T R A N S C R I P T

ENVIRONMENT, NATURAL RESOURCES AND REGIONAL DEVELOPMENT COMMITTEE

Inquiry into the CFA training college at Fiskville

Melbourne — 19 November 2015

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Mr Douglas Ahearne, principal environmental scientist,
Mr Michael Rehfisch, principal environmental auditor, and
Ms Kristi Hanson, principal risk assessor, Senversa.

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The CHAIR — Welcome. I will just go through some preliminaries before we get started. First of all, I understand that you provided information to the committee, but because it was only a day or two ago there has not been anything done with that. So we will put that in. Certainly we will read it and we will look at it, but we have not been able to go through that for today.

First of all, welcome to this parliamentary inquiry. I welcome representatives of Senversa, Mr Douglas Ahearne, Mr Michael Rehfisch and Ms Kristi Hanson. Thank you for coming in to talk to us today. Just before we go into the evidence and the questions that we have for you, there are a couple of formalities, and that is as outlined in the guide given to you by the secretariat.

All evidence at this hearing is taken by the committee under the provisions of the Parliamentary Committees Act 2003 and other relevant legislation and attracts parliamentary privilege. Any comments you make outside the hearing will not attract parliamentary privilege. It is an act of contempt of Parliament to provide false or misleading evidence to the inquiry. The committee may ask you to provide further information based on the questioning that we have today. Also, the evidence is being recorded, and we will give you a copy of the proofs to check for accuracy before we actually make it public.

Again, thank you for coming in. We have a lot of questions that we want to ask because this was a vital report that you provided. I understand from the secretariat that you understood that there was to be a presentation, but we are mindful that we really do want to ask a lot of questions. I am not sure what the presentation is or — —

Mr REHFISCH — That is fine, Chair. I think it was really just a case that we have some figures which accompany the material that we think is relevant in terms of pointing out the spatial distribution of chemicals of concern.

The CHAIR — So when we are making reference to areas of the site, you have that. That sounds really helpful.

Visual presentation.

Mr REHFISCH — We think it might assist in just outlining areas that we are talking about to you. The only other thing I would draw to the committee's attention before we commence is that in relation to committee's question 4 around the extent of testing of water and groundwater beyond the Fiskville site, there is some information provided in the statement and also in the PowerPoint which is potentially private information and it is not in the public realm. I seek some advice from the committee on how to deal with that information sensitively, particularly the last slide. The second last slide to the one I have got up here relates to some adjacent land information around chemicals of concern.

Ms WARD — This one?

Mr REHFISCH — That one.

The CHAIR — Okay, I see what you mean. Maybe we should seek some advice ourselves on what we want to do in terms of referring to that. We will just be a moment.

Mr REHFISCH — Okay.

The CHAIR — What we might do with that is if we confine ourselves to the actual Fiskville site, and then at the end of the hearing we might go into a private hearing for 5 or 10 minutes to get a bit more information on that. Then we can work out whether we make that publicly available or we leave it as a private hearing. Is that okay with you?

Mr REHFISCH — Yes, thank you.

The CHAIR — From our point of view, the first thing that we would like to ask is — and just to clarify for the gallery we are talking about the final report that was commissioned by the CFA into Fiskville prior to its closure — as preliminary things, if you could perhaps tell us a little bit about how you conducted this investigation? What were the parameters in terms of what the CFA was asking you to do? What were you required to test? What were the areas that you were required to test in? What was the methodology that was used in order to come to this report?

Mr REHFISCH — Yes, by way of background we thought it was useful to provide a bit of background on why the potable water assessment was completed, because since approximately August 2012 the CFA moved from recirculation of fire training water from the dam network for fire training purposes to the potable water network, which involved water coming from that large more modern tank that is just to the north of what is known as the flammable liquids PAD. It is important to note that they ceased using firefighting foams for fire training practice since 2014, which is relatively recently, but PFOS-containing foams they phased out in 2007.

Preceding all of this the EPA got involved, and there was a requirement to complete a section 53V environmental audit. That 53 environmental audit contained 26 individual prioritised recommendations. One of those recommendations was to look at the potential for the leaching of contamination from the PAD infrastructure — that is, the pipework, the drainage structures on the concrete PAD — and whether if you applied water to it, it would pick up those contaminants and that they would then enter the fire training system.

We were engaged. There has been reference made to Cardno Lane Piper in our report. The CFA was being assisted up until 2014 by Cardno Lane Piper, and we came in post then just to help with more of an advisory role around trying to implement some of these 26 recommendations.

The CHAIR — Maybe just on that, in terms of you as an organisation, who else do you work for? Do you do the same work as Cardno Lane Piper or different work?

Mr REHFISCH — Yes, that is right. With Doug and Kristi here today, we are a contaminated land consultancy that provides client information regularly to government and private clients. We are members of industry peak bodies like the Australian Land and Groundwater Association and the Australian Contaminated Land Consultants Association, so we provide professional contaminated land assessment and management services. We have a range of private and government clients. I guess you could say we do similar work to Cardno Lane Piper, correct.

The CHAIR — Thank you. Keep going.

Mr REHFISCH — Getting back to that recommendation about looking at potential for infrastructure to contaminate waters that are applied to the PADs, we assisted the CFA in then commissioning a consultant — not ourselves — to come out and actually simulate a fire training activity with potable water. A sample was taken of the water that was to be applied, and then samples were taken of the water as it ran across the PAD and entered other infrastructure. When the results came in from that activity, the sample which represented the source sample, the clean sample, was identified to have the contaminants of concern in there — PFOS, PFOA. I must say that the focus of the potable water assessment became around those chemical indicators. Microbiological indicators are important, but we were looking at the chemical indicators.

