obtained the county-level incidence rate for each of the counties with available data and then we also used US EPA's data. They did national-level PFAS testing in public drinking water systems that are systems serving, for example, municipal waters but not the private wells. They didn't include private wells. We used that data. They have done PFAS testing from 2013 to 2015 in the first wave, and then did another wave of testing in 2023 to the present day, so the testing is still ongoing. In the first round, they tested for the six PFAS I listed in the paper. Then in the recent wave, they tested more PFAS—I think about 20-something PFAS.

What I did was merge the two datasets. I'm trying to understand in areas where they have higher PFAS detections or where the cancer incidence rate was higher than those without PFAS detections at the county level. That's why it's called "ecological"—because we didn't use individual-level data. We only used county-level data. We tried to control for various neighbourhood-level information as well as individual-level information like age and sex.

The CHAIR: Yes. How long did the research take?

SHIWEN LI: Roughly a year, I think, from the beginning to the end.

The CHAIR: Now the summary states that the objective was essentially to look at whether there was an association between PFAS contamination in drinking water and the incidence of cancer. Is that a correct summary?

SHIWEN LI: Yes.

The CHAIR: There's a difference, isn't there, between an association and an example of a causative relationship. Where did you get to with that? Our health departments here have stated that, to date, a causative relationship between the health effects and PFAS exposure has not been clearly established. Would that be a correct statement? From your current research, would you agree with that?

SHIWEN LI: My study is only one of the many studies that studied PFAS and cancer. The unique part of my study is that we tried to screen all the cancer associations with all the PFAS data available. The point is to give directions of other cancers that haven't been linked to PFAS yet. That was my initial intention of developing the study. But there has been, like I stated in my opening statement, for example, the NASEM—the National Academy of Sciences, Engineering, and Medicine. They did a systematic review of existing literature on PFAS and various cancers.

They tried to evaluate each of the studies and then tried to identify high-quality studies that can provide evidence leading to a point of causation. What they call it in the report is "likely to cause cancer", so that's their statement. But my study in particular, because it's an ecological study, is more for screening purposes for future research rather than establishing a strong causation because, for example, if you can't really do a randomised controlled clinical trials, which is the highest evidence that you can do to establish causations, that's kind of impossible for toxic chemicals to do randomised trials. So most current scientific practice is to do systematic reviews and evaluate evidence leading to some conclusions.

The CHAIR: This research states that you found that PFAS in drinking water was associated with cancers in the organ system, including the oral cavity, pharynx, lung, digestive system, brain, urinary system, soft tissue and thyroid. There are very interesting maps in your study that show, in some ways, the correlation between higher levels of PFAS in drinking water and the incidence of cancer. Could you expand on that a bit for the Committee?

SHIWEN LI: You mean explaining the maps?

The CHAIR: Because it's a very technical paper, what has led you to say in the impact statement in the summary on the front page that you found that PFAS in drinking water was associated with those cancers that I mentioned?

SHIWEN LI: What we did was we tried to use statistical models to model the associations between the exposure—in this case, PFAS—and cancer. The statistical model we used was to select other variables that may also influence the cancer incidence rates. When we put them in the models, all the other factors were—what we call it is we are controlling for all the other variables that may potentially confound or may potentially bias the associations because, if we simply look at the correlations, there are a lot of factors that might explain the correlations.

So what we did is a step forward to try to control for additional factors that may confound the associations. Although it's not perfect, we tried our best with our modelling approach. In the statistical models, we used 95 per cent confidence intervals to indicate significance of associations. So if you see me listing, for example, an effect

estimate, if it's above one and the 95 per cent confidence interval doesn't include one, then we call it "a significant association" based on this statistical threshold. I'm not sure if I'm explaining to the question that you want me to answer, but that's how we arrived at the conclusion.

The CHAIR: I'm sure members will continue to probe and ask questions to get a better understanding of this.

The Hon. SCOTT BARRETT: I wonder if, as well-renowned academics, someone could give me some insight into how advanced our research is here in Australia.

The CHAIR: Are you aware, Dr Li or Dr Aung?

MAX AUNG: I will confess that we are not abreast of the latest research that has been conducted specifically in local areas in Australia. But if you wanted to share specific examples with us, we'd be happy to take the time to independently review and reflect and provide additional feedback.

The Hon. SCOTT BARRETT: I'm headed down two paths and we'll tackle one at a time. How can we, as policymakers, help develop the research sector in this area? The other aspect that might be along the same lines is how can we be more collaborative internationally sharing that research and bouncing off each other's research?

MAX AUNG: That's a great question. I would say that one area that'd be particularly helpful is to engage in exposure assessment of PFAS in drinking water systems. Something that we've been doing in the US is we have a national biomonitoring study, called the National Health and Nutrition Examination Survey, where we've been randomly sampling swathes of the US to try to understand exposure levels in the general population, and then individual states have also been doing this at a State level. I think that could certainly help in terms of trying to understand the context of the exposure levels of PFAS in your specific context and being able to sort of compare and contrast with other biomonitoring studies across the world, including the US. We also have another study where we linked those biomonitored PFAS to self-reported cancer diagnoses as well. I'm happy to share that paper as well, if it's helpful.

The Hon. SCOTT BARRETT: Going a little bit deeper into that international collaboration, it seems like the US is more advanced in the research as well as their experiences with PFAS. How should we be sharing that?

MAX AUNG: Sharing like data access?

The Hon. SCOTT BARRETT: Knowledge, I guess.

MAX AUNG: I think there are a lot of forums in which we can share research. I would say academic conferences, town halls and community workshops. I think all of those are really great forums to talk about what we know about the science. Recently we had a national PFAS conference here in the US. It was last June. A lot of different stakeholders got together in Michigan, which is a major site of PFAS contamination. It included researchers like Dr Li and I, as well as community members who've been affected by contamination, as well as regulators, State agencies and senators. It was a really great forum. I think that could also be a really great model to think about, especially with your local context.

The Hon. GREG DONNELLY: Thank you both, gentlemen, for making yourselves available today. It's greatly appreciated. I want to provide just a bit of opening context, if I could, and then ask a few questions. The inquiry that we're undertaking here is looking at the whole issue of PFAS contamination in water, and it has been said by various witnesses that essentially PFAS is, to use the words, found everywhere. It has manifested in all sorts of places, including water, and that's just something that we have got ourselves into as a position. We find ourselves where it would be surprising to, in fact, not find it in various places, including drinking water. Which brings then the question, if it's in the water—and let's make this assumption, if I could, and it's a bold assumption but I think it's accurate. If we had the completely perfect situation, it would be that it not be in our drinking water. In other words, the ultimate position to be in that I think would be arguably the most satisfactory is that it would be desirable to have no PFAS chemicals and the chemicals within the PFAS family in our drinking water, and, of course, that would in fact apply to a number of other impurities in our drinking water. I just set that up as caveat.

