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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WITNESS

Dr John Kalish, Assistant Secretary, Australian Safeguards and Non-Proliferation Office *(via teleconference)*.

The CHAIR: I declare open the Environment and Planning Standing Committee public hearings. All mobile phones should now be turned to silent. I will extend my welcome to you, Dr Kalish. The Committee is hearing evidence today in relation to the Inquiry into Nuclear Prohibition, and the evidence is being recorded. All evidence taken at this hearing is protected by parliamentary privilege, as provided by the *Constitution Act 1975*, and is further subject to the provisions of the Legislative Council standing orders. Therefore the information you give today is protected by law; however, any comment repeated outside this hearing may not be protected. Any deliberately false evidence or misleading of the Committee may be considered a contempt of Parliament. You will be provided with a proof version of the transcript in the next few days. We have allowed 5 to 10 minutes for you to give us an overview, and we will then go to questions. It is all yours, Dr Kalish. Do you want to give a bit of an overview about the state of affairs of the nuclear industry in Victoria? It is over to you.

Dr KALISH: Thank you very much. And thank you for giving me the opportunity to appear before the Committee. Just to clarify, my name is Dr John Kalish. I am the Assistant Secretary in the Australian Safeguards and Non-Proliferation Office, and I will provide some opening remarks to clarify exactly what our role is in relation to nuclear activities in Australia and globally.

So the principal focus of the Australian Safeguards and Non-Proliferation Office—ASNO, as I will call it for short—is on international and domestic action to prevent proliferation of nuclear and chemical weapons. So we have a dual role, both nuclear and chemical. And there was an Act in 2003, the *Non-Proliferation Legislation Amendment Act*, which consolidated the offices of the national authority for nuclear safeguards, associated with our responsibilities under the Treaty on the Non-Proliferation of Nuclear Weapons, the NPT; the national authority for the Chemical Weapons Convention; and the national authority for the Comprehensive Nuclear-Test-Ban Treaty, under a single title, the Australian Safeguards and Non-Proliferation Office. So there were three separate things initially, and they were brought together by this legislation. And the current Director General of ASNO is Dr Robert Floyd, who is not able to appear today before the Committee. So I am representing the office in this case.

And you should be aware that the Director General of ASNO is a statutory appointment, although the office itself is funded by staff that receive resources from the Department of Foreign Affairs and Trade. The Director General reports directly to the Minister for Foreign Affairs. And we work closely with a range of other areas in the Department of Foreign Affairs and Trade, notably with the department's international security division, and they have a lead with Australia's non-proliferation and arms control policies.

One of the most important acts under which we operate is the *Nuclear Non-Proliferation (Safeguards) Act 1987*—for short, the safeguards Act—and that forms the basis for ASNO's nuclear regulatory activities. And some of the things that are covered in that Act include our implementation of a bilateral agreement that we have with the International Atomic Energy Agency, the IAEA, in relation to safeguards. So we have what is known as a bilateral safeguards agreement with the IAEA.

And we also, under this Act, are required to carry out regulation in relation to physical protection—or you might call that nuclear security—on nuclear materials and facilities that are being used for nuclear purposes and for storage and transport. So all those things are subject to various requirements in relation to physical protection. And we also have a responsibility to fulfil Australia's obligations under 25 bilateral nuclear cooperation agreements that we have with 43 different countries. And much of this work under these agreements relates to industry that exports uranium or a concentrate to many other countries throughout the world.

We use internationally respected rules and guidelines set out by the IAEA as our basis for national regulation, and we implement it through the safeguards Act. And one of the things that we do is we license and inspect Australia's uranium mines; the Australian Nuclear Science and Technology Organisation's OPAL research reactor, so ANSTO's OPAL research reactor; and other possessors of nuclear material, including government departments, CSIRO, universities and industry. So we license many of these entities.

For nuclear safeguards, ASNO is responsible for what is known as Australia's state system of accounting for and control of nuclear material, and this is something that is established under IAEA guidelines. And as part of that we carry out inspections of nuclear facilities in Australia and areas holding the material.