That was found in that source water, and then the question was raised: it is in the potable water that is used at the PAD, which is part of the industrial water network that is provided through what is known as the red hydrant system and the beige hydrant system. With the red hydrant system, my understanding is that it is provided with water from the tank immediately north of the flammable liquids PAD, and that the beige hydrant system, which is in my understanding — but it would need to be confirmed with the CFA — more of a backup system, and it is provided with water from a tank that is immediately east of dam 2.

We were commissioned, as we have pointed out in our statement, to basically come up with a sampling methodology to assess the entire network of water outlets at the site. It was not limited to the PAD hydrant system; it included all of the administrative buildings, all of the emergency showers, for example, and range of other faucets and outlets where water could be used. We sought some input from a range of stakeholders in terms of what the sampling method should be, including the CFA. The appointed environmental auditor was given the opportunity to comment on the methodology, as was WorkSafe, the Department of Health and the consultant toxicologist retained by CFA, Dr Roger Drew, from ToxConsult.

The CHAIR — Yes, we have heard all these names before.

Mr REHFISCH — Okay.

The CHAIR — It seems to be a bit of a circle.

Mr REHFISCH — We completed sampling of 494 water outlets, and all of those samples were analysed for a suite of perfluorinated compounds, including PFOS, PFOA, 62 FTS and 82 FTS. Then some samples were analysed for a broader range, a broader suite of contaminants, including a more extended suite of contaminants in that fluorinated compound group, but also select contaminants of concern that are typically associated with the use of fuels at the site and the products of incomplete combustion of the burning of fuels and the burning of materials in fire training. That included total recoverable hydrocarbons, polycyclic aromatic hydrocarbons, monocyclic aromatic hydrocarbons and dioxins and furans in limited analysis.

In addition to that, having emphasised the point earlier that we were looking at chemical quality, some general water quality parameters were analysed at a selection of outlets, and that included the suite of heavy metals, indicators like calcium, hardness, pH — and there is a list there — but it also included E. coli and chlorine and some forms of nitrate nitrogen and total nitrogen. That was completed over an approximately two-week period. Doug Ahearne, to my left here, was involved in the management of the field program there. We completed that using Senversa staff, who are a range of scientists and environmental engineers with training in the collection of water samples.

The CHAIR — In the information that we have there was found present PFOS, PFOA —

Mr REHFISCH — Correct.

The CHAIR — various dioxins and many other heavy metals and traces of other chemicals?

Mr REHFISCH — The key thing that was identified and the areas where it occurred was the perfluorinated compounds, PFOS and PFOA. That was restricted to the industrial water outlets from the fire training areas. It is important to point out that all samples collected from the domestic water outlets, like kitchen taps, showers, basins and the like, did not report concentrations of PFCs greater than what we call the laboratory limit of reporting, which is effectively a way of saying they are not detected.

The CHAIR — Just on that area, we have heard today two things. One is this issue about what is the standard that is considered safe, so what is it that you used as a standard in terms of your testing results? The second thing we heard today was that there is a whole lot of much more sophisticated technology and ways of testing that, as we understand it, probably have not been used by the EPA or other organisations. Did you have access to that information or that technology as well to do the testing?

Mr REHFISCH — I was not here to hear that aspect of that discussion. What I can say though is that the testing that was done, similar to the last speaker, was done by a NATA-accredited laboratory, and it was done using a method which is an adopted method from a United States Environmental Protection Agency-approved method. I am talking about the perfluorinated compounds here. It is considered, in my professional opinion, industry practice to use a NATA-accredited laboratory and to use that particular method for analysis.

The CHAIR — Is that based on information or research you have in terms of Australia and what it is used here or the best practice internationally?

Mr REHFISCH — That is right. There is a combination. There is currently no Australian criteria for PFOS/PFOA in drinking water, so the criteria we look at are from international sources; but in terms of test methods the National Association of Testing Authorities approves or accredits laboratories for certain analysis. The analysis that they have accredited ALS, which it did this laboratory analysis with, is an Australian-approved method for the detection of these chemicals in water.

The CHAIR — An Australian-approved method?

Mr REHFISCH — Which is piggybacking on the US EPA method. It is effectively taking that method and endorsing it as an Australian method.

The CHAIR — Okay.

Mr REHFISCH — If it helps the committee, the first figure shows the distribution of PFOS/PFOA.

The CHAIR — Yes, that would be good.

Mr REHFISCH — I am just realising it might not be that visible on the screen, but on your overheads you have got a copy of that figure. First of all we are pointing out the tank immediately north of the flammable liquids PAD. That is the tank used to supply the red hydrant network, and there were concentrations of PFOS, which is on this figure, reported in and around that hydrant network on the PAD. The highest concentration reported was just to the south of dam 1, immediately left of the VUT building, at 49.9 micrograms per litre for PFOS.

Given it is difficult to see on the screen, the main reason I have included this figure is that it is the one that shows where the occurrences of detectable PFOS were. There were a number of figures in the potable water report, but it is this figure that has been produced subsequent to that report showing the distribution just to make it easier for me to point out where these concentrations are. It reflects that PFCs, when detected, were detected in that area.

The CHAIR — In terms of where you do the testing, how was that determined? How do you determine where exactly you are testing for the various chemicals?

Mr REHFISCH — In this case we walked around — and Doug might be able to help me here — with the PAD supervisor. He is the gentleman in charge of the operation at the PADs, and we identified both with him and looking around in a systematic manner all of the outlets that are on the site. We did not go up there and just start sampling; we went up there and basically logged where things were and then commenced the sampling.

In the case of the site with 494 locations we attempted to sample every accessible outlet. The only exception to that would be to say that on the PADs there are what are known as cooling outlets to cool the metal props so that they do not overheat and, I imagine, warp and become unserviceable. They have an outlet tap which leads to a series of spray nozzles. We did not sample every individual nozzle, but we took a representative sample of that pipework so we could say that we sampled all water that could be coming out and spraying around, as well as the water that comes from the hydrant network that is used to do the fire training.