If those statements are correct or very close to being correct, do you have a view about how governments or legislatures and regulators deal with the reality of trying to set limits as far as we practically can with the scientific knowledge we have to deal with this chemical in our drinking water, knowing full well that we just can't make it disappear overnight? I guess I'm moving from a strict scientific examination. Can I commend you on your research, because we do need to know about its presence in not just drinking water but also in the environment more generally. But when it comes to coming to terms with how we progress to set regulations—and these regulations may, in fact, lead to tighter limits and lower limits on PFAS—as regulators or through the legislature

and regulators, how do we go about setting a limit that we can then work on reducing over time in a practical way? I might just pause there. It's a challenging question, I know. It has been posed to other witnesses, but this is taking an overall perspective from yourselves as scientists looking at this issue.

SHIWEN LI: I guess one suggestion would be to try to do health economics studies on the issue, trying to estimate the cost of reducing PFAS and trying to weigh that against the potential healthcare expenditures that it may incur, and see the most cost-effective ways of reducing that. That's a new area of research that people are doing, including myself, trying to do cost-effective analysis of regulating chemicals, taking into consideration all the factors.

The Hon. GREG DONNELLY: Sorry to interrupt you, doctor. Just to press you, I'm talking about the very practical requirement of a legislature or a regulatory body to, in the first instance, create and then enforce a specific limit that we can generally accept is where we ought to be with our overall ambition of trying to move contamination by PFAS over time. How do we identify that limit that we can work on and work with in a practical way?

SHIWEN LI: I think what I'm trying to say is that you do need to work with public health officials to do the research, and I do think economics is a big part of the problem that you need to consider, because for some of the waterways and water companies, it might not be affordable. Then thinking about other economic solutions that might support those regulations will be important. So it is a combination of economics, time and then the limits. So it's impossible if you set a limit for next year and then nobody has the resources to achieve it. But then you do need to have solid research before you set the limit. I think that's really important, in my opinion.

The Hon. GREG DONNELLY: That's very helpful. Dr Aung, do you have a view? Are you concurrent with that position or would you like to elucidate further on the answer?

MAX AUNG: The only thing I would really add is I think it's really critical to also engage with public stakeholders, getting insight of the effects from local communities who have been impacted by the problem, getting their input and doing that community engagement. I'm not sure exactly what the local context of your decision-making or rule-making is, but having that engagement with local stakeholders is so critical and will help inform your process.

The Hon. GREG DONNELLY: I have more questions but I might need to put them on notice.

The Hon. AILEEN MacDONALD: Thank you both for attending today. My first question is to Dr Li. Based on your modelling, which populations do you think are most at risk from, say, low-dose, long-term PFAS exposure?

SHIWEN LI: My research doesn't answer what the population at risk is. We're just trying to look at the exposed population versus unexposed. But based on the NASEM guidelines, they specifically point out that those who have metabolic disorders are at a higher risk of PFAS, and they have clinical guidelines on those who have higher PFAS and other metabolic syndromes.

The Hon. AILEEN MacDONALD: This might add to my colleague the Hon. Scott Barrett's question. Do you believe Australia's current PFAS safety thresholds in drinking water reflect the best available science?

The CHAIR: Are you aware of what they are? Otherwise, I can quickly let you know.

The Hon. AILEEN MacDONALD: We can do it as a question on notice. We might do that and then give you that information so that then you can then answer that question. What do you think the implications of, say, PFAS accumulation in the body over time are, particularly for communities with ongoing low-level exposure?

SHIWEN LI: I think the clinical implications is the part that I can't really comment on. But all I can say is that as long as you don't cut off the exposure sources, the PFAS chemicals are going to keep accumulating and then potentially arising to some health effects. But then the probabilities of one individual getting a disease or not—that's harder to determine.

The Hon. AILEEN MacDONALD: Dr Aung, in your view, how effective are biomonitoring programs in tracking PFAS exposure, and then in doing that, informing public policy?

MAX AUNG: In terms of biomonitoring in the general population, it really helps for a lot of our research studies to benchmark where our unique local populations fall in this wide distribution of the population. So it can help inform, for example—let's say we're doing a local study of a community that lives near a PFAS-polluting industry where there's high contamination. By having that national distribution of PFAS concentrations at the national level, we can communicate that to policymakers and community members and be able to explain that this local community is falling way above the average of the national distribution. That can help really put important

context so that decision-makers can use that information to determine what types of resources they need to invest into that local community.

The Hon. AILEEN MacDONALD: Further on that, how important is early intervention and precautionary regulation in protecting communities from long-term PFAS impacts?

MAX AUNG: I would say it depends on the health outcome. Some diseases—one, particularly, that we study is metabolic-associated liver disease. It's a chronic condition that can increase in severity over time and stay relatively without major symptoms as the disease progresses. So if PFAS are impacting that condition and having toxic effects on the liver, knowing that somebody has higher exposures early on is helpful because it may serve as a preventive tool from later life disease. So that's one anecdote I would mention.

The Hon. AILEEN MacDONALD: I have two more questions. What lessons can New South Wales take from US approaches to community engagement and PFAS health surveillance? Maybe take it on notice?

MAX AUNG: Yes, I'll have to think about that a little bit more. Also, I don't quite know yet what you've been already doing, so it would be nice to know that a little bit better.

The Hon. AILEEN MacDONALD: Okay, then maybe the second one. Do you have any recommendations for integrating PFAS biomonitoring into our public health policy, particularly for us in rural and regional areas?

MAX AUNG: I think one thing, for us, that we've learnt—we've been taking a lot of lessons from that National Academies report. The use of all of that data that they integrated in their report—they were able to provide these parameters of concentrations to inform clinical care and clinical guidelines. It's still early on, and a lot of that hasn't been fully translated to clinicians and hospitals and public healthcare systems, but we, as researchers, have really been able to anchor onto that as we communicate our biomonitoring studies to our local residents. When we do community engagement, we always show that NASEM report and how their PFAS levels are contextualised by those guidelines. So I would say a good first step is to explore that report and think about how that can be used when you're doing biomonitoring and report-back of data to community residents.

