T R A N S C R I P T

LEGISLATIVE COUNCIL ENVIRONMENT AND PLANNING COMMITTEE

Inquiry into Nuclear Energy Prohibition

Melbourne—Thursday, 12 March 2020

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WITNESSES

Mr Noel Cleaves, Manager, Environmental Health Regulation and Compliance,

Dr Angie Bone, Deputy Chief Health Officer, Environment, and

Ms Melissa Skilbeck, Deputy Secretary, Regulation, Health Protection and Emergency Management, Department of Health and Human Services.

The CHAIR: Good afternoon. I declare open the Standing Committee on the Environment and Planning public hearing. All mobile phones should now be turned to silent. There is no-one here from the public at this stage. The Committee is hearing evidence today in relation to the Inquiry into Nuclear Prohibition, and the evidence is being recorded. I would like to welcome our witnesses for today, Mr Cleaves, Ms Skilbeck and Dr Bone from the Department of Health and Human Services. We really appreciate that you are giving us your time in this particular time. We are dealing with other pressing issues like the coronavirus. We really appreciate you providing us with your time. All evidence taken at this hearing is protected by parliamentary privilege as provided by the *Constitution Act 1975* and further subject to the provisions of the Legislative Council's standing orders. Therefore the information you give today is protected by law. However, any comments repeated outside this hearing may not be protected. Any deliberately false evidence or misleading of the Committee may be considered a contempt of Parliament. All evidence is being recorded—I did say that—and you will be provided with a proof version of the transcript in the next few days. We have allowed about 5 or 10 minutes for an opening statement. Then we will take questions. We are in your hands. Who would like to take the lead? Ms Skilbeck?

Ms SKILBECK: Thank you very much, and thank you for having us. I have got a bit of an overview of what it is the State Government does in relation to regulating radiation risks. I can start with a bit of an overview and then leave time for questions. There is quite a history of the Victorian State regulating radioactive substances—all the way back since 1961 and more modern arrangements in 1983. Our current arrangements are reflected in the Victorian *Radiation Act 2005*. That Act in effect implements the *National Directory for Radiation Protection*, which is published by ARPANSA, who I note you are speaking with after us, so I will not go into that too much. The purpose of the Act is to protect the health and safety of all persons and the environment from the harmful effects of radiation. It includes a radiation protection principle, which is a key driver for our work, which is that radiation practices must be justified—greater benefit than detriment—and doses should be kept below prescribed limits and as low as reasonably achievable, with all of that taking into account economic, social and environmental factors. We also license a significant number of activities currently under that Act.

In effect ionising radiation must be licensed unless it is specifically exempted. Non-ionising radiation is not required to be licensed unless it is prescribed. So it works the other way around. In effect we are overwhelmingly regulating X-ray devices and radioactive material. Non-ionising radiation sources were once prescribed, but since we banned tanning beds there is no longer a prescribed item there. But our regulatory framework includes licences for constructing a radiation facility, for managing radiation and for using radiation. There is a requirement for management licence-holders who possess high consequence radioactive material to also have approved security plans and transport security plans for that material. Also they are required, if they have management licences for prescribed uses—most types of medical diagnostic X-ray machines, for example—to be periodically tested and certified in particular ways.

Our radiation team, which Noel Cleaves here heads, is a grand total of 10.5 FTE, with qualifications in physics, nuclear physics, nuclear medicine and medical radiography. This reflects our overwhelming focus on the medical sector for radiation regulation currently. We do our regulation under the better regulatory practice framework that the department has for all our regulatory functions, and the radiation team itself has a published regulation plan—a statement of potential harms for Victorians, focus areas and ways in which we plan to focus our regulatory efforts for the next year. They are all published on our internet site.

Our major activity, therefore, is assessing applications for all of those licences and authorisations and then monitoring the holders of those licences. Most common non-compliances which we need to regulate and enforce are failures to comply with particular licence conditions, including the national code of practice. In practice that tends to be in the medical sector, just by virtue of the numbers—things like administrative

matters like not renewing one's licence on time and particular code of practice items like particular plans not being up to date. We maintain a radiation safety website that provides up-to-date information for all of those licence-holders, and we have recently introduced a licensing portal—entered this century—in order to reduce the administrative burden on the licence-holders, we hope much more so as this year rolls on.

A key part of our accountability is as a control agency under the emergency management arrangements of the state, regulated through the *Emergency Management Act*. The department is the control agency for radiological spills and releases. That requires us to have preparedness to respond to those sorts of incidents. We are called upon to assist others, often police if they find a lost radiation source—those sorts of things. Our preparedness includes developing and reviewing standard operating procedures, training and exercising for particular scenarios and the maintenance of radiation detection equipment and our systems for monitoring 24/7. We have a 24/7 emergency response service. We are called upon at any time if there is an event.