The CHAIR — As I understand it, one of the public concerns raised — this is in terms of publicly from the CFA and so on — was that the PFOS and PFOA or whatever had actually got into the infrastructure, which is the pipework. Could you explain a bit why that might be different to in the soil, or is it different, or in terms of a functioning training facility how does that express itself in terms of its risks?

Mr REHFISCH — I am speculating here because the underground services network has not been completely identified and there are not good plans showing exactly where it is and the site has been since shut down so there has not been that investigative work done because it is no longer used. The site was shut down after the results came in of this work, so there was not a window in there to exactly know where the pipework is. But based on the results and the distribution it would appear that these contaminants of concern have been absorbed into or remained within the infrastructure network. They do have an affinity for sticking to things, for want of a better word — metals, concrete, pipe flanges and the like. In part the high result that was found next to the VUT building is attributed, at least from information provided to us from the CFA, to it being a dead end-type part of the pipework which is not used much, so there is potentially sediment that might have accumulated in there which has also got that material on it. In terms of how — —

Ms WARD — Does that sound like a feasible explanation?

Mr REHFISCH — Yes, it does. I think it was used as the recirculating network for many years. There is potential for the network to have some faults in it, to leak. If it is going to leak, it also has the possibility of letting water come back into it when the system is depressurised, because it is a system that relies on a pump house which is just at the south of that circle representing the tank to pressurise the network. If that network has got leaks in it, it can leak out into the ground and then vice versa come back in. If there are foams that have been sprayed around that have got onto the ground, then dissolved perfluorinated compounds can get into the perched water, which is also in that area, and get back into the pipework.

The CHAIR — So from what you are saying does that then mean that the concern is that — we do not know the extent of it because there has been nothing in terms of the underground pipework — because it is contaminated throughout that infrastructure what happens when it is used again? Does that mean it moves the PFOS to other areas? How does that work?

Mr REHFISCH — We turned the hydrants on and flushed them for a short period of time. We also collected some samples after a longer period of flush, but they were not in the end analysed, because initial samples came back reporting the concentrations we got, and that was as far as that line of inquiry went there. I think the thing is that there were potentially faults in the system, it being an old system. One other thing that has also just come to mind is that there are reports that potentially just to the south of the midpoint on the western side of the flammable liquids PAD is an area where there has been wet ground in the past. It is associated the CFA believes with pipework deficiencies in that area. So there is potential for it to come and go like that, but I think probably one of the major sources is residual impact in the pipework. It is just resolubilising back into the water as it is passed through the system. Just to confirm, from our investigations there were no PFCs identified in the holding tank before it came into the pump house and then out onto the system. That is why we are surmising that is the source.

The CHAIR — So it sits in there and as water is pumped through or moves through to do the fire training it then collects that PFOS in the water and then it sprays out?

Mr REHFISCH — That is correct.

Mr TILLEY — Looking at the expertise of Senversa, can that site be rehabilitated and used again?

Mr REHFISCH — I have not come prepared today for a discussion around remediation of the site in terms of specifics — and I would be happy to assist the committee as required there — but one of the difficulties with perfluorinated compounds is that they are very persistent and they potentially bioaccumulate. The treatment technologies at the moment that are out there are very difficult to confirm that they will adequately treat the problem. With enough money and enough engineering there could be new infrastructure put in place to deal with some of the issues there. It is a very expensive undertaking.

The CHAIR — What would it involve? Would it mean pulling out all of the pipework and replacing all of that, plus there is all the soil contamination in various areas as well? Is that what would be needed?

Mr REHFISCH — Our expertise I guess is really in the area of contaminated land assessment and clean-up, but if you are thinking about infrastructure upgrades and renewal programs, there are significant design phases you go through to work that up and cost it up. But it would involve the issues you just mentioned, like the replacement of infrastructure and upgrading of bunding and concrete and the like. One of the big things that the CFA was looking at before it was shut down was the development of a water treatment plant out there to deal with some of these issues, so it involves quite a bit.

The CHAIR — Was there any testing around — and you might have mentioned this but it is late in the day — the accommodation areas and places like that? Was there anything found there, any chemicals of any sort or whatever?

Mr REHFISCH — No. Doug, if you do not mind just pointing out that other stuff. There was one other area where there was one detection, and that was at what is known as the hangar area.

Mr AHEARNE — As Michael said earlier, every water outlet we could find was tested, and that included right throughout the accommodation area, so kitchen taps, bathroom sink taps and the like. In all of those — and there were probably several hundred of those because there is quite a lot of accommodation there and a lot of administration areas — there were no PFCs, PFOS, PFOA or similar detected in any of those samples. There was one spot where PFCs were detected, and that was further to the north near the airstrip in a building called the hangar area. There was a tap there that again you could fit a fire hose to, basically, so there was some conjecture there that it may have been exposed to PFOS-containing foams at some stage in the past.

The CHAIR — With the nature of PFOS, for example, as we are talking about that, there is talk about it being able to move around and that it is very persistent. Would you expect that if you did more testing today or next month that you might actually find it in further places or in different places, or would you expect that it would stay where it is right now and the testing results would be the same today as they were when you did this?

Mr REHFISCH — I think I will answer that question. I think based on the results we have got there is a clear association of PFCs with the industrial core of the site around the flammable liquids PADs and the gas

PADs and the like. I do not have this information to hand. A question to ask of the water authorities is the adequacy of backflow prevention, but my understanding is that the water that very recently was coming from that large tank immediately north of the flammable liquids PAD was basically pumped in there and then that tank was drained. So there would need to be multiple breakdowns for things to travel backwards, but I think that is a reasonable question to ask someone around backflow prevention. Assuming the backflow prevention is fine, then there would be no reason to think that there should be PFCs reported in other taps.