We also facilitate inspections that the IAEA carries out in Australia several times a year, and we engage in other, what we call, verification activities in relation to IAEA obligations. One of the things that Australia has achieved through this series of nuclear safeguards is what is known as the broader conclusion, and that is in relation to the IAEA's criteria on the peaceful use of nuclear material. What this does is it verifies that all nuclear material and facilities in Australia are being used for peaceful purposes and there is no diversion of nuclear material. It also confirms that our declarations that we make annually are correct and complete. That is the nuclear safeguard side of things.

In terms of nuclear security, there are two main threats that we consider in relation to nuclear materials and facilities—neither are probably really obvious intuitively. And that is nuclear sabotage—so there is a plausible event where nuclear sabotage could take place, and of course there would be a consequent release of radioactive material—and the other key aspect in relation to nuclear security is the possible theft of nuclear material for the purposes of ultimately constructing a nuclear explosive device. We engage with nuclear facilities in relation to security requirements, and we use a risk-based, graded approach to prevent and mitigate these threats.

One of the things that is probably important to the Inquiry's main question is: unlike other domestic legislation the safeguards Act does not prohibit the granting of permits to establish or operate a nuclear power reactor in Australia, but Australia's regulatory regime as it currently exists in relation to nuclear safeguards and nuclear security is designed for Australia's current nuclear footprint, and some minor revisions would be required to meet an expansion in Australia's nuclear activities. So these are some changes in the way the legislation operates and the size of the organisation.

We feel, and I think we can say that globally it is recognised, that Australia is a leader in nuclear safeguards and nuclear security. In fact for many years we have been ranked number one, or equal number one, in terms of nuclear security on a global index of nuclear security. Given some changes to the legislation and increased resources, we would be able to meet the challenge of regulating an expanded nuclear industry. I will finish my comments there, and I am happy to receive any questions you might have.

The CHAIR: Thank you, Dr Kalish. It is Cesar here. The comments you made were that the Act does not prohibit nuclear power or energy being established. Did I hear you correctly?

Dr KALISH: Yes. The Federal prohibitions of course exist under the EPBC Act and the ARPANS Act, the *Australian Radiation Protection and Nuclear Safety Act*.

The CHAIR: So if company A decided to construct a nuclear power station, for example, you are saying there is nothing in the Act prohibiting them from doing that, or will other Acts come in to override that?

Dr KALISH: Other Acts would come into play, so our Act does not specifically deal with that instance.

The CHAIR: Right. Yes. One last question from me, and then I will go to the rest of the Committee. In what ways would nuclear power generation from small modular reactors and generation IV, I think it is, technology interact with Australia's stance on non-proliferation and our current commitment? Would that have any impact on that?

Dr KALISH: Certainly small modular reactors would be identified as a nuclear facility, and we would be required to comply with our International Atomic Energy Agency bilateral safeguards agreement requirements, and that involves a range of safeguards activities that are well established, not specifically for small modular reactors, but certainly those could be implemented.

The CHAIR: One last question from me: what, if any, oversight responsibility would ASNO have in relation to the recently announced radioactive waste facility in South Australia? Can you sort of take us

through that? Where it is at and what sort of oversight you have in place and your thoughts on where we are at with it.

Dr KALISH: Sorry, there is some noise in the background. You said the waste facility?

The CHAIR: That is right. The radioactive waste facility in South Australia. I think the Minister made some announcement in relation to that I think a month ago or a couple of months ago. What sort of oversight responsibility will your organisation have in relation to that?

Dr KALISH: We would play a role in the facility to the extent that the facility contained or would be likely to contain in the future nuclear material. There is a specific definition of 'nuclear material', and that would include things that contain uranium, thorium and plutonium. Based on discussions that have been going on it is almost certain that this facility would include some nuclear material with a low level of radioactivity. And that material in the facility would be subject to international atomic energy safeguards and verification activities such as inspections. ASNO would play a role in ensuring that that material was adequately safeguarded so it could not be diverted and that it was also subject to adequate levels of physical protection. It would also work with the IAEA to facilitate inspections in addition to any inspections that we might organise on our own behalf.