We also are supported in this work by a ministerial advisory committee on radiation. It meets bimonthly. It had an annual report tabled in Parliament only recently, I think, for this year. It provides us with advice on matters of radiation safety, particularly though, again, about medical practices, given our current focus. The current committee members' terms expire this year, so we will need to renew that committee. It has 12 members. Expertise includes, not exhaustively, radiation, oncology, law, epidemiology, medical physics, health physics, radiography, radiology, nuclear medicine et cetera. I can go through in more detail our licensing framework, if that would assist.

The CHAIR: That would be good, yes.

Ms SKILBECK: I went through the list before. Let us go through them one at a time. The radiation facility construction licences—if anyone wants to construct a facility or convert an existing facility to house high consequence radioactive material, they must apply for such a licence. We have to be assured of matters of physical security prior to the construction or conversion of such a facility. These provisions actually came in only in 2013 as part of an implementation of tighter controls for the possession and transportation in particular of radioactive material. We have not yet issued such a licence. We suspect we may well be asked to do so this year.

Radiation management licences are for any companies or individuals wishing to conduct a specific radiation practice, and that includes something as simple as possessing an X-ray machine or radioactive material for a specific purpose at a particular site. So it is a very particular licence. There are 2660 active management licences currently, and they are operating at over 3500 sites in Victoria. Overwhelmingly, 48 per cent of all of those are at dental practices, with 8 per cent being industrial, 13 per cent being veterinary and 7 per cent being medical, and the others include education. The sorts of practices that are authorised as a result are your X-rays, CT scans and those sorts of things; radiopharmaceuticals and nuclear medicine and all of those applications; the transport of radioactive material itself; sale; research that involves, or may involve, the exposure of people to ionising radiation; the disposal of radiation sources; and the mining or processing of any naturally occurring radioactive material. Again, this was a new feature from 2013, and it gave effect to the national arrangements to improve the physical security around radioactive material. That very much, if you recall that time, focused on the potential misuse by terrorism.

We have 40 management licences currently, and for each of those we require a security plan and identification checking of all individuals involved. The transport of that material also has very similar plans required. Then there are the more numerous ones. Radiation use licences—there are about 15 000 of those. Again, there are 44 per cent in the medical sector, 33 in the dental sector and so on. We also separately require as mandatory to test prescribed radiation sources—again, most often they are the X-ray units or CT scanning units—so that they continue to meet the radiation safety standards that they were first certified with.

We also certify the testers to see that they are approved. The Act has specific requirements around management licence-holders who have high-consequence radioactive material and having certified security plans and transport security plans. We have quite an array of offences that we can impose for any breaches in these requirements. To give you a sort of order of magnitude, if one is conducting a radiation practice without a

management licence, the maximum penalty is just shy of $1.5 million. If you are using a radiation source without a licence, an individual could be charged up to just shy of $200 000. Non-compliance with conditions of a licence would vary significantly depending on the nature of that, but the offence costs could be up to $990 000. And our other one of offering or conducting commercial tanning practices, which has been quite a focus of inspection and enforcement activity for us, if you are doing that commercially either for fee or reward, the maximum offence is just shy of $50 000.

We have all sorts of conditions that may be imposed on those licences, depending on the particular situation and its use. We do charge for many of the industrial licences, and in addition to all of that there is a mandatory incident reporting regime, which our annual report, as opposed to the Ministerial Advisory Council's annual report, details each year. Overwhelmingly, just again by force of numbers, it is in the medical sector that those events occur.

Nationally there is quite a bit of variability, albeit we are a nationally consistent system. We try, as close as possible, in our Victorian Act and regulations to be consistent with the national approaches, which is sensible. In fact Noel is the representative on the national Radiation Health Committee, so we are part of the national arrangements that draft the policies, the codes and the standards that the Radiation Health Expert Reference Panel or enHealth, which is the national environmental health group, or the Australian Health Protection Principal Committee, who are currently somewhat otherwise focused, or the COAG Health Council would then approve.

I would note just in concluding that this is not a task that we do by ourselves. We have quite an array of co-regulators, depending on the circumstances in which radiation is used. We work very closely with ARPANSA, the national body, but at the State level the EPA, the environment protection authority, the Victorian Pharmacy Authority, WorkSafe and Earth Resources Regulation are close working colleagues of ours regularly. That is the overview, Chair

The CHAIR: Excellent. Thank you very much for that, Ms Skilbeck.