There are so many samples that have been collected out there. It is well above what I would consider, just based on my professional experience, the level of testing you would do on a tap network. Normally you would take what you would consider to be some representative samples, but to actually try to sample every outlet and to have consistent reporting of non-detects in everywhere but the industrial area, where we know historically fire water has been recirculated and the hydrants have had fire hoses going on them and coming off them, and similarly up at the hangar area where it was more an industrial-looking outlet than a tap or a showerhead, then it is unlikely that it has gone beyond that area, in my opinion.

The CHAIR — Other than where the soil testing and everything have been because of the dams and the leaching into the soil and so on?

Mr REHFISCH — Yes, just to be very clear, I am talking about within the reticulated water network. Certainly in soil there are 28-plus reports that went to support the 53V environmental audit. They are showing that there is widespread PFC contamination across the property.

Ms WARD — One of the things that we have learnt is that the PADs absorb the PFOS, so when it rains it comes back out again, so the sponge just continually leaches. Every time it rains or there is water on it, it just keeps pouring out in little rivulets all over. I suspect you would imagine to find PFOS in sections all over the place. It is not necessarily a consistent flooding pattern, but it is spread out.

Mr REHFISCH — That is correct. The very reason that this work was commissioned was based on one of the auditor's 26 recommendations to test the infrastructure to see whether it could leach these chemicals of concern back into the water.

Ms WARD — And what was found?

Mr REHFISCH — That is what I have just described. It was found in the water that was run across the PAD as part of that simulated fire training, but it was also found in the recirculation network at the PAD area only.

Ms WARD — So it is just going to keep pushing PFOS out time after time after time?

Mr REHFISCH — That particular network, yes, it would. But what was not done was to test the water coming out of that pipework for a long period to see whether we were just looking at, so to speak, a little pulse of contamination, and then once the pipes got the water flowing through it whether it would lead to lower concentrations.

The CHAIR — In terms of where the PFOS is in the infrastructure, say, if the testing was done three years ago or four years ago, would it be the same levels as now or over time do you think it is reducing?

Mr REHFISCH — In terms of whether it is reducing, I do not know the answer to that question. There has not been that level of testing done of the pipework. There has been some testing done of the PFC concentrations as they have changed over time in the dam network at the site. There has been generally a decreasing trend in the dams but a slight increasing trend in the lake, and that is to do with the preliminary diversion works that the CFA undertook to take Beremboke Creek offline from Lake Fiskville to try to minimise discharge from the lake to the downstream properties.

Ms WARD — Considering that we are told that they stopped using firefighting foam with PFOS and PFOA in 2007 at Fiskville, how do you explain the high levels that we are still finding now? Does that mean that there must have been a huge amount of PFOS across the site in 2007?

Mr REHFISCH — I think it is a very persistent compound, so it does not degrade readily. I am speculating in the sense that I do not know what the results were before the testing was done in 2012, because that was

when the assessment programs were done. But it is unlikely that there would be significant changes in a couple of years when it is considered to have a very long — —

Ms WARD — We are talking eight years.

Mr REHFISCH — Yes. For a compound that is considered very persistent that is not a very long time.

The CHAIR — Did Senversa also do the ecological assessment? Is that all part of what we are going to talk about in private session?

Mr REHFISCH — No, I think the private session is probably more to do with some of the downstream property testing.

The CHAIR — Okay. What about that ecological risk assessment? Was that done by Senversa, or have you seen it?

Mr REHFISCH — There was quite a lot of reporting done to support the 53V environmental audit and then we came in. I believe the ecological risk assessment was finalised in 2015. I have not got that information at hand with me today. But we came in basically to review that and also to have a look at what the CFA might need to be thinking about in terms of clean-up — around whether the whole of the lake needs to be cleaned up or whether just the water in the lake needs to be cleaned up to try to minimise risks.

The CHAIR — Have you seen all the reports that have been done for the CFA over this issue?

Mr REHFISCH — Yes.

The CHAIR — We understand that, for example, the MFB commissioned a review of a Cardno Lane Piper report and was quite critical of it in terms of its methodology and I think also where samples were taken and things like that. What has your overall view been of the reports from different organisations that have been done? You do not have to say the names of any, but in terms of how rigorous they are and how well they have been done, or have you not looked in that detail?

Mr REHFISCH — In some respects I have not looked in that detail. We have relied upon some of the information that is from those reports in some of the work that has been done since. In terms of answering that, there has been very extensive testing done — —

The CHAIR — But if it is not well done, there is not much point to it.

Mr REHFISCH — It has been done by a reputable firm. There has been a lot of work done by Cardno Lane Piper, and I guess all I would like to say in this forum is that we have come in in about the last year to assist the CFA with working through some of these recommendations from the audit report. Cardno Lane Piper are the ones that know everything about all the testing that was done, and they probably would be happy to answer any questions about any review that anyone has done from, say, MFB or others.

The CHAIR — I certainly was not implying anything about them, but just that there seems to be an issue that there are differences that are not necessarily discussed. In terms of the work that you have done, you have done this assessment of all of the work that has been done to try and bring it into some perspective in terms of the decision-making, as to whether it should stay open or closed, and further testing. We understand from the documents we got that the report you provided you also provided to Ashurst, the CFA lawyers. Was there a particular reason why you were asked to provide it to them?

Mr REHFISCH — Not that I am aware of, although we were engaged to assist CFA via Ashurst, which is something that is commonly done in the industry.

The CHAIR — Within the industry, what do you mean? Within the consulting industry?

Mr REHFISCH — All I mean is it is not uncommon for some clients to engage a consultant through their lawyers.

The CHAIR — Even a statutory authority or a government agency?