The Hon. CAMERON MURPHY: In relation to your study, one of the things that this Committee has heard in evidence before is there are literally tens of thousands of different types of PFAS—PFAS, PFOS, PFOA and so on—in what could be described as the class of PFAS chemicals. Your study, as I understand it, focused on the main six—is that right?—and you were looking at that cancer risk in relation to those. What I want to know was whether there are different risks for different types of PFAS. Are some more risky than others? Do some have a higher link to rates of cancer than others? Is there an accumulation risk where, if you've got two different types of PFAS together, the risk is increased? You may not know the answer to that, but I wanted to see if you had a view. Also, are there things we should do if we don't know the answer to that now? Should we be banning or limiting types of PFAS—long-chain, for example, or other types of PFAS—before we know the answers to those questions?

SHIWEN LI: In my study, as well as in many other PFAS cancer studies, it does show that different PFAS has different toxicities to different tissues. It depends on their chemical structures. They might accumulate in one organ tissue more than the other ones, so there are differences. There is some PFAS that might be considered less toxic. In general, they're all toxic, but they're relative.

The Hon. CAMERON MURPHY: Is that the reason why there are different cancers that you point the link to between men and women? Is that because of the particular organs that it accumulates in? Or is it the type of PFAS?

SHIWEN LI: That is more because there is often a sex-specific effect of PFAS. I do consider that that's slightly more because of the sex differences rather than—it's possible, but I haven't done too much research into that. Definitely there are sex differences. For example, some of the PFAS may act similar to hormones. They will interact with certain hormone receptors more than the other and maybe one type of hormone receptor is more common in one sex than the other one, so then you will see differences in the cancer risk. Different PFAS does have different metabolic rates in the body. Your body metabolises different PFAS differently. For some of the PFAS, it may stay in your body shorter than the other ones, so that might also cause the differences in bioaccumulations. Also, depending on the chemical structure, some of the PFAS you will never be able to detect in certain biological fluids like urine or blood. But they do get used and maybe they degrade into something else in the body. It's not always 100 per cent correlating with the exact PFAS chemicals they use in the products or in the water contamination versus the metabolised version of the PFAS in your body. It's not 100 per cent matching, because of the metabolism.

The Hon. CAMERON MURPHY: Given that that's the case, what we've heard from our health authorities, for example, is that there just isn't evidence confirming particular links to cancers and whether there's a causal link there. Should we be taking a more cautious approach in terms of PFAS until a link is established? Or do you think we can manage this by setting lower amounts in water levels and reducing exposure elsewhere? Do you have a view about that?

SHIWEN LI: My recommendation would be to look at what other legislative authorities have established—not legislative but other authoritative bodies, like the international society of cancer, IARC, who determined the cancer risk. They have determined PFOA and PFOS as group 1 and group 2A carcinogens. They have published papers on those as well. For example, the NASEM called them likely to cause cancer. It's really up to your interpretation what "likely" means, whether it's harmful or not and whether it's causation or not.

The Hon. CAMERON MURPHY: Do you think that extends to the whole class of PFAS chemicals? As I say, what we hear in a lot of this is that the risks aren't known because we simply haven't conducted studies into those risks in relation to many of the chemicals within the class.

SHIWEN LI: In our research, something we call it is the regrettable substitution. Sometimes we replace a chemical with another chemical that we think is supposedly less toxic, but the result of large-scale exposure and population-level studies, we can never know. But at that time, it's kind of too late. It's up to you to decide what kind of approach you want to take. It's also interesting that I do see with some of the PFAS, they change the chemical structure slightly and they call it a different name. They use that as a replacement, but they are equally toxic. That's also happening at the same time. By chemical structure, it is a different chemical, but they only change maybe one carbon bond on there and call it a different chemical. Someone would say there's no study in it. It's true that there is no study on that new chemical.

The CHAIR: I might jump in with a few more questions. To be clear, for the Committee, when you mentioned NASEM, you were talking about the National Academy of Sciences, Engineering, and Medicine. They have released a guidance on PFAS exposure, testing and clinical follow-up. Our witnesses are nodding, for the purposes of Hansard.

MAX AUNG: Yes.

The CHAIR: The report recommends, I understand, that the Centers for Disease Control and Prevention in the US update its clinical guidance to advise clinicians to offer PFAS blood testing to patients who are likely to have a history of elevated exposure. That's what NASEM has recommended. Is that correct? Is that happening in the US or is that just what the National Academy of Sciences, Engineering, and Medicine is recommending?

MAX AUNG: I think at the current stage, it's a recommendation. The implementation of that is certainly still a consideration.

SHIWEN LI: In some clinical studying, medical doctors can order a test using a code. That exists for PFAS testing. That part exists. The widespread knowledge of the existence that doctors can order PFAS testing is not quite there yet.

The CHAIR: With the experience that you've had and the knowledge that you've gained as a result of looking at the levels of PFAS pollution combined with the cancer incidences, I wanted to give you an example of a community here in New South Wales that may have been or has been exposed to PFAS chemicals, PFOS particularly, in their drinking water. This community is called the Blue Mountains. A new report has come out recently which has acknowledged that this community, or some of them, have been drinking PFOS in their drinking water, potentially for 32 years, from an incident back in 1992.

In Australia, we've got draft drinking water guidelines which suggest that the new PFOS levels are four nanograms per litre, which is the same as the US—so four parts per trillion. We know for sure that they have been drinking 16 parts per trillion—that's four times higher than the safe level—potentially back to 1992. There's another reservoir that has recently come out, and it was at 28.7 nanograms per litre or parts per trillion. Would you consider, based on the work that you've done, that this community should have their health monitored and their blood tested?

MAX AUNG: Based on those contamination levels, you'd also have to think about exposure routes and assessing if this is indeed the drinking water that they consume.

The CHAIR: Let's just say yes, because many of the residents have been drinking that tap water for many years.

MAX AUNG: Based off of information from the National Academies' report, it would be helpful to do biomonitoring to see if there are elevated levels and use the best available science that we have from that to help inform clinical interventions or clinical follow-up.

The CHAIR: Some of the residents in the Blue Mountains are getting their own blood tested because there hasn't been anything put in place by the State or Federal governments. It's A\$500 a pop, which is more than the US. One woman has over 20 nanograms per litre of different PFAS chemicals in her blood. Quite high levels are coming through. What benefits do you see for the Government if it was to undertake or offer voluntary blood tests for this community? Do you see benefits in terms of the Government doing this?

MAX AUNG: I would certainly think that knowing PFAS levels can help inform ways to reduce exposure at the community level. That could certainly be a potential benefit. On your question in terms of broader impacts, I might need a little bit more context on that.

The CHAIR: Your research is drawing reasonably strong links between higher levels of PFAS chemicals in drinking water and incidence of cancer. For example, your conclusion reads:

This cancer-wide ecological study presents evidence linking PFAS exposure through drinking water to increased cancer risks.