Mr HAYES: Thank you very much for your presentation. I just wanted to ask a couple of questions. Have limits of radiation emissions ever been breached that you know of?

Ms SKILBECK: By definition, yes—certainly greater than one situation, yes. They are the sorts of events that we inspect.

Mr CLEAVES: There are limits set for radiation doses that workers and the public can receive. It is extremely rare that the public would ever receive more than that prescribed number, which is actually a very low number. Also certainly in the 20 years that I have been here no worker has received higher than the higher number that applies for workers. The discharge of radioactive material is a bit more complex to assess, but again it would be very rare that that would ever go over what we regard as limits for those things. Perhaps that is enough to answer.

Mr HAYES: So the breaches are mainly around equipment, are they?

Mr CLEAVES: The breaches that we talk about you could either describe as administrative or technical—administrative in terms of not renewing a licence in time, which is a common problem with licencing systems, and technical in that the codes of practice typically require many things to be complied with. An inspection may find that there are some things on that list of things that need to be complied with that are not complied with. Those things are usually fairly easily able to be rectified; they are often administrative or non-compliance.

Ms SKILBECK: The other view on it, if I may, is the incidents that are reported and published in our annual report. You will see there is quite an array of instances where doses in a medical setting have been in excess—literally the wrong leg and therefore twice, and those sorts of circumstances. They are quite common.

Mr HAYES: Could I just ask, further to that, how you monitor compliance? Do you do random inspections or do you inspect every site?

Mr CLEAVES: We try to perform targeted inspections more often than random. That is, we have access to data—it is limited, but the data we acquire through licensing. That is enough for us to use in combination with a

risk assessment process that says that an industrial radiographer using very large radioactive sources to X-ray welds in pipes inherently has a higher risk rating than a dentist using a simple intra-oral X-ray. So we try to use a combination of those things as far as we can.

Ms BATH: Thank you for being here today. You have stimulated my interest in a range of things, but in particular the plethora of locations and places that radioactive material is used. I have an interest in the storage of waste and disposal. I actually used to be a secondary school teacher in science. In our lab there were radioactive dots everywhere and it was highly organised. But there are many places in our state where we have these things—schools being one, hospitals, the research industry, dental practices. They are very normal functions, I guess, that you would have to do. Storage and disposal: can you walk us through some of those?

Mr CLEAVES: Disposal generally has to be authorised by us if you are talking radioactive material. Disposal of X-ray units is a little bit relaxed because potentially the risk is less. If you unplug it, it is inherently much safer at that point. But radioactive material that a person wants to dispose of has to be specifically authorised by us. The question about schools, for example: most of the sources that schools would have are actually exempt from our regulation because they are designed to be a low-risk activity that is inherently safe. Once upon a time—going back a long time, yes—there would have been higher activity sources, but those days are generally—

The CHAIR: Just to follow up from that, where does the waste go at the moment?

Mr CLEAVES: Yes, sure. At the moment, as in most places in Australia, there is no long-term disposal site. Obviously people may be aware there is a project nationally to establish a facility, and at the moment it is looking like it is in South Australia. So in Victoria we would licence someone to store the material, and that might be long-term storage. We also approve the export of radioactive material. Often it goes back to the manufacturer. That is part of the usual process of approval: people supply information to say that the company in Canada that they are buying the material from has agreed to take it back at the end of its life. But there are some sources, particularly legacy sources, where there is no long-term disposal pathway currently. That is when we would licence someone to store it. We will ensure that it is stored in a secure facility, and those are things that we would inspect from time to time because we regard those as being, again, of a higher risk than a dentist with an intra-oral X-ray unit.

Ms BATH: Thank you for those comments. Moving from that, if we then expand to nuclear waste—so a nuclear power plant et cetera—what research are you doing on that front?

Ms SKILBECK: We have got a number of projects that Noel's team are assessing in the mineral sands space and a number that have been reviewed in the past and have not proceeded. There would need to be quite specific arrangements put in place depending on the particular site and environmental conditions—all of those sorts of things—and the peculiarities of the waste for each site. It varies quite a bit, doesn't it, Noel?

Mr CLEAVES: I guess if we are making the distinction between uranium mining and processing and then nuclear power, uranium mining and processing is a little bit similar to what happens with mineral sand mining and processing. There are differences, but conceptually it is a little bit similar. There is an active mining process, a technical process, to extract the product that is in demand, and then there is some waste. Some of the waste will be radioactive, some will not be. All those processes will be authorised by us in a mineral sand context. There is a tight approval process. Obviously they go through an EES—an environment effects statement—process. We are involved in that, and then there will also be a management licence required before they can actually start the processes, and then we will require compliance with codes of practice, regular reporting et cetera. So the analogy for uranium mining and processing is a little bit similar to mineral sand. One thing we know from experience is that the community are very interested in things like mineral sand mining and processing, and clearly they would be very interested in uranium mining and processing, so we know we would have to allocate more resources to those sorts of things.