Mr REHFISCH — I do not know that I can answer that question fully, only to say that it is not uncommon.

The CHAIR — The government organisations you have worked for, have they ever made that sort of requirement of you?

Mr REHFISCH — Yes. There are some matters where yes, they have, and other matters where they have not.

Mr TILLEY — Just going back to the testing regime with Cardno, to any of the witnesses, do you have any concerns whatsoever about the testing regime?

Mr REHFISCH — In terms of the testing regime around the potable water assessment, or do you just mean broadly across the whole site?

Mr TILLEY — The whole lot. All the testing. Do you have any concerns about any particular part?

Mr REHFISCH — No, I do not, and I will caveat that by saying that the site is under what is termed a 53X environmental audit, which is a total assessment of the site and the nature of any effects or potential effects on the environment and human health. That report is being required by the EPA through a clean-up notice and that is going to be the final report once all the further assessment work is done, once all the clean-up is done and once the site is rendered what they call suitable for use. That use is unknown at the moment based on the site being closed for live fire training.

That work will be commissioned, I imagine, by CFA for a consultant to do. That work will be reviewed by the environmental auditor, Mr Darryl Strudwick. He is currently the auditor engaged to do that. That is the process which is used to iron out and make sure that we have got defensible reporting at the end of the day. He has already reviewed and formed his independent opinion as an agent on behalf of the EPA, because he is appointed by the EPA to do that. He will be required to do that as the audit is completed for the 53X.

Mr TILLEY — During this investigation evidence has been heard in relation to the historical use of techniques used in firefighting, the use of benzene, solvents and others. Is there any evidence historically that demonstrates any further risk to the site?

Mr REHFISCH — At the moment works that have been done in support of the 53V were a targeted assessment, and they were targeted because, I imagine — and I was not party to this at the time and I am not party to what the EPA's thinking was at the time — usually a 53V environmental audit is done to get a very rapid, if you like, assessment of high-level risks such as risks to site users and potential risks to offsite users. Then from that work EPA has required a 53X environmental audit, which is the whole site. That will involve a systematic grid as well as further targeted sampling, and that will get to the bottom of the contamination that might not be identified based on site history information.

Mr TILLEY — With these further investigations and other risk assessments it is hardly Chernobyl then?

Mr REHFISCH — No, at the moment the auditor's findings are as read. There is a very large assessment program that will be commenced by CFA, which will cover soil, sediment, surface water, the shallow perched water that is around the PAD area and potentially deeper groundwater, although there is nothing to indicate to date — and I have some slides on groundwater, around that deeper groundwater — that it is of concern.

The CHAIR — I was in two minds whether to go through the other slides. I am not sure whether everyone can see them. It is probably good to be able to go through each of the maps that you have provided in terms of the testing.

Mr REHFISCH — All right. This is the result of surface water testing over time at the site within the site boundary. This is a series of graphs around the perimeter of this figure which show a concentration of those four perfluorinated compounds I mentioned earlier — PFOS, PFOA, 6:2 and 8:2 FTS. What that figure is just trying to show is that there are variable concentrations over time. This is effectively quarterly sampling that was implemented after the completion of the audit and it also includes the Cardno audit work. I suppose as an example on that screen, up in dam 1 at the very top right graph, that shows that concentrations have come down markedly since the very early testing, but then they have come up as well.

The CHAIR — When you say the very early testing, when was that?

Mr REHFISCH — In 2012 I believe the testing was done by Cardno.

The CHAIR — That is what we are talking about. That is the start of the testing that we are talking about?

Mr REHFISCH — To support the 53V audit. Then there are other results around there showing that some of the concentrations have gone up — and that is principally Lake Fiskville — and that is because CFA has been actively managing water to minimise discharge of water downstream since the completion of the audit.

The CHAIR — In what way? What does that mean?

Mr REHFISCH — What that means is they are physically pumping water to manage water levels in the dams to Lake Fiskville.

The CHAIR — So it is at Lake Fiskville, which is adjacent to adjoining properties, and then it goes into the adjoining property. I just do not understand. Why do they do that? Why is that best practice to be pumping from the dam into the lake and then from the lake to the next door neighbour's house?

Mr REHFISCH — There has been no deliberate release of water from Lake Fiskville, to my understanding, since the completion of the audit. What they are doing —- —

The CHAIR — No deliberate release of water from — —

Mr REHFISCH — From Lake Fiskville to downstream users.

Ms WARD — So there was deliberate release of the water before that?

Mr REHFISCH — No, when I say deliberate, I mean it was open and part of the drainage network of the site historically. But then in 2014 I believe it is, but I would need to check my dates, there was major diversion works put in place. Kristi is just showing you now that Beremboke Creek used to run through Lake Fiskville and in periods of flooding in the catchment Lake Fiskville could rise up and over the top. Now it is diverted so that Lake Fiskville is closed.

Ms WARD — So that entire process is to stop water from Lake Fiskville going onto adjoining properties. That was the main reason for that occurring?

Mr REHFISCH — That is right, to close off Lake Fiskville from downstream users.

The CHAIR — We visited the site, and from what we understood it was just loose rock — crushed rock, basically, porous rock — that was just put in across where the waterway ran off into the next property. Is that the type of system — —

Mr REHFISCH — That is part of the diversion of the creek. Beremboke Creek now has been moved east, and as it comes around the bottom of the toe of Lake Fiskville and goes off-site it is not passing through the lake as such.

Mr YOUNG — They have basically dug a channel around it, which is what we saw.

Mr REHFISCH — Dug a channel, a diversion channel. It is a big diversion channel.

Ms HANSON — I think the point there is that prior to that diversion there was more water flowing through the lake, and hence the concentrations on average would be lower just due to dilution. Now that the water is held in Lake Fiskville for a longer period of time, you are not getting that same level of dilution, so the concentrations are higher than they have historically been.