That's what you've concluded. You then say:

The significant associations identified between PFAS in drinking water and various cancers, including those of the endocrine, digestive, oral cavity, pharynx, skin, and respiratory systems, underscore the urgent need for more comprehensive research.

There has been a significant association. Would it therefore follow that governments that are in charge of communities that have had a history of elevated exposure to PFAS in drinking water should be undertaking blood tests and other health studies of those impacted communities? That's surely the beginning, isn't it?

SHIWEN LI: Understanding the exposure levels, like Dr Aung said, is very important. Without knowing how much PFAS is in their blood, it's kind of impossible to do any other research.

The CHAIR: Your research would help health authorities potentially understand early monitoring. I did visit the US earlier in the year, to Michigan and Minnesota, to talk to communities impacted by PFAS in drinking water. An example in Michigan is a woman who, after drinking elevated levels of PFAS in her private drinking well for some time—because of that discovery, she got an early test for thyroid cancer, and it was detected early. Isn't that one of the main reasons to try and ensure that those health impacts are caught early? If somebody does have high levels, you can then test them for different things.

MAX AUNG: Yes, certainly. That's a great point to make. It's unfortunate to catch thyroid cancer, although early is better than later. According to the NASEM guidelines, there's also other biomarkers indicative of liver damage and of high cholesterol, and those can even be earlier indicators of chronic disease. I totally agree that there is the spectrum of disease prevention. Having biomonitoring studies can help inform early detection and early prediction so that we can implement a healthcare plan that can help prevent the progression of the disease.

The CHAIR: I want to get your thoughts about a broader suite of chemicals that we should be testing for in our drinking water. I know that you will potentially take it on notice, but we do have a few minutes left. Australia currently has five PFAS chemicals: PFOA, PFOS, PFHxS—and then we don't currently test for PFBS or GenX chemicals. Actually, at the moment, there's PFOA, PFOS and PFHxS. Our draft guidelines have been closed for public consultation, and hopefully will come online this year. Our draft guidelines are stricter and include PFBS but nothing for GenX chemicals. Your research shows a very strong link between PFBS and oral cancers, particularly in women. Your research says that the largest effect was observed between the detection of PFBS and cancers in the oral cavity and pharynx. Do you think that we should be doing more? Should we be more concerned about PFBS, therefore, in our drinking water?

SHIWEN LI: PFAS-testing-wise, there is the EPA method that tests for about 70 PFAS. If resources are available, you should use the most current method available to do PFAS testing. The prior dataset that they released, that only has six PFAS, presents a challenge of finding associations with limited data and very high detection limits. If the technology allows, and if resources allow, I would think using the most current technology would be better than using the outdated ones. For the associations, I think it's interesting to see, in the most current EPA testing, that PFBS is very prevalent among water systems. The reason why it's prevalent is unknown, to me at least. It's interesting that this is a very prevalent, low-exposure PFAS that we found in different water systems.

The CHAIR: That's basically once you start testing for it. You're saying the US EPA, and this is federally—are they requiring water utilities across the state to test for 70 different PFAS chemicals? Is that correct?

SHIWEN LI: It's just the method they're using. In terms of regulating or not—that's a different topic. Testing-wise, the EPA method just does the targeted testing of those 70-ish PFAS.

The CHAIR: For just another example of one, your paper has PFNA that's associated with cancers in the endocrine system—mainly thyroid cancers. Again, that's just not on our radar at all. We're at quite an early stage of requiring our water utilities to actually test let alone filter. Do you agree, considering where we are in this kind of journey, that it would be better to test for more to begin with as opposed to something which is quite outdated in terms of the chemicals that are currently listed on our draft drinking water guidelines? They're important, but we should potentially look at what more we could do.

SHIWEN LI: I really think it depends on the resources available. PFOA and PFOS are still one of the most highly prevalent PFAS. If you want to start somewhere with limited resources, those are the ones that you should target. If more resources are available, and with the most current technology available, then at least you should learn the lessons from what other people have done and try and see if there's resources to catch up with everyone else.

The CHAIR: Yes, Australia needs to catch up with everybody else. PFOA has been declared carcinogenic by the International Agency for Research on Cancer. The US EPA has a drinking water guideline of four nanograms per litre. Is that correct?

SHIWEN LI: Yes.

The CHAIR: Our current guidelines are 560 nanograms per litre for PFOA. Firstly, what's your view on 560 nanograms per litre, which is the current for PFOA, based on your study into cancer?

SHIWEN LI: So far, I don't think any water system—maybe some of them. In my study, the average is below 10, I think. I can't remember the exact details of the numbers.

The CHAIR: So you haven't found high levels of PFOA in drinking water anyway?

SHIWEN LI: I don't recall. Only a couple. Not a huge amount.

The CHAIR: Our revised drinking water guideline for PFOA is 200 nanograms per litre. Do you see a reason why, for example, that 200 wouldn't be lowered to four if you're unsure of why it would be in drinking water in the first place?

SHIWEN LI: Again, it's very rare to find a water system that has that much at higher levels. I don't think it's practical to set a limit that no water system can reach that high ever.

The CHAIR: There are statements such as, "It is unlikely or very unlikely that we are able to show any health outcomes that could be directly attributed to particular PFAS or PFAS amounts." Is your research showing there are health outcomes, and significant health outcomes, as a result of higher levels of PFAS in drinking water if people have been drinking that water?

MAX AUNG: With this study, since it's ecological, we can't assume that they're drinking that water. It's an association between the cancer incidence relative to the drinking water contamination. That's where you'd have to interpret the findings, at those boundaries.

The CHAIR: We're out of time. Thank you both so much for agreeing to appear before this inquiry at relatively short notice. Your research and evidence have been extremely valuable. The Committee will be in touch with you if you've agreed to take anything on notice or if members have additional questions for you. Thank you so much, once again, for tuning in from the other side of the world for this inquiry.

(The witnesses withdrew.)

Senator JUDY SEEBERGER, Minnesota State Senator, Representing Senate District 41, before the Committee via videoconference, affirmed and examined

Ms AVONNA STARCK, State Director, Clean Water Action Minnesota, before the Committee via videoconference, affirmed and examined

The CHAIR: Senator Judy Seeberger and Ms Avonna Starck, thank you both so much for joining us today. Senator Seeberger, thank you for making yourself available on what I understand is a very busy day for you. Do you have a short opening statement for the Committee?

JUDY SEEBERGER: For years my constituents and I have been ingesting water contaminated with PFAS. My district is one of the most heavily contaminated by PFAS in the state of Minnesota due to years of illegal and irresponsible chemical disposal and dumping by 3M. For thousands of Minnesotans in my region, including me, it's a problem that we must deal with every time we turn on our faucets, wash our hands, brush our teeth, do our laundry, cook dinner—I could go on. It's a problem that we'll be dealing with for decades to come.