The CHAIR: Thank you. I will turn now to the rest of the Members.

Ms BATH: Thank you very much, Dr Kalish. Thank you for your contribution today. You mentioned in some of your opening remarks that your role is to inspect nuclear facilities in Australia. I guess I would like a snapshot of what they are, how many there are. Large or small? Is this just in relation to mining or what other entities are there?

Dr KALISH: There are different types of inspections. There are safeguards inspections that seek to confirm that declarations of nuclear material are accurate and that the nuclear material has not been diverted so that it is still in place, and there are also physical protection or security-related inspections. Now, the inspections that we carry out in relation to safeguards are carried out by us, ASNO, but also by the International Atomic Energy Agency as an independent verification mechanism that ensures global confidence in our declaration of nuclear materials. We have annually several inspections from the International Atomic Energy Agency, and they may include inspections of the OPAL research reactor at Lucas Heights run by ANSTO. For example, they would look at the amount of fuel in our declaration—how much nuclear fuel has been identified as being present at the facility and in the reactor—and then they would seek to verify that those numbers were accurate by actually directly inspecting and/or measuring the fuel in the facility, in the reactor itself and in storage. They would also consider other locations where material has been stored on a long-term basis that may include nuclear material. So it could be a storage facility where there is a cask of radioactive material stored, or it could be a facility where small amounts of material is stored for research purposes.

These inspections are carried out by the IAEA but also we, from time to time, will carry out inspections of ANSTO. The International Atomic Energy Agency also has the ability and the right to carry out inspections at very short notice. Literally with less than 24 hours notice they indicate they are in the country and would like to inspect the facility, and they can then go and confirm with very little notification the declarations that we have and the placement of the materials in that facility. So that is something that happens there at least a few times a year.

In addition, as the facility grows there are inspections that look at the development of new facilities at Lucas Heights. For example, they are developing a waste treatment plant, which is based on a synroc process, and that is linked to the nuclear medicine facility. As this facility is being constructed the International Atomic Energy Agency inspects it to confirm that it is being designed as per the design plan, and that way they can ensure that there is no inbuilt mechanism where, for example, material could be diverted in a clandestine way. So there are a range of inspections and steps that are taken.

We also have inspections of CSIRO facilities that might have nuclear material, universities and also private businesses. From time to time inspections will also take place at uranium mines. For example, some of these uranium mines, like the Olympic Dam mine, will contain large quantities of nuclear

material—uranium ore concentrate—in drums prior to shipping, and inspections can take place of that material to ensure the quantities are consistent with their declarations but also to ensure that that material is under adequate levels of physical protection. Again, certain types of inspections are carried out by the IAEA, and some are carried out by ASNO.

Ms BATH: Thank you. Can I have just one more? Thank you for that very fulsome response. You mentioned also that Australia has the nuclear security rating of number one on the global concern, which is very reassuring. Is it actually a real threat that at a facility or at a mine entities would come to seek to steal? Is this something that you have your radar on?

Dr KALISH: Certainly we have classified assessments regarding the likelihood of various events, and we develop a graded response—a DBT; design basis threat response—that is based on that information. Certainly it is plausible, and there have been public instances where there were potential threats to ANSTO identified in the past, and certainly we need to ensure that those facilities are protected from any such threats. Even if a small quantity of nuclear material were stolen from a facility and used, for example, in something called a dirty bomb, this would be something that would be of great concern to us of course but also the general public. So we need to ensure that we are fully protected against the possibility of such events.

Ms TAYLOR: This might not be the right question for you, and I am happy to defer to another question which I would like to ask instead if it is not appropriate. You are talking about theoretically diffusing risk with these small modular reactors in terms of a potential risk of proliferation and so forth, if I am interpreting that correctly. How many of these are commercially active now around the world?