The CHAIR — If it rains and there is overflow or whatever, I just do not know how you contain it in the lake.

Mr REHFISCH — It is an interim measure until the large-scale remediation gets completed at the site. There is adequate freeboard there at the moment to get through periods of high flow, particularly high rainfall,

because it is not connected to the drainage system. It is really just the catchment that is locally around the lake. There is active monitoring of that as well by CFA. My understanding is that there is fairly much full-time observation of water levels around the site and movement of water to manage water levels in the dams, but there is a need to get on there and start dealing with that water. I think there are plans underway to remediate all of that water.

Ms WARD — As advisers how did you communicate your results to the CFA? Who were you in contact with to explain the results and to talk them through things?

Mr REHFISCH — Our main contact was with the program office. They have got an office that is off to the side of the CEO called the Informing the Future program, and the person in there who was the main contact around the potable water system is Amy Fuller. There was some interim reporting via email and then the report itself.

Ms WARD — Your report on page 2 says that based on comments from the environmental auditor samples were also collected from dams that are filled with rainwater and these dams were located on the golf course. What were the comments from the environmental auditor that made you go to these areas as well?

Mr REHFISCH — Going from memory now — and I would need to check this and get back to the committee — my understanding is that when the auditor reviewed our work plan, he just said, 'While you're out there, what about we get some samples from the golf course dams?'. We said, 'Okay, we'll get some', but it was not formally reported as part of the potable water assessment.

Ms WARD — The fifth dot point of your conclusion says:

> The results indicate that historical fire training activities and water recirculation have resulted in contamination of the fire training water infrastructure with PFCs and, at least in some isolated areas, organic contaminants typically associated with the fuels used in fire training activities. Further investigation would be required to assess the risk posed by BTEX.

Does that give you an idea of how long the pollution has been there and the scope?

Mr REHFISCH — Sorry; could you just repeat that last part of your question?

Ms WARD — You are talking about the historical training activities and the water recirculation that resulted in this contamination.

Mr REHFISCH — I have got that conclusion in front of me, yes.

Ms WARD — With this finding that the historical fire training activities have — —

Sorry, I have lost my train of thought.

The CHAIR — While you are thinking, can I just ask, in terms of those graphs on the right-hand side, they are the dams.

Mr REHFISCH — Dams, Lake Fiskville, the wetland.

The CHAIR — Okay, you have got the different colours. The blue line is the dam.

Mr REHFISCH — Yes. Maybe let us just point them out, Kristi.

The CHAIR — Just to explain to us.

Ms HANSON — Are you talking about these blue lines?

The CHAIR — Yes.

Ms HANSON — The blue line represents the concentration of PFOS. The red line represents the concentration of PFOA, and the green and the purple lines represent the other two compounds, which are the 6:2 and 8:2 FTS. Those are the different perfluorinated compounds that were measured — concentrations of them versus time — in each location.

Ms WARD — What compounds are those?

Ms HANSON — They are perfluorinated compounds that are often associated with the use of firefighting foams, but as you can see in these graphs they are typically present at lower concentrations than PFOS and PFOA. There is not a lot of information about their toxicity, but they are also generally not considered to be as harmful.

The CHAIR — Would you mind explaining the top right-hand graph, to start with?

Mr REHFISCH — With the top right graph we have got a time scale along the horizontal axis, and we have got the concentration in what is termed micrograms per litre or parts per billion on the vertical axis. So if we just take, for example, the blue line, that is showing the concentration of PFOS at the dam 1 inlet was just under 250 micrograms per litre when it was analysed on 1 August 2012. Then the next time it was sampled was on 1 August 2014.

The CHAIR — And that is the end there?

Mr REHFISCH — And it is down there — it looks like it is around 49 micrograms per litre.

Ms WARD — That is where you have the dip?

Mr REHFISCH — That is where it dips down. Then the next sample was in May 2015, and the concentration of PFOS then — reading from the graph, although based on the scale I cannot be 100 per cent sure — is around 140 micrograms.

The CHAIR — What was the time of the dip?

Mr REHFISCH — That was August 2014.

The CHAIR — So why would it have gone up again?

Mr REHFISCH — Temporal variations occur. There is concentration that occurs with the water levels dropping and evaporation. These are persistent compounds, so if you shrink a body of water that it is in through evaporation it concentrates things up. That is one reason. The big drop from the very start is probably to do with a decrease generally in the use of foams at the site, although I am speculating there.

The CHAIR — I think that was 2007.

Mr REHFISCH — That was 2007, not 2012. There are a number of reasons why that could change with time. There are the differences between winter and summer, and there is also the big difference being that around 2012 is when they moved from recirculating water to using the potable supply. So you are putting into the system a lot of fresh water and so the concentrations will drop because once the water runs off the PAD through the search basin and through the triple interceptor, it goes into dam 1. That is the first of the four dams that it goes through. Once they started using a lot of potable water, the concentrations dropped because you are flushing the system in a sense.

The CHAIR — It just seems odd that it has gone up when all this work was being done to minimise it and stop it.

Mr REHFISCH — Just on that point, there has been no work done in the dams per se; it has been done to try to minimise the discharge offsite. It is written up in the CFA's EPA and auditor-endorsed clean-up plan that containment was stage 1 of the approach — let's try to minimise discharge offsite. Then stage 2 is the stage we are in at the moment around significant further assessment to try to work out the full scale of the problem, and then getting to stages 3 and 4 and 5 around redressing it through clean-up and then monitoring the success of that clean-up.

Ms WARD — We have levels of 49.9 with PFOS found this year, which has raised considerable concern and alarm. Do you think there should have been alarm bells rung in 2012 when it was at 250?