I am proud to say that in 2023 I authored a bill that passed the Minnesota State Legislature and was signed into law and which provides the most comprehensive bans on PFAS in the United States. With this bill, our state has banned the use of PFAS in everyday products such as cookware, cosmetics, cleaning products, carpets and rugs, juvenile products, menstrual products and more. By 2032 we will have banned the use of all non-essential PFAS in our state. These commonsense prohibitions will stop the introduction of these chemicals into our environment, and I'm encouraged to see other nations move in the same direction.

Minnesota is noteworthy for many things: beautiful lakes, forests, streams, farmland, vibrant cities, world-class educational institutions and some of the nicest people you'll ever meet. But we're also noteworthy as the place where PFAS began. That's why I'm proud that we are now leading the fight to eliminate PFAS from our environment, and to help every state in our nation and countries around the globe do the same. I am honoured to be before this Committee and humbled to partner with you in this fight.

The CHAIR: Thank you so much, Senator, for that wonderful opening statement. Avonna, do you have one as well?

AVONNA STARCK: As I said, I'm the state director of Clean Water Action Minnesota. Our mission is to ensure safe, swimmable, drinkable and fishable water for generations to come. While much divides global citizens today, we can all come together on the issue of PFAS. This global threat to human health and the environment impacts everyone regardless of race, ethnicity, religion, socio-economic status, political leanings, gender or age. It is the great equaliser that puts us all in the same storm. In Minnesota, we passed the strongest ban on non-essential PFAS in consumer products in the United States, and possibly even the world. We're addressing PFAS in firefighting foam, and we are requiring the disclosure of PFAS in consumer products by those who are selling those products in Minnesota.

A PFAS plume in the east metro of the Minneapolis-Saint Paul area was the catalyst for change. But, as we know, the consequences of exposure aren't limited to a small land mass halfway around the world from where you sit. The PFAS problem is global, thus the solution must also be global. Clean Water Action Minnesota led the work to pass Amara's law. It was a hard-fought battle, and I'm happy to share with you what we learned in 2023, as well as the threats we're currently fighting now that implementation has begun. Our ban on intentionally added PFAS in 11 consumer items began on 1 January 2025. Manufacturers must disclose their use of PFAS in items sold in Minnesota starting on 1 January 2026, and all non-essential uses of PFAS will be banned by 1 January 2032. "Essential" means the item is necessary for the health, safety or functioning of society.

As Senator Seeberger said, we are the birthplace of PFAS, and Minnesota takes being the leader in ending it very seriously. Today I am happy to elaborate on how the chemical industry is seeking to redefine what a PFAS is and what exemptions they are lobbying for, or anything else that I can help with. We must work together to turn off the tap of PFAS entering our water so that clean-up can occur in a meaningful way. The cost of doing nothing is simply too high. When we consider the cost on human health and to taxpayers, we have to do something. Remember, the chemical industry knew this chemical was toxic for over 70 years. They hired powerful lobbyists and controlled the narrative while concealing the truth. It's up to us to share accurate science and data to combat years of damage. There is strength in numbers, and I am grateful for a strong collaborative partnership. Together we can tackle this serious health and environmental issue once and for all.

The CHAIR: Thank you, Ms Starck. That was wonderful as well. Members of this Committee, being from a State of Australia—New South Wales—will be very interested in the fact that you, Senator, in the state of Minnesota have been able to get legislation passed that does bans products that, frankly, one would think would

need to be done at the Federal level. You've talked a little in terms of the elements of the bill banning particular products from 1 January this year. What were the challenges? Could you talk us through the development of that, who you worked with and why you chose to begin with those products—the health products, cookware, a range of things. We could potentially get the detail on notice. We might even get the bill tabled. Why did you go with those products that were banned on 1 January? What led you to these products?

JUDY SEEBERGER: From my perspective, the urgency surrounding the ban on consumer products came from how prevalent they are in our daily lives. My interest began with firefighting foam. As I began to dig into this issue a little more, I discovered that PFAS was really everywhere—dental floss, menstrual products, microwave popcorn, take-out food containers. We've known about the cookware for quite some time. The more I dug, the more I found.

In having conversations with constituents and members of my family, I learned that the vast majority of the population was just like me. We had no idea how widely this chemical was found throughout everything we use in our everyday lives. That really spoke to me. As consumers, we should know what we're putting in our food or applying to our face, or what is in the textiles around us. To the extent that we've been surrounded by this for so long, it just made sense to initiate this ban on everyday consumer products that we use as a normal part of our everyday lives.

AVONNA STARCK: Yes. One of the reasons the list kept growing was that, as the word got out that we were moving forward with this legislation, we kept having manufacturers reach out and ask for exemptions. For example, dental floss was not originally on the list. When they reached out for an exemption, we were really startled and shocked, frankly, that PFAS was so prevalent in dental floss. So we added that to the list. We added menstrual products to the list as well, by the request of another legislator who was really passionate about reproductive health. The way that we built that list of 11 products came from legacy bills with which attempts had already been made to go through the process. But then, as Senator Seeberger said, we kept learning more and more, and it was really startling. That's how the list grew.

The CHAIR: I'll get back to the legislation in a second, but from a drinking water perspective, with the regulations in Minnesota, are the public water municipalities in Minnesota now filtered sufficiently, and is drinking water now at a standard for public drinking water in the state? Or is there still work to be done there?

JUDY SEEBERGER: There's still work to be done. I can speak to the area where I live. My home is on a well. I don't have municipal water, but the aquifer that feeds my well and my home is contaminated. I have filters in my basement to filter out the PFAS. For one of the cities that I represent—the city of Hastings, which is to the south of my district—their municipal wells were in compliance until the thresholds were lowered last year. Now every single municipal well is out of compliance, and the city residents are receiving water with PFAS levels that are higher than acceptable levels. The city is building a treatment facility to remove the PFAS from the water. But it's a startlingly expensive project and, here at the state level, we're trying our best to find funds or bonding options for the city to be able to afford an \$80 million project that a very small city the size of Hastings just can't afford itself. In some places we do have safe, clean drinking water and in some places we're still playing catch-up.

The CHAIR: Pretty much every water utility or representative of water utilities that has appeared before this Committee has urged us to look at the products in terms of PFAS, because it's impossible for them to do much about it other than filter. But there are issues with sewerage, wastewater and what have you, in terms of the levels of PFAS. I assume the reason that you've turned to products is because that's the best and easiest way to get PFAS out of the water cycle. Ms Starck from Clean Water Action, is that why you've gone there?