Dr KALISH: Well, that in some respects depends on your definition of a small modular reactor. There are very few. There are no, for example, small modular reactors that are licensed for operation in North America, although they are under development, and one is planned for deployment in the next 10 years. Reactors are constructed by a company called NuScale, based in Oregon in the United States. Other countries are developing small modular reactors, but none have been developed that are designed for broadscale commercial deployment. The Russians do have what they classify as small modular reactors on vessels—seagoing small modular reactors. They are based on models used for maritime reactors—maritime propulsion reactors. Those have been used in remote locations by the Russians. These are not commercially available, but they have been deployed. This is something that is in the future and is likely to happen in the future. Exactly how widespread they will become in the short term is hard to predict.

Ms TAYLOR: Fair enough. If I could have one more question. Therefore, when we are assessing the risk regarding non-proliferation, it is really about a hypothesis of a commercial entity that really is not in play yet. Even if there are longer term plans, it is really at a hypothesis stage.

Dr KALISH: I think I would not quite use those terms, because there are some reactors, for example, in operation—some generation II reactors—that are relatively small and they in some respects would meet the footprint of a small modular reactor but they are not based on the design principles that are being used in more modern small modular reactors. One of the things that we do is to implement safeguards by design. Modern reactor development uses a principle where the reactor is designed and built so that a high level of nuclear safeguards can be assured. In other words, as these reactors are being planned in various countries, including the NuScale reactor in the United States, safeguards experts are engaged in the development of the reactor and confirming that a certain design aspect of the reactor will be amenable to effective and efficient nuclear safeguards. So the reactors, when they go into place, will already have a protocol established for safeguards. This is something that is part of the planning and design.

When these reactors go in within the next 10 years they will be inspected before they are completed to confirm that there are no potential diversion points or loopholes in the design. For some recently designed reactors or built reactors, for example the ones in the United Arab Emirates, which have just been completed—there are four; these are large AP1000 reactors—they have been inspected on an ongoing basis by the International Atomic Energy Agency as they have gone in, and the same would happen with small modular reactors. So it is well beyond hypothesis.

Ms TAYLOR: Even though they are not commercially available right now?

Dr KALISH: Even if one goes into the United States—a NuScale reactor—as a demonstration reactor, it still requires the capacity to be safeguarded.

Ms TAYLOR: Sure. But they are not commercially available now. I am just looking at how current they are—whether it is right now, ready to go, 100 around the world, or they are still in the development phase. That is what I am seeking.

Dr KALISH: Yes, they are still being developed.

Mr LIMBRICK: Thank you, Dr Kalish. I had a couple of questions about Victoria specifically. Firstly, what type of monitoring operations currently does ASNO do in Victoria, if you could give us an idea on that? And secondly, if hypothetically the *Nuclear Activities (Prohibitions) Act* in Victoria was repealed, what is your confidence level of ASNO to be able to expand monitoring operations to any other nuclear activities that might happen in Victoria?

Dr KALISH: Now, in terms of verification activities, safeguards activities and security activities in Victoria, I cannot give you an exact number, but certainly there are a number of facilities—think of universities—that maintain nuclear material. The CSIRO also hold nuclear material, albeit in very small quantities. Those facilities would be subject to inspections in both the safeguards and physical protection sphere. So we are engaged in Victoria to that extent. Of course there are no nuclear reactors in Victoria. The only research reactor in Australia is located in New South Wales, so that is obviously one of our major focal points in terms of inspection activity. So there is some inspection activity. If Victoria were to increase its nuclear footprint, then of course we would be able to meet that either through an increased rate of inspections by ourselves and/or the IAEA.

Mr LIMBRICK: I noticed that you did not mention nuclear medicine. I know that there is a lot of nuclear medicine activity happening in Victoria. Is that through a different regulator, or how does that work?