Mr REHFISCH — There was a lot of work done — and Cardno has reported on that; they could talk to that in detail — around assessing the risk posed by the perfluorinated compounds back then, and it was deemed to

be not an unacceptable risk. But I think that question specifically should probably be asked of others; it is a good question. There has been significant work done since then as well. One of the things that was done at around the time these results were coming through — and Kristi is our risk assessor — is that we looked at what might be a criteria to adopt if fire training water recirculation was to recommence, which it did not. And that had a concentration of 80 parts per billion compared to 49.9, so a higher number. Then that risk assessment has been further documented and independently peer reviewed, and the concentration for PFOS was reviewed upwards to 2600 parts per billion.

Ms WARD — Who did that review?

Mr REHFISCH — Roger Drew from Toxikos.

Ms WARD — I am happy to be corrected because I am just going from my memory, but I thought the recommendation was 4 parts. So it is 0.2 for drinking water and it is 4 for general water.

Mr REHFISCH — It is 0.2 for drinking water. What was termed a primary contact recreation number — there are Australian standards and methodologies for determining how to derive criteria, and there is a very coarse screening approach because this was data coming in based on this assessment. There was a simple multiplication factor applied to the drinking water criteria, which was 20, which would then result in the criteria moving from 0.2 to 4.

Ms WARD — Sorry, you are going to have to explain that to me again. I have not followed you at all.

Mr REHFISCH — Yes. I am happy to have Kristi chime in here.

Ms WARD — At the moment we have a number of agencies that have told us that the acceptable standards, which they are basing on the US EPA recommendations, is 0.2 for drinking water and 4 for general water in contact with people. What are the mechanisms to then go to these much higher amounts?

Mr REHFISCH — As a starting point I think it is important to realise that the number of 0.2, which is a provisional health advisory number from the US EPA, is for drinking water, and that is for the consumption of 2 litres of water per day every day of your life. Now when you are in a fire training scenario, it is understood that your actual ingestion or drinking of water, which is the dominant pathway for uptake of this contaminant of concern, is a lot less than 2 litres per day every day of your life. That is where risk assessment is used to look at the specifics of the situation that you are in to see whether there is an acceptable alternative concentration, or more than that, to look at whether the risks posed by that exposure are unacceptable.

Ms WARD — So it is Roger Drew who has evaluated that risk?

Mr REHFISCH — Kristi was involved in the derivation of the criteria.

Ms WARD — Did you come up with those numbers as well?

Ms HANSON — Yes. There are a few steps in the process, so as Michael said — and you are aware — the drinking water guideline that is commonly accepted is 0.2 and that comes from the US EPA.

Ms WARD — And the contact is 4?

Ms HANSON — Yes. And there is also a multiplier that typically gets applied between 10 and 20 to account for primary contact recreation, which is also a scenario that is different from a fire training scenario, because that is assuming someone is swimming in water for a couple of hours a day. The typical rule of thumb that is adopted there is that someone who is swimming might ingest 100 millilitres to 200 millilitres of water versus 2 litres or 2000 millilitres. So that is where that multiplier comes.

The CHAIR — Is that through drinking or absorption?

Ms HANSON — That is through ingestion, so there is a bit of a caveat when you apply that number that you do not want to apply it blindly to a compound that is significantly dermally absorbed or a volatile compound that might be inhaled whilst swimming or during exposure. In the case of PFOS dermal absorption is very

negligible and it is not volatile, so it is appropriate to apply that guideline. For some of the initial screening that we have done to — —

The CHAIR — It does seem to be that in firefighters there are higher concentrations of PFOS, so how does it get there?

Ms HANSON — Sorry?

The CHAIR — As I understand it there have been studies where firefighters often have a higher level of PFOS in them. How does that happen if they are not — —

Ms HANSON — That could be due to the incidental ingestion pathway. There is incidental ingestion of sprays that will occur during fire training use, and that is documented. There are studies that have looked at what volumes of water do get incidentally ingested both through spray drift and then the occasional accidental swallowing of a larger volume of water. In some of the initial screenings that we have done when we are just trying to quickly screen data, we would often look at the 4 micrograms per litre because there is a high degree of confidence that if it is below that, there is not going to be a risk under a fire training use scenario. But we also took it a step further to do an actual risk assessment, a quantitative risk assessment, where we went through all the pathways of exposure, including ingestion, including dermal contact, and considering whether aerosol inhalation might be significant. That is where these site-specific numbers — the 2600 micrograms per litre was the number — were ultimately derived as a concentration that under normal fire training activities should not pose a risk.

The CHAIR — To fit in with what the CFA wanted?

Ms HANSON — No, it was not to fit in — —

The CHAIR — It just seems the number has been increasing of various contaminants or poisons that have been allowed. Certain experts have done a revision.

Ms WARD — Such as the E. coli changes.

Ms HANSON — I cannot comment on the changes to the E. coli criteria, we were not involved in that. In terms of the PFOS criteria that we were calculating, we did adopt what we consider to be reasonably conservative parameters that were then subjected to peer review, including by Roger Drew. The main reason for the change from our draft to our final was changes in the assumptions about dermal exposure and the extent of dermal exposure based on some additional studies that had been identified.

The CHAIR — Recent ones or the 2009 studies, or are you up to date?

Ms HANSON — I cannot remember off the top of my head what the date of that study was. I can look it up here, though. There was a 2005 study. We had initially adopted — —

The CHAIR — Have you looked at any of the new studies?

Ms WARD — Have you looked at any studies since?

Ms HANSON — Sorry?

The CHAIR — As I understand, there have been a number of much more recent studies.

Ms HANSON — On dermal absorption?

Ms WARD — Or across the board.

The CHAIR — On PFOS.