AVONNA STARCK: Yes. You have to think about contamination as a cycle. For things that you're bringing into your home, not only are you being exposed to them, with your babies crawling on carpets and rugs and you putting cosmetics on your face, but also, when those items end up in the trash, that is another method of exposure. We have 101 landfills in Minnesota, and 98 of those are leaching into the groundwater. We're looking at a bill for between \$14 billion and \$20 billion over the next 20 years just to clean up our wastewater. That's not accounting for the soil that has been contaminated by sludge or anything like that. When we're talking about banning items, it's really this idea of turning off the taps so we're not putting more into our landfills to leach into our groundwater to come out of our taps, and cleaning it up that way.

The CHAIR: That's extremely useful, thank you. I'm interested in what it looks like in terms of banning these products at a state level. On 1 January, let's say with cosmetics, were certain cosmetics taken off the shelves and others put on? Has it led to different practices by companies in Minnesota? Talk us through what is happening and what is changing as a result of this for consumers when they go to the shops.

JUDY SEEBERGER: To be frank, I have not seen empty shelves or lack of product availability based on the bans that went into effect on 1 January. Companies were well aware of what we were doing in 2023. They had almost two years to make any changes that were necessary to keep continuity with regard to products. The way I look at it is that the introduction of PFAS in these products has happened over time. Yet we've been able to exist as a society and a species for thousands of years. There are alternatives. There always have been alternatives. There are products that don't rely on PFAS. That technology is out there. I was expecting a bigger pushback from product manufacturers, and I really haven't heard a thing. From my perspective, it has rolled out very smoothly.

AVONNA STARCK: I'm really noticing that companies are using this as a new marketing technique as well. I go shopping and everyone wants to advertise that their cookware is PFAS free. Everyone wants to advertise that their make-up is safe and clean. One of the things we talked a lot about during the legislative session this year and back in 2023 was that this is going to drive us in a new direction of innovation. I know that there are countries around the world who are working on ending the importation of products with intentionally added PFAS. We argued that, if Minnesota wants to be a leader, then we have to remove this stuff now, if we're going to have trading partners. These companies really are catching up with the fact that consumers don't want to buy it, and it's not profitable to sell it.

The Hon. SCOTT BARRETT: In the legislation you've spoken about, you were very specific to say non-essential items with PFAS in them. Can we touch more on what the essential items are and how you're managing the risk of contamination from those essential items?

JUDY SEEBERGER: I can start and perhaps Ms Starck can take over. Some of the essential uses that we learned of during the course of drafting this legislation had to do with certain medical equipment, implantable devices and things that, because of the nature of the product and the use of the PFAS within it, were convincingly necessary uses of the product—for example, in the orthotics industry, certain prosthetics and things like that. We had to differentiate between those particular uses and, for example, a bag of microwave popcorn. It was fairly easy to put in one column the uses that are non-essential and, for the other column, we really didn't want to be putting health or lives at risk by interrupting that product viability prematurely.

AVONNA STARCK: I would add that the process to be considered essential goes through our agency, the Minnesota Pollution Control Agency. There's an application process that the manufacturer will work with through that process. And it is not an indefinite exemption is the recommendation that Clean Water Action made. I can also get more information from the agency, since they weren't able to make it tonight, if that would be helpful, on exactly how they're going through that rule-making process to determine what they consider essential if there are no alternatives, if that would be helpful.

The Hon. SCOTT BARRETT: Thank you. My second question is quite different. Is the goal to bring the contaminated drinking sources back into a safe level? If so, how are you tracking with that?

JUDY SEEBERGER: The goal is always to mitigate the PFAS contamination within our environment. Within my district and within the state of Minnesota, different geographical areas are doing different things. In my area, where I live, we've been tracking the PFAS plumes in our aquifers for almost 20 years. The remediation efforts really consist of the filtering systems at the end use point. There is a 3M manufacturing plant in my district that is proactively pumping from an aquifer to filter the water and reintroducing the clean water into the aquifer to try to eradicate it from the groundwater. But, from my perspective, we've always had to take that two-pronged approach of mitigating and remediating what's in the environment now and stopping the further introduction of additional PFAS from now on.

The Hon. SCOTT BARRETT: Are you optimistic, then, that one day these contaminated water sources will be drinkable again?

JUDY SEEBERGER: Yes and no. I think we're making progress, but we're playing catch-up. There's an entire lake in my district that is so contaminated. You can't eat the fish. You really shouldn't swim in it. And it's a beautiful lake. How do you clean a whole lake? I guess I don't know the answer to that. We can certainly stop the problem from getting worse, and we can certainly address what we can. I'm hopeful that in the future, as technology continues to advance, we will be able to identify additional ways, better ways and more robust ways to ensure that our drinking water supply, at the very least, is as safe as it can be.

The Hon. SCOTT BARRETT: When you look back through the process of the development and then the implementation of the bill, are there things you wish you knew as you put that through that would also be advantageous for us to know now as we're a bit earlier in that stage?

JUDY SEEBERGER: Once you enact a bill, sometimes issues arise or things you never thought of pop up. For example, I've been in conversations with dealers and manufacturers of power sports equipment. Think

ATVs, dirt bikes, motorcycles, that kind of thing. Somehow the smaller versions of those have been deemed to be juvenile products. Intentionally added PFAS in juvenile products was banned, effective 1 January. When we enacted that, we're thinking clothing, toys, blankets, pacifiers, bottles, that kind of thing. But turns out it also includes smaller ATVs, smaller dirt bikes. It's those kinds of strange technicalities, if you will, that arise. So I'm working on that problem to ensure that just the size of your motorcycle doesn't dictate whether it's banned in 2025 or 2032. But that's the same with any kind of legislation. Sometimes weird, unintended consequences arise, and we simply have to work through them when they do arise. But I'm certainly happy to share some of those unintended consequences with you as you draft your legislation.

AVONNA STARCK: I think that the way that Amara's law was signed into law is a textbook example of how a bill becomes a law in the US. We didn't really run into that many hiccups through the committee process. I would just say to be in close communication. For example, we have a situation where we were working really, really closely with Delta Air Lines. They have been wonderful partners in this. We are the second largest maintenance base in the world for Delta Air Lines. They started attempting to be in compliance right away. But, because of the massive size and age of their particular hangar in Minnesota, no matter how fast they go, they just need a little extra time to be in complete compliance. We've been working very closely with them, sometimes multiple texts and emails a day.