Nuclear power is a little bit more complicated. Obviously Australia does not have an industry in that path. You will hear today from ARPANSA, who are a little bit more focused on that. But from our point of view if the legislation was to be removed and there were serious applications coming forward, we would potentially be looking at what would be needed in terms of strengthening our legislation. It is a good piece of legislation at the moment. It may not need a lot of strengthening, if any, but it is something that we would have to undertake as a

serious project, and then there is the issue of what level of oversight and resourcing you have to put in to authorise and monitor a nuclear power plant, which is an order of magnitude different to the sorts of things we do.

Ms SKILBECK: Yes, it is substantially different. I think we looked at the Canadian example, because one tends to look there for a similar frame, and they have, I think, in excess of 300 people focused on their one facility. So it is several orders of magnitude different to the function we currently run.

Ms TAYLOR: I have got a couple of questions. I understand an investigation of associated risks found that leaks have occurred in 75 per cent of US plants, and a great number have taken place in the last five years. Factoring in that they are older, but nevertheless we do not want to talk in hypotheses here, we want to talk on how the industry has run to date, it does suggest a level of tolerance for such leaks with tritium. In the event that such leaks were to occur in Australia are you confident you could exclude any such leaks ever happening, and if they did occur, what would you do?

Ms SKILBECK: Given that we do not actually have an operating power industry, that is just not an experience we have. Obviously we have a framework. Our regulatory framework would apply as it does for almost everything else that we do. We are driven by avoiding the harm that is possible to both the public and to the environment. That is our guiding principle for the regulation and prioritisation of what we would do. Of course, there is a lot more experience in the Northern Hemisphere specifically about how to regulate such facilities. As you noted, there have been a lot of technological improvements over time as well. But at the moment we do not have the direct experience to report on that. Is that fair to say, Noel?

Mr CLEAVES: That is absolutely fair.

Ms TAYLOR: Okay, so factoring in that I think there is only one permanent facility being constructed for the disposal of high-level nuclear waste in Finland—and please feel free to correct me—

Mr CLEAVES: That is correct.

Ms TAYLOR: Say there is a 100-year cycle for the actual repository for the waste, what do you do at the end of the 100 years in terms of when that actual repository is degrading? How do you then transfer that waste safely to a new repository?

Mr CLEAVES: To some extent I think that is a question that is probably appropriate for Carl-Magnus Larsson, who you will be talking to this afternoon.

Ms TAYLOR: Okay, fair enough.

Mr CLEAVES: He has significantly more experience in this, internationally. The one thing I would say is that Australia is party to a range of agreements, which includes being a member of the International Atomic Energy Agency. That agency produces an amazing volume of codes, design documents, guidance documents and safety guides that cover almost everything that you can think of in terms of the radiation safety sector, but particularly in the atomic energy and nuclear energy sector. There are guides around what they call decommissioning. It is an extraordinarily difficult and complex task, though, which I think is clearly understood. But perhaps Carl-Magnus Larsson might be able to provide you with some more specific comment on that.

Ms TAYLOR: No worries. I will redirect.

Mr LIMBRICK: A lot of your focus appears to be on medicine. I assume that is because the *Nuclear Activities (Prohibitions) Act* specifically carves out medicine and allows it to occur. I am interested: if the *Nuclear Activities (Prohibitions) Act* was lifted—people talk about nuclear energy and all that sort of thing—what other activities could be allowed that we might see in other states, or you might envisage happening in Victoria, apart from nuclear energy?

Mr CLEAVES: If one makes the assumption that there is an economically viable amount of uranium in concentrations, or thorium, then uranium mining and processing is the conceivable thing. If the Act did not exist, an application could come in from a company to say, 'We would like to establish a uranium mine and processing plant,' as exists in South Australia and has existed in the Northern Territory and, I think, has now

been approved to be constructed in WA. In practical terms that is the only thing that is excluded in practice. Every radiation practice that happens in the world can happen in Australia and in Victoria with the exception of the things that are—

Mr LIMBRICK: Would that include mineral sands processing as well?

Mr CLEAVES: Yes.

Ms SKILBECK: That could be regulated today.

Mr LIMBRICK: It could be?

Ms SKILBECK: Yes.

Mr CLEAVES: Yes. Essentially the prohibition Act allows for us to be able to authorise those sorts of activities, and we do. It is a tight definitional issue, but it is quite reasonable for applications to come in and to be approved under our radiation Act for mineral sand mining and processing.

Mr LIMBRICK: And one other thing that was mentioned before—Ms Taylor mentioned tritium. What are the health effects of tritium?

Mr CLEAVES: Tritium—it is an inhalation risk because it is usually in the form of a gas. Any radioactive gas that is inhaled goes deep into the lungs, so it is obviously the risk of long-term effects, including cancer. That is the worst case that you are talking about. Tritium is actually used in a whole range of things. It is used in liquid form to form things like gun sights and so on. It is widely used. But in the scenario that you are talking about an inhalation risk would be the major problem.

Mr LIMBRICK: So in its gaseous form it can be dangerous, but if it is in liquid—

Mr CLEAVES: Well, in these other forms it can also be dangerous if you do something to it—scrape it up and try to inhale it or something like that—but it is normally regarded as quite a safe, benign substance in those forms, yes.

Dr BONE: I might add just in general terms about radiation health risks, if that would be useful, that the risk to health really depends on the dose that you get and over the time period that you get it as well. So a very acute injury could be a very massive dose very quickly, which could cause acute radiation sickness and death, as you would have seen in atomic bombs or at Chernobyl, for example, versus the longer term risks of small amounts of radiation exposure, which over many years perhaps can increase the risk of certain types of cancer and some, what we call, heritable mutations. But it is very dose dependent. Workers will be people who will be more at risk than the general population because they will be having a greater exposure, and the risk around sites is usually considered to be related to the density of the population and how close that population is living to them.

Mr LIMBRICK: And just one final question. You mentioned that a percentage of these licences are for industrial use in Victoria.

Ms SKILBECK: Yes.

Mr LIMBRICK: Could you give us some sense of what type of applications we are talking about? I think you mentioned inspecting steel welds was one application. What other types of applications are we talking about?

Mr CLEAVES: They are actually used much more widely than people would expect. They are usually simply a part of an operation. Even in a factory that is making paper there may be a thing called a fixed radiation gauge, where there is a radioactive source passing a beam through the substance, like a roll of paper, to help guide a thickness gauge, and it is simply used in that. Some of those sources are quite significant, some are small. Industrial radiography uses both X-rays and radioactive material, and those sources have to be very strong because they are literally being used to X-ray the welds in steel pipes, ships et cetera, and that is used widely across Victoria. Virtually anywhere where you have got big industry, they will contract in an industrial radiographer to do some work. The research industry often uses radioactive material as well for different

purposes. There are things called cabinet X-ray devices that are literally used to inspect an article, again for flaws or for some other purposes. Security scanning—

Mr LIMBRICK: Is that like a box you put an object in to scan it?

Mr CLEAVES: Yes, and some of those are quite inherently safe. Some are a little bit different.

Ms SKILBECK: Customs.

Mr CLEAVES: Yes, customs are using things like explosives detectors—all sorts of things. Yes, there is a very wide variety of sources, but in most cases it is ancillary to what they are doing. It just helps them do whatever they need to do, yes.

Mrs McARTHUR: If the nuclear activity were to be expanded in Australia, would DHHS take more of a partnership regulatory role with new bodies or would it expect a new body to be set up as a chief regulator that all current co-regulators would report to?

Ms SKILBECK: That is a bit of a crystal ball-gazing institutional design question—one of my favourites. I think there is a lot of gain to be had from the cross-fertilisation of skills and experiences of a regulatory unit, particularly one requiring such expertise as this one, so my instinct would be to build on the current function, perhaps in a different institutional form if the Canadian scale of the business is any indication. I think there would be a question about whether the co-regulatory arrangements would remain as is, or indeed some expertise, particularly the environmental expertise that we work with with the EPA, would come into a dedicated regulator.

There have been many PhDs written on specialised versus general regulators in every industry, and we could talk about it for hours, but it really would depend on the circumstances at the time—the nature of the business, how fast it was building up, your forecasting. Do you want to start small and be able to expand, and to what extent? Do you want a one-stop shop of expertise in one place or to use the expertise of the partners who we use now? I have to say, having the deep expertise of Environment Protection Authority Victoria or WorkSafe and so forth certainly is of great benefit to us, and hopefully we are to them, on many occasions. At what point that would no longer be practically effective is really an interesting empirical question.

Mrs McARTHUR: Do you have enough resources now to do your job?

Ms SKILBECK: The current job or the future job?

Mrs McARTHUR: I will start with the current one.

Ms SKILBECK: The point that Noel made earlier is that we use the best intelligence and data we have to target our activity. If we had more resources, we would be able to do more activity, and, yes, we would be doing greater inspections of things we consider risky. That is just a longwinded way of saying, 'Yes, we would love to be doing more'.

Mrs McARTHUR: What things do you consider risky?

Mr CLEAVES: Our risk assessments that we do cover a whole lot of factors, but the things that come up the top of the list are usually—one of the industrial practices is a sterilising unit. There are two of those in Victoria that actually sterilise articles. One uses linear accelerators to produce a beam to sterilise things in a large room, one uses large amounts of radioactive material. It is used for export and import—a range of things. That is one that comes up on our list. Also industrial radiographers because of the nature of big sources being transported around Victoria. Medical brachytherapy uses very high radioactive sources that are implanted into parts of the body for periods of time. Radiotherapy in general, because it is so technical. It is an amazing service, but it is so technical that you have to have great quality assurance programs to ensure that it is delivering beams in the exact location that you are aiming for. It is incredibly complex.

Ms SKILBECK: I would add also, not because of the risk of the application of the radiation, per se, but some of the changes in some industries, transport is one area where we could do more. It is the nature of the transport industry and the subcontracting and so forth that makes it more complicated than it was when the statute was first written.

Mrs McARTHUR: One last question. Given we do not hear much or anything about people breaching all the regulations and whatever, we figure either they are all very compliant or you are doing a wonderful job. Is it a factor of both?

Ms SKILBECK: We would like to claim the latter, of course.

Mrs McARTHUR: They are doing a good job. They need a pay rise.

Mr CLEAVES: Look, what I would say is generally people who use radiation are cognisant of the risks. Even people who are not technical would accept that there is a risk that they need to manage. So broadly speaking it is generally not an industry where people are trying hard not to comply. People try to comply, but the nature of the international code, which Australia then adopts—there are Australian codes—is that there are many requirements, and so it is not always easy to comply with every aspect of that. That is a reality.

Ms SKILBECK: It is, and we have, I think, 15 regulatory units in the department. Poor Noel gets used as the example quite a lot because we licence everything that moves in this scheme. Every other scheme that we have has a subset of the sorts of array of licences Noel has, and there is a reason for that. You need to regulate before the fact in radiation. So I think it goes to the consciousness of the folk involved in the industry—and quite frankly the first people harmed in any misuse of radiation will be those people—and the fact that there is such extensive regulation before any activity is permitted in this space, which is appropriate. But the other element of this area is, of course, those who have other intentions, and the more widespread the use of radioactive sources, the greater the security driver for the work that we do alongside the police as well.

The CHAIR: Actually, I have got a question. I think you touched on it earlier. Let us say we decided to remove all the prohibition enacted by the *Nuclear Activities (Prohibitions) Act 1983*—let us say we wiped it out—you talked about uranium mining, but then you talked about that there is a lot of stuff we do already under the current Act.

Ms SKILBECK: Yes.

The CHAIR: So if the Act has been done away with, what are the benefits? Does nuclear energy become one? Power generation, is that one of the benefits? Or can you do that under the current Act?

Mr CLEAVES: No, nuclear power could not be authorised under the current legislation.

The CHAIR: Okay.

Mr CLEAVES: Essentially we would see that it comes down to two things: uranium mining and processing—some variation of that—and nuclear power. Most other things we can conceivably think of—

The CHAIR: You can do under the current Act.

Mr CLEAVES: can be legally conducted in Victoria if you get the right authorisation.

Mr HAYES: Can I just ask one more? You talked about likely future work that you would be doing, but do you foresee an expansion in the industry at the moment?

Mr CLEAVES: Yes.

Mr HAYES: Apart from the current publicity that is in the paper about nuclear.

Mr CLEAVES: Medicine is the area that is constantly pushing the boundaries—

Ms SKILBECK: Yes, hugely growing.

Mr CLEAVES: In terms of the types of radiation sources that are being used it is just a constantly evolving area. There is the use of artificial intelligence to guide some procedures, including radiotherapy, because we are entering a period where it is becoming too technical almost for human beings to manage quickly. So those are the sorts of challenges that are coming. And then the other one is the crossover of disciplines in the medicine area. A cardiologist may now want to do something that usually would have been done by a different profession over the years. There is just a lot of blurring of boundaries, and that is becoming challenging. It

always has been challenging, but it is becoming more challenging in terms of should we give a licence to that person to use that type of complex source? What is the evidence that that source is efficacious—not just that it is safe, but does it actually do the job? So medicine is really the growth area; it is not so much in other areas.