Ms HANSON — Sorry, yes. That 2005 study was specifically relevant to the rates of dermal absorption of PFOS through the skin. The number that we originally derived, we used what they call dermal permeability constant that is based on a mathematical equation. During the course of reviewing the document we became aware of some actual experimental studies that provided a more refined value to use. That is what caused that

change. It certainly had nothing to do with trying to achieve any particular value. We were simply looking through the literature and trying to adopt — —

The CHAIR — Why would you be looking for another way of doing it as opposed to just using what was already there?

Ms HANSON — It was just that in the peer review process we were made aware of this study that we had not been made aware of.

The CHAIR — But in terms of looking at a different number as an acceptable level, what prompted that?

Ms HANSON — We were not looking to achieve a different number, we were simply looking to use the most justifiable assumptions in the assessment.

Ms WARD — Do you think a 10-year-old study is the most accurate reference point?

Ms HANSON — There are not any other studies for this particular aspect of the assessment — or at least none that we are aware of, I cannot say definitively that there are no others. It is not uncommon. With a lot of these assumptions that you make in risk assessment and the modelling that you do, you do look back through a lot of the historical literature. There are not always recent studies, so it is not uncommon to utilise a study because that was the study that was most relevant to the question at hand.

Ms WARD — The thing that we have found — or I particularly have, and I think some of my colleagues have found — is the speed with which information around PFOS and PFOA is not only accumulating but widening.

Ms HANSON — Absolutely.

Ms WARD — And the degree with which the acceptable safe levels are continually decreasing, so I find it very interesting to see — to my mind, and I will use my words — pushing the boundaries in terms of exceptions to these acceptable levels and how far you can push it to what would be an acceptable level for a firefighter to use. I find it particularly concerning in the instance of trainers who are regularly in contact with water spray and water day after day after day that you could see it as acceptable for them to have a much higher exposure to PFOS according to what you have found.

Ms HANSON — The method we use to derive these numbers are consistent with typical industry practice for evaluating risk and quantifying risk. We follow methodologies that are put out and endorsed by both international and Australian regulatory agencies, including N Health and the National Environment Protection Council. There are guidelines published on this process, and we utilise this — —

Ms WARD — Yes, but in pushing these limits up, what if you are wrong?

Ms HANSON — Yes, they are going up, but they are going up because the exposure is actually less. We have a drinking water guideline that assumes a very, very high level of exposure — 2 litres of water a day. What we factor into the risk assessment process is the actual exposure based on documented studies of how much water people are exposed to. I also point out that we did incorporate a number of conservative assumptions. We assumed that people were involved in six fire training sessions a day every day of their working careers, so we do generally operate at the most conservative end of the spectrum. I know it is very hard, because the generic screening levels are very, very conservative — for a reason, they should be very, very conservative — because they need to cover all scenarios and any receptor contacting water and ingesting it every day of their lives.

Ms WARD — So considering that we know that firefighters have a high propensity to attract various cancers, that they have a higher incidence of a degree of illnesses, do you think it appropriate to expose them to a hypothetical number based on a hypothetical risk? I understand the processes that you have gone through, and I respect that, but considering the dangerous circumstances in which firefighters work and train, do you think adding another roll of the dice, in terms of a hypothetical limit based on a number of scenarios, is the way to go, or should it instead be adopting what is the general practice across the world?

Ms HANSON — I cannot speak to what is specifically causing cancer in firefighters — —

Ms WARD — No, I am not asking you to.

Ms HANSON — I guess what I will say is we are not deviating from the general practice across the world. This is the general practice across the world, to utilise a risk-based methodology to determine what is an acceptable level of contaminant to be exposed to.

Ms WARD — So you would find these figures in the United States or in Canada, where it has been banned, or across Europe where it has been heavily restricted, you would also find firefighters using this kind of level of contaminated water in their practice?

Ms HANSON — I do not know what people are using in other parts of the world, but other parts of the world will utilise this risk-based methodology to determine what concentration would not be expected to pose a risk.

Mr REHFISCH — I suppose, just more broadly, I mean the CFA moved to potable water on their PAD network, and the idea was that they would be developing a water treatment plant to treat it down to the lowest level practicable. We were looking at those concentrations as part of the potable water assessment, in terms of what they mean right now, not sort of looking historically around at the exposures that firefighters are exposed to. But it was around: what does that number mean? What does that 49.9 micrograms mean, based on PFOS — PFOS only?

Ms WARD — I just think you need to look at the whole picture and the whole context. When you are doing a risk evaluation, you need to also look at the other risk factors that are experienced within one certain profession, such as firefighters. So there are multiple risks that they are exposed to; are they taken into account?

Ms HANSON — They were not specifically taken into account, and generally it is difficult to factor in everything that any individual is exposed to. It does get factored in, because we consider background exposure to the chemical of concern that we are looking at. Generally different chemicals are going to operate by different modes of action. So the mode of action that PFOS is operating by is different to the mode of action that other contaminants that firefighters are exposed to will operate by, so the risks will not necessarily be additive. Without being able to quantify those risks due to the other pathways, you cannot robustly take them into account. So it is not something that there is a currently accepted methodology for incorporating into, but also this is consistent with typically applied methodologies worldwide. I guess the other thing to point out is that the toxicity values that we use in these calculations incorporate safety factors — they have applied multiple order of magnitude safety factors to them — so there is quite a bit of inherent conservatism built into the equation.

The CHAIR — Is it possible to get the information on how you based that assessment because you may have used a methodology, but was it then, in terms of the — —

Mr REHFISCH — That is included in the papers. That is appendix D in the papers.

The CHAIR — Thank you very much for coming in and answering all our questions and giving us some information about the work that is being done at the Fiskville site.

Mr REHFISCH — Thanks for the opportunity.

The CHAIR — The committee is adjourning the public hearing and will now be going into private session. I ask that members of the gallery leave; thank you.

Closed proceedings follow.