So I think it's just little special things like that, that the Opposition runs around and says the bill is not working in Minnesota, it's not implementable. That's not true. It's this very unique situation that no other state is going to have a problem with. But, because we're the second largest maintenance base, they just needed a little extra time. They've been in full compliance in other states that have passed bans on PFAS in firefighting foam, because their hangars there are a more appropriate size. So I think the big takeaway is just over communication, working with everybody who's going to have to be in compliance, but then also having strong communication with other states and countries that have done similar things, because it's really easy for the truth to be manipulated when we're talking about how certain bills are being implemented.

The Hon. SCOTT BARRETT: Senator, personally, you spoke about the filtration system you have on your home. I just wonder how many homes across Minnesota are fitted with those filtration systems and how affordable they are for individual water supplies.

JUDY SEEBERGER: I don't have any idea how many homes have the in-home filtration systems that I do. Like I said, I don't have municipal water. I'm on a well. And the unique situation of where I live is I'm a part of the—my community, the town where I live, Afton, is a beneficiary of the 3M settlement funds. So the settlement pool of funds is paying for the filters in my basement. They are very expensive. They're huge gas filters, two very big filters in my basement. Through the settlement funds in the 3M settlement account, we get those filters replaced every year. When that ends, our family's going to be on the hook for that. It's not cheap. It's not fun. That's why, again, at the state level, we're looking at ways to fund these efforts, both through municipalities and through private homes on wells, to ensure that homeowners don't have to bear the cost of these filtration systems.

The CHAIR: Senator, just to get it on the record, because I don't believe it is on the record yet for this inquiry, how much was the 3M settlement?

JUDY SEEBERGER: The settlement fund was \$850 million. That is running out much sooner and much quicker than was projected when it was set up.

The CHAIR: That's very frightening. I'm not sure that information is actually helpful for us, in terms of how much it is and that it's running out very quickly. I think our Government would be very scared to hear that.

The Hon. AILEEN MacDONALD: Thank you, Senator and Ms Starck. I'll start with the senator, if I may, and thank you for the work you've done in the PFAS remediation and environmental policy work. I was just wondering, in that context, what are some lessons. It goes on to the question from my colleague the Hon. Scott Barrett. What are some lessons you would convey to us? Or what advice would you offer to New South Wales lawmakers about building bipartisan support and public trust in that PFAS policy reform?

JUDY SEEBERGER: My advice is be persistent, because you're on the right side of history here. What I've always said is I place the health of my constituents over the profits of the companies that have known for decades that these chemicals are toxic. Ms Starck can provide you with all the talking points to counter every ridiculous argument that they will throw to try to prevent this legislation from passing. But you can't discount the necessity to take every measure you can to protect the health of your residents and constituents. That's what I'm doing. I drew a hard line. I would not back down. I'm a reasonable legislator. I can make deals and compromises on just about everything. But on this particular law, I drew a hard line. I think Ms Starck saw that in action a few

times when we were negotiating this, and my colleagues across the aisle understood it as well. Just stick to your guns. You're doing the right thing.

The CHAIR: Ms Starck, I'll go to you as well. I think you probably have some stuff to say to this too.

AVONNA STARCK: Yes, thank you, Madam Chair. You have to be honest. We had situations where our opposition would come in and tell part of the truth or half of the truth. We took it very seriously that we should continue that truth. An example of that would be when they came in and said, "California vetoed this bill, period." I testified and said, "That is accurate, but the Governor of California also said it was a good bill and he wanted to sign it." The only reason that he didn't was because they were in a budget deficit, which was not the situation we were in in Minnesota. We had a surplus. I would say be honest.

We worked really hard to work with members of the Republican Party, even though we had a Democratic trifecta. We had the Governor, the House and the Senate. We went in with our GOP lobbyists who said, "Avonna can have whatever she wants. She has a trifecta. She has the House, the Senate and the Governor, but she wants to work with you." We purposefully took the partisanship out of this on day one, because nobody wants their kids exposed to this. Nobody wants to be exposed to this themselves, regardless of what party they're a part of.

At the end of the day, I think the story of this young woman, Amara Strande, who spent these last few months of her life walking the halls of the legislature and telling her story—she grew up in the plume area. She was diagnosed with cancer when she was 15 years old. The doctors expressed to her family that, had they caught it early, she might have had a better chance. We are huge advocates of medical monitoring here. Amara could have been any of our kids. She could have been any of our sisters. She spent those last days telling her story. I think that left, right and centre saw themselves and their families in Amara. My advice would be to be honest, reach out and ask for help. The science is there, proving that we are on the right side of history, as Senator Seeberger said. We take this partnership very seriously.

The Hon. AILEEN MacDONALD: As a follow on, how did you ensure that vulnerable or low-income communities were included in those PFAS-related decision-making and remediation efforts? Sometimes they're the voices that aren't heard. How did you ensure that those voices were part of that story?

AVONNA STARCK: Clean Water Action at that time had an environmental justice organiser, who really helps connect us to those most at-need communities to lift their voices up. The thing about PFAS is it does really hit everyone, regardless of your income and your background. We elevated all of those stories. We had a situation where in the east metro it was one particular high school that was hit so desperately hard and so those were the voices we lifted up. But we absolutely keep front and centre the need to fund these remediation projects in every part of our state, absolutely. We are having a crisis right now on some of the indigenous reservations. We have one elementary school in particular with extraordinarily high PFAS levels. We are working our hardest to communicate with that community and see how we can offer help and assistance.

The CHAIR: What Minnesota is doing, are other states in the US following? It's one state in 50. What are other states doing in terms of banning PFAS products? Are they following suit?

JUDY SEEBERGER: Some states are. Many are watching with interest to see how it unfolds here in the state of Minnesota and what difficulties we encounter. I think Ms Starck can speak to specific efforts of other states. But I want to highlight that I have received correspondence from people from across the United States applauding the work that we've done to mitigate PFAS and ban PFAS here in the state of Minnesota. I have had the honour of talking to folks from around the world, including your wonderful Committee, to share what we have done. It is getting national and international attention. I'm so proud to be able to partner and help and do anything that I can as a legislator to help other states craft similar legislation.

AVONNA STARCK: One of the documents that I shared has a chart on it that shows all of the different states and what portions of the bill that they are passing. States are kind of picking and choosing out of Amara's law what they think is the most feasible to pass in their particular state. One thing I have to highlight is the need of defending the definition of PFAS as one fluorinated carbon atom. That's really what we're spending a lot of time on right now because opponents to Amara's law are really trying to open that up to a broader definition to create more loopholes. In that document you'll see that, for firefighting foam, 15 states have taken action; for carpets and rugs, 10 states have taken action; for ski wax, six states have taken action and so on.