Mr LIMBRICK: Just one question relating to medicine: is the source for all of the radioisotopes that you use the reactor in Sydney or are there other sources as well?

Mr CLEAVES: No. In fact the majority of all long-lived sources are imported into Australia. The things that would come out of Lucas Heights typically are the things that you might end up receiving in a stress test at a hospital to monitor heart performance. They are what we call 'short lived'. That is, put it in a corner, wait a couple of weeks—you cannot measure it.

Mr LIMBRICK: This is what was mentioned earlier—technetium-99 and that sort of thing.

Mr CLEAVES: Yes. But the long-lived things are typically what we call sealed radioactive sources—that is, radioactive material encapsulated in stainless steel or ceramics.

Ms SKILBECK: Machines.

Mr CLEAVES: And then sometimes they are inside a machine as well. They vary. But those things are invariably coming from North America or Europe or perhaps a few other places in the world. They are imported into Australia and, as I mentioned, sometimes then exported back either for reactivation so they can be reused again or sometimes for final disposal.

Ms BATH: A follow-up question: interestingly we always think Australia does very well in medicine on the forefront and now AI, artificial intelligence. What I am interested in is your point of view as a regulatory body. You need people who come into your institution or organisation to have high-grade skills. Are there gaps in the education stream pathway to you? And this may not be a question you can answer, but in terms of the medicine skills, are there gaps there that you see happening overseas that we could be doing better with in Victoria?

Ms SKILBECK: Do you want to throw to Angie on that one?

Mr CLEAVES: The one I can answer is—medical physics is a demand area. There is a number of projects that have been happening nationally to try to encourage people to take up that area. That is a demand area. With the growth in high-tech medicine and medical use of radiation there essentially is a relationship between the number of those devices and the number of medical physicists you need, and it is not a simple training program to go through that. We have many of them, but you would predict there will be a need for more.

Ms BATH: There is a niche.

Mr CLEAVES: In terms of our own skills, we have been pretty successful at poaching people from other places, but it is a challenge. I mentioned that issue of radiotherapy. If we are going to try to do an inspection of a very complex area, we have to know the right questions to ask.

Ms BATH: So what would be the pathway of somebody working in your organisation to you to do those inspections?

Ms SKILBECK: There is quite an array of them. In terms of skills that I read out, actually, there is the importance of diversity.

Mr CLEAVES: We have got a number of people who have come out of the hospital system—so nuclear medicine, radiographers. Then there are health physicists—the people who can do the dose estimations as well as many other things and estimate shielding requirements. We have also been able to recruit a number of people who have worked in radiation safety consultancies, which means that they get a very good broad experience. They all come with undergraduate or postgraduate studies in some form of physics somewhere in the process. It is a constant challenge, though. Every time you do a recruitment you are hoping you will find someone who applies. We have been lucky with that, though.

Ms TAYLOR: Your approach is targeted, you were saying. I am not questioning it, I am just saying you have to tick off a number of factors that may make it more likely than not that a certain person emitting or

handling radiation is handling it in a less satisfactory or more satisfactory way. Does that mean every provider, every facility, that is dealing with radiation? We are talking about low-level nuclear waste as opposed to high-level, or what are we talking about?

Mr CLEAVES: The process we use is we have a very complex matrix of risk assessment where there are about 25 factors that we use to try to grade every type of practice—not the organisation, but the practice. So medical brachytherapy versus dental intra-oral, for example. We categorise them against that list, trying to form a view that says, 'That practice we regard as of higher risk than this other practice'. There are about 170 different practices that we segregate them down to, and we end up with a league ladder.

The other things that then go on to that might be past performance. If we have had a particular problem with a particular organisation, then obviously that gets it slightly higher up our list as well. But broadly speaking we have tried to target practices first, because we would make a judgement that there is something intrinsically risky about that practice that we need to closely try to monitor or we need to understand to a higher level to assure ourselves that it is being appropriately managed.

The second question: it is very rare that we authorise the possession of any nuclear materials as such. There will be very small amounts of uranium oxide or something, usually in a research institution or something like that. Normally we are talking about that difference between nuclear materials and radioactive materials. We would be authorising much more likely radioactive materials—the isotopes on the nuclear side of things, the uraniums and thoriums and so on. It is a bit less common and they are usually much smaller volumes—not particularly significant, generally.

Ms TAYLOR: So therefore every practice would get checked at least once? And I am not criticising you, I am saying you only have so much capacity, so I am just seeing how you—

Ms SKILBECK: We will be a bit shy, if you do not mind, about the absolute frequency by classes, because the expectation of inspection is very useful in maintaining compliance. But, yes, it does certainly vary, and it will vary from per annum to once every several years.

Ms TAYLOR: And the only other thing I was just going to say is even if a practice practices well, and there will be governance principles within that, there is always the possibility of human error, isn't there?

Ms SKILBECK: Absolutely, yes.

Ms TAYLOR: That is a risk factor as well.

Ms SKILBECK: That is right.

Ms TAYLOR: I am just saying when we are dealing with dangerous substances there is always that element.

Ms SKILBECK: Yes, and that is why the incident reporting regime overlays with our proactive regulation. Making sure that incidents are reported is a really important part of what we do. As you can read in the annual report tabled in Parliament, we then document them all, and from those there is another overlay to the risk profiling that we do. If we start to see changes in trends in where the incidents are coming from, that will also direct some of our particular actions.

Mrs McARTHUR: Do you charge those you are regulating, and is it on a cost-recovery basis?

Mr CLEAVES: As good public servants, of course the answer is yes. Radiation last financial year was just over $3 million in revenue. There is a scheme. Essentially it is broadly based on the higher the risk, the higher the fee, and the more X-ray units that you have, you will pay a higher fee—it is per source. Or the bigger the activity of the radioactive source, you will pay a higher fee.

Ms SKILBECK: I will put my old Treasury hat on for a tick. Because it is a regulatory function, all those fees go straight into the Consolidated Fund. It is not the source for our funding.

Mrs McARTHUR: Oh, that is a shame.

Ms SKILBECK: It is, although I am kind of enamoured with the public finance principle that we should not have an incentive to charge people more. It is a public good what we do, but it is also not full cost recovery for that reason. There are a lot of participants who we could not charge in full.

The CHAIR: The fees you would be charging would not be sufficient to cover your costs anyway, would they?

Ms SKILBECK: I think we do all right on occasion.

Mr CLEAVES: Yes.

Ms SKILBECK: In the State's accounts, if the Consolidated Fund looked at our revenue—I do not think we even report our full cost to them—we would be swings and roundabouts, Chair.

Ms BATH: On that, you would have a discussion with industry in relation to that, or do you just say, 'Here's our fees'?

Mr CLEAVES: Again, one of the challenges in radiation is that there is no one body; there are many bodies. There are many different sectors, so therefore many different groups, so we tend to consult with those individual groups rather than one overall—

Ms SKILBECK: If we are changing our fees by regulation, there is a formal regulatory impact statement process that applies here. So we will pick those groups but also try to publish widely.

Ms BATH: Consultation-appropriate.

The CHAIR: Is there a radioactive processing plant, like Lucas Heights in Sydney, for example, for medical stuff, in Victoria?

Ms SKILBECK: No.

The CHAIR: Someone mentioned that to me earlier in relation to when we used to produce carbide in Victoria they used to—

Ms SKILBECK: Oh, okay.

Mr CLEAVES: There are some sites that make small amounts of radioactive material using a thing called a cyclotron, so it is an electrically powered device that produces small amounts that are used in things like PET scanners, if people have heard of that type of medical device. We are talking very tiny amounts. The reason it has to be local is, again, it is short lived and you have literally got to get it into the patient, or into the equipment, in very, very short times. So they are often either located right in a large medical hospital or very close by. There are two, I think, facilities that take radioactive material that they have purchased from Lucas Heights and then use that to make a different type of radioactive material that is used in radiopharmaceuticals. I do not think it is necessarily the thing that you were talking about, but that is the closest we have got to it.

The CHAIR: Excellent.

Ms TAYLOR: So the onus is upon the particular practice to report—if they are not within a certain higher risk matrix—if there is an incident. I get that there is an incentive for one's own health to do that, however human beings are human beings. I am just clarifying that there is an onus on that practice to self-report.

Ms SKILBECK: Yes. So it is mandatory for all, regardless of their risk profile, licensed providers to report any incidents, and the incidents are defined. It is an inherent challenge of regulating anything. That is where the alchemy of Noel comes into play; if we suspect, given the pattern of incidents, that some people are not reporting, our inspection program would alter accordingly. Just as much as seeing an outlier in a significant number of incidents, no incidents at all for something that is inherently risky is also suspicious.

Mr CLEAVES: That is exactly right.

The CHAIR: On that note, Ms Skilbeck, Dr Bone, Mr Cleaves, thank you very much for your contribution to this Inquiry, and thank you for the work you are doing on our behalf.

Ms SKILBECK: Thank you very much.

Mr CLEAVES: Thanks for your time.

The CHAIR: We really appreciate it. A copy of the transcript will be sent to you, so if you have any corrections, please do that.

Witnesses withdrew.