Dr KALISH: Nuclear medicine product—technetium-99 is the product that is actually used on the patients and produced at ANSTO—is a radioactive material. It does not contain any nuclear material, but the production of that isotope requires nuclear material. So when it is in the reactor at Lucas Heights they use uranium, and when the uranium is irradiated it splits—it fissions—and produces molybdenum-99 and technetium. The nuclear medicine product that goes from New South Wales to Victoria is a fission product of uranium but not what globally would be called a nuclear material. So it is not subject to our nuclear safeguards and security agreement. Of course it would be subject to control by ARPANSA, which is responsible for radiation safety and protection.

Mr LIMBRICK: Okay. Another question regarding our uranium exports: it is my understanding we export, I do not know, approximately 10 000 tonnes a year of uranium concentrate. What sort of verification activities does ASNO do to ensure that those exports are used for peaceful purposes?

Dr KALISH: This is one of the major activities we engage in. I think last year we exported about 7500 tonnes of uranium ore concentrate to a range of countries throughout the world, including Canada, the US, several countries in the European Union, China—I think Japan has cut back a bit—and the Republic of Korea. We inspect uranium mines, and I have already mentioned that we do that in relation to ensuring that the material is secure and that the quantities of material that are there are consistent with the logbook information that they maintain. So we verify that directly.

We also work closely with our nuclear cooperation agreement counterparts in other countries—counterpart agencies and departments in other countries—to verify the amount of nuclear material that is present in those countries that is what we call Australian obligated nuclear material, or AONM. When we send uranium ore concentrate to another country, we call that Australian obligated nuclear material, and that country picks up an obligation to report in relation to the disposition of that material, including the form that it is in and where it is located within their nuclear infrastructure. We get those data in annual reports, and those annual reports are reflected in the Australian Safeguards and Non-proliferation Office annual report. We seek to, on many occasions, corroborate the information that is sent to them by having bilateral meetings with those countries in relation to the disposition of that nuclear material. I should mention that

you can get that information from our annual report, as I mentioned, and that can be found at www.dfat.gov.au/asno. Then if you look for annual reports, you can find that information.

Mr LIMBRICK: Thank you, Dr Kalish. One other question. It is my understanding that lots of mining activities produce uranium and thorium by-products inadvertently as a result of their operation. At what point does that become something that ASNO would monitor? Is there some sort of threshold, or how does that work exactly?

Dr KALISH: I will not get into the technical details, but we work with our counterparts in other departments in relation to exports of material that is not uranium ore concentrate—so not a specific uranium export but maybe, for example, a zircon sand, a sand that can be used to produce zirconium. That sand may, on some occasions, contain significant quantities of uranium and thorium. We are talking about exports in the hundreds of thousands of tonnes. So even if it is a small quantity of uranium and thorium—and we have a threshold of 500 parts per million—then we evaluate the destination of that material and the likelihood of diversion, and in some cases an end-user agreement is required to ensure that that material will be used solely for the zirconium and that any waste stream that would include the uranium and thorium would not be sent to a processor where the uranium and thorium would be removed. There are some occasions where in fact the waste stream is sent to another party for removing uranium and thorium, and we have a direct oversight with the relevant partner countries regarding where that material goes and the quantity that is extracted. That is something that is looked at in some detail, and as you suggest, there are a range of mining products that might contain uranium and thorium.

Ms TERPSTRA: Thank you, Dr Kalish, for your contribution this morning. It is Sonja Terpstra here, Member for Eastern Metropolitan Region. I just wanted to ask you in regard to safeguards what your view might be on what might be non-negotiable regulatory safeguards around nuclear?

Dr KALISH: In terms of safeguards in Australia broadly, or with individual entities, individual companies, in Australia?

Ms TERPSTRA: In Australia.

Dr KALISH: We have a system of permits that outlines a series of requirements in relation to reporting and inspection, and those are not flexible. We evaluate risk. Individual permit holders may have very small quantities of material. So in that case we have permit requirements that vary somewhat. For example, if a permit holder holds, let us say, 10 kilograms of depleted uranium in a radiography camera, their requirements for inspection and reporting are somewhat different to those for the Australian Nuclear Science and Technology Organisation, which holds kilograms of uranium-235. Those requirements are strictly laid out in permits, with a risk-based approach to those permits, but beyond that those requirements are not flexible.

Ms TERPSTRA: And in your view what would there be in terms of a regulatory regime that would be non-negotiable to ensure safeguards and public safety? Have you got a view on that? What would be non-negotiable in a regulatory framework?

Dr KALISH: Certainly we need to comply with all our requirements under the bilateral agreement with the International Atomic Energy Agency, and that comprehensive safeguards agreement has a very detailed schedule of reporting requirements in relation to different types of nuclear material, nuclear technology and nuclear facilities. So those things are not negotiable, and that also would include verification of those declarations or the development of any facility, which involves, among other things, inspections by both ASNO and the International Atomic Energy Agency, including potentially random inspections.

Mrs McARTHUR: Thank you, Dr Kalish. There are now currently numerous nuclear energy facilities around the world. Can you tell us of any thefts that have occurred from those facilities of the product?

Dr KALISH: I do not, off the top of my head, have any detailed knowledge of theft from facilities, but certainly facilities have been attacked with the intent to steal material. A very well known example took place in South Africa I think a couple of decades ago now. So this is something that is plausible, but how that material might be used of course by an actor—state actor or non-state actor—is not clear. But I do not

have information on the top of my head of any specific theft of material from facilities. Occasionally material does crop up—small amounts of uranium ore concentrate or small quantities of material—but exactly where it has been stolen from is often difficult to determine, but not necessarily from nuclear power facilities. One of the issues with—I think you were talking about nuclear reactors—nuclear power facilities is when they receive their uranium it is in the form of fuel elements. In many cases that means that it is in the form of sintered fuel pellets that are installed within zirconium rods in larger fuel assemblies. Actually physically moving one of those assemblies is difficult. They weigh many tonnes individually, and then how the uranium could be used is also, well, questionable. Finally, once the material is removed from the reactor after it has been used to generate power it is highly radioactive and goes into a storage pool facility for a period of time while its radioactivity level declines. Theft of material from such a facility is obviously very, very dangerous.

Mrs McARTHUR: Dr Kalish, in your opinion, would you consider the nuclear reactors that are producing energy in other parts of the world safe?

Dr KALISH: I do not think I am going to comment on the safety of reactors generally. I think there is a varying level of safety at different facilities, and that is something that you would be better off asking ARPANSA, who deals with nuclear safety. As I mentioned, we deal with nuclear security and nuclear safeguards. But of course older reactors, in many cases, are not considered as safe as new reactors, and reactors that are being built now are designed to have increased levels of safety built into the design. And this is obviously something that has been learned from experience.

Mrs McARTHUR: Thank you, Dr Kalish. Finally, would you consider the Australian regulatory framework conducive to having a secure nuclear facility, and would there be any regulatory reforms needed to be introduced to ensure that a nuclear facility is both functional, safe and secure?

Dr KALISH: Again, I will keep my comments to the security and safeguards aspect of it. I have already mentioned that our nuclear safeguards Act has the capacity to regulate a nuclear power facility as it currently stands, but it would be more effective with some refinement. Also it would be a requirement for increased capacity in terms of human resources to carry out those enhanced activities, but certainly it is not beyond the capacity of what we are able to do.

The CHAIR: Any other questions? Mr Hayes, Deputy Chair, joined us earlier. Dr Kalish, thank you very much for all the evidence you provided to the Committee. It has been a worthwhile exercise to give us an update as to where things are at in relation to the role ASNO plays in Australia. So we appreciate your time and your evidence. A copy of the transcript will be sent to you in the next few days, so if you discover any errors, please let us know. Otherwise it will be published as stated. Thank you very much, and stay safe.

Dr KALISH: You are welcome, and I wish you all the best for the rest of your Inquiry.

Mr LIMBRICK: Thank you very much.

Witness withdrew.