Eyeballs are on Minnesota, and they know we have to stay strong. If you think about dominoes, we were that first domino to start knocking over. I've had conversations with legislators in Oregon, Vermont, Montana and across the country where we don't even have Clean Water Action offices because they are so interested in trying to do what we have done. I tend to connect those legislators with Senator Seeberger so that they can really work on, from that angle, what that looks like. But it is happening and it's really exciting.

The CHAIR: We just heard from witnesses that have published research earlier this year in January that shows a connection between PFAS in drinking water across the United States associated with many cancers. It's quite an interesting bit of research. Importantly, the research looked at quite a few different PFAS chemicals, because you've just talked about different PFAS chemicals. Australia's drinking water guidelines have PFOS, PFOA, PFHxS and then we're just introducing PFBS. That's all. With GenX chemicals, we've been told that there's not enough evidence for GenX chemicals. Do you have any comment as to whether we should be expanding those chemicals in terms of drinking water guidelines, firstly? They're the four on the radar of the Federal body that is responsible for setting drinking water guidelines. Do either of you have a comment about that?

AVONNA STARCK: In terms of Amara's law, we classify PFAS as a class of chemicals rather than calling out individual chemicals for the ban. In terms of drinking water, we follow the EPA. Currently, the EPA recommended guidance for PFOA and PFOS is four parts per trillion and then PFHxS, PFNA and GenX are 10 parts per trillion, and then there's a mixture of two or more PFAS that is also addressed. The more that we learn about these individual chemicals, much like the previous testifier said, they will change one little atom here and one little atom there and then you have this regrettable substitution. It's a constant chase of the science. I'm not quite sure if that's helpful or not because there are up to 15,000 different PFAS that we're trying to keep eyeballs on. But for the ones that you've identified, we know what those toxic ramifications of exposure are.

The CHAIR: There are two different things here, aren't there? There's the testing in our drinking water, and the last witnesses said that the US EPA had the ability to test for 70, I think, at this point in time. But when we're looking at banning—we have just lost Avonna's video. Hopefully she can still hear and hasn't jumped off entirely. We're looking at whether to ban PFAS in products. Again, this is possibly the Australian Government, but who knows what a State Government can do in this country around banning products. But if we do, it's better to look at all PFAS as opposed to handpicking particular PFAS chemicals. That would be potentially impossible because, at the moment, looking at PFOS and PFOA, it's simply banning the import of it as a chemical or banning the manufacture in this country as opposed to all products containing it, other than firefighting foam, which we'll keep separate. Senator, I'll go to you, in case we've lost Ms Starck.

JUDY SEEBERGER: From my perspective, that was the easiest and the best way to go about it when it came to the legislation banning PFAS-containing products. I think it's easier to capture what I was trying to capture by not getting into the weeds of which particular substance is what, for the exact reasons that Ms Starck said, that we can be seeing different versions develop through time. But the intent of my bill is the same—to keep those products out of consumer goods. When it comes to drinking water standards, I leave that to the pollution agencies, and they have chosen to identify particular PFAS elements when they come up with the acceptable levels.

The Hon. TAYLOR MARTIN: Thank you both for making time today. It was mentioned earlier about powersports or ATVs and motorbikes that contain PFAS, and that was a bit of an unintended consequence in the negative, so to speak. I know from conversations I've had with some stakeholders outside of this Committee process who had some ideas that had been somewhat proven, to more or less differing degrees, as to how to filter the product out. For example, one group that was backed by a couple of local universities was looking into using hemp to take some of the water out of some farming areas north of Sydney. Are there any experiences you have had like that, where people have come with solutions that are somewhat surprising or out of left field?

The CHAIR: Senator, you're on your own at the moment because we've just lost Ms Starck, who may be trying to rejoin. Are you okay to answer that one?

JUDY SEEBERGER: Absolutely. We've always said, if the companies that fought this legislation could put half as much effort into innovation, we'd be almost home free here. I have heard of many different initiatives to both mitigate the PFAS that's already in our drinking water through different forms of filtration and different methods of breaking down actual PFAS. I've heard of many different, innovative products. I happen to have one right here that's made out of sugar beet residue. I love the idea of using hemp as a filtration system. This particular company uses sugar beet residue to line paperboard containers and create a non-plastic, biodegradable liner to keep PFAS and other chemicals out of our environment. The innovation is definitely there. We need to recognise the innovation. We need to funnel more funding and recognition to innovative sources and, again, if the PFAS companies could join us in that fight, I think we'd be ahead of the game.

The CHAIR: I think Ms Starck may have joined by phone now. Is that correct?

AVONNA STARCK: Yes. Can you hear me?

The CHAIR: Yes, we can.

AVONNA STARCK: So sorry, we're having a storm. I apologise.

The CHAIR: That's absolutely fine. Our weather in Sydney is not too crash hot either. In this State, we've got floods. Mrs McDonald, I'll throw to you, if you've got one last question.

The Hon. AILEEN MacDONALD: What are the most important elements of a public communication strategy? Could you share some insights on that?

AVONNA STARCK: People are really busy and have a lot going on, and PFAS is a really complicated issue to understand. But we laid a foundation of community education through town hall meetings, social media and reaching out to impacted communities, and then we built a coalition of people who had been impacted by exposure. That's really what drove the bus. We had Amara tell her story; we had Derek Lowen, who survived a brain tumour; and Ben Rule survived leukaemia. Telling these stories that people, legislators and lawmakers could really identify with was key. Helping the average person understand how they're bringing these chemicals into their homes, how they were exposed and how their children were exposed, was so very important.

Then we used our field and our phone canvass team to go out and have individual one-on-one conversations with our members, and we brought that back to legislators. We would go to Senator Seeberger and say, "We've talked to 40 people in your district, and this is what they're saying." And that's really impactful to support people who are driving the innovation around passing a bill like this, but it's also really important for people who have concerns and aren't so convinced that this is a good idea. They need to know how important it is and how their constituents are being impacted. So there is on-the-boots lobbying, there's communicating with the industry—our chamber of commerce—and then there's really helping average Americans or Australians understand, what is this chemical, this cluster of letters, and how does it impact me?

The CHAIR: Thank you. We have to finish now because we are a couple of minutes over time, but I do think we could continue talking about this for some time more. I thank you both so much for the fantastic work you have done acting on PFAS, in your jurisdiction, Senator, and Ms Starck, your advocacy. Thanks so much for making yourselves available; we really appreciate it. The Committee will get be touch if you have agreed to take anything on notice or if members have any further questions of you. Let's hope we get some great outcomes from this inquiry as a result of your evidence today.

(The witnesses withdrew.)

The Committee adjourned at 11